

Congress Theme

The Decade of Education for Sustainable Development (ESD)

The Quest: a vehicle for integrated learning

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Introduction

Most young learners of the 21st century in Australia who visit our Botanic Garden live in a very different and rapidly changing world to that of their predecessors. They are immersed in a visually and auditory rich world that is fast paced and socially connected. Increasing woven through their lives are new digital technologies that unleash a torrent of data and information but not necessarily wisdom. The challenge for Botanic Gardens and similar learning institutions like zoos, art galleries and museums is: how can we can compete with their virtual worlds and deliver engaging programs in the real world that capture their attention and their imagination?

How can we build programmes around the intrinsic interests of young people? In many ways the fundamentals of age-related developmental interests have not changed too much. The soap-opera entertainment genre is still ever popular with its classic story lines of love, mystery, danger and romance. Social networking is very high on the agenda: just look at the popularity of Facebook and mobile texting. Electronic gaming with its ability to create imaginative virtual landscapes and scenarios coupled with interactivity is increasingly a part of day-to-day leisure time activity.

In trying to connect more effectively with young people we have looked at developing programs that in some way combine these elements in different ways so that the learning is a more immersive, interactive, imaginative, and collaborative and therefore a more lasting experience. We have used different quest simulations in the form of an adventure, a journey, a mission or challenge to engage and immerse young people in learning. The simulations vary in complexity depending on the audience, visit time available and the Garden's built and planted landscapes.

Fundamental attributes of this approach include:

- A license to imagine – one of the most powerful motivational tools.
- Learning that resonates – feeds of the intrinsic, age related interests.
- Inclusive of different learning styles – takes into account the multiple ways different people learn best.
- Integrated learning – seeing the curriculum as a whole unified learning universe, rather than quarantined separate components.

Greek Odyssey – a quest project

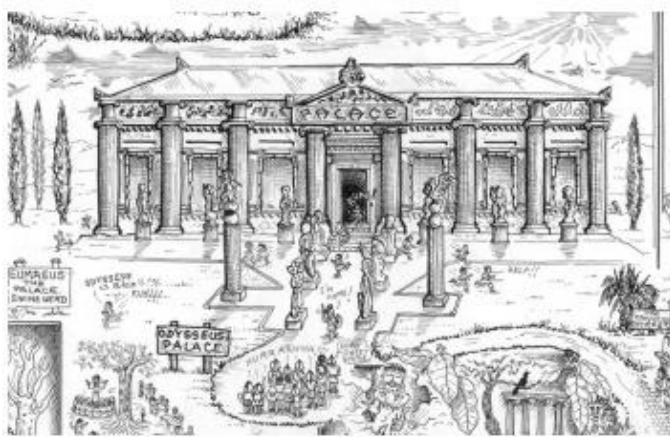
A Greek Odyssey was a major collaborative project created using the quest model. It was developed collaboratively following an approach by local Greek language teachers who wanted an activity trail in our Garden to help students learn about Greek language and culture. After much discussion and the sharing of ideas a Greek Odyssey quest simulation approach was agreed upon because of its potential to widen the creative, motivational and learning opportunities of students.



The odyssey begins...



Enjoying the journey...



The palace of Odysseus



Escaping the labyrinth

“The Odyssey is one giant action adventure, combined with a super sized ‘soapie’ featuring Gods, heroes, villains, magic and mystery all woven together into one colossal story.”

At school

The Greek Odyssey begins at school with students set the challenge of writing their own version of a Greek Odyssey that includes the uses, myths and symbolism of 14 Greek plants found in the Garden. To help them with this task, students visit the Garden that has been transformed into an ancient Greek landscape, courtesy of a highly detailed, cartoon style ancient scroll map.

“On your Odyssey ... explore the Garden, gather information, improve your Greek and use it to help you write your own odyssey back at school.”

At the Garden

Once at the Garden students take on the character of the hero Odysseus, as they would an avatar in the digital world. Starting at the Gates of Troy (our Friends Gates) they embark on their Odyssey adventure in search of the Palace of Odysseus (our Attic Greek-style Museum of Economic Botany).

“As you enter the garden gates, farewell Troy behind you and begin planning your Odyssey Adventure.”

“Just like Odysseus your adventure finishes when you arrive home at the Palace of Odysseus in the heart of the Garden.”

While on their adventure students are encouraged to practice their Greek language skills as they collect and share plant information, ideas, ancient myths and images for writing their own odyssey back at school. There are numerous pre-and post-visit activities included to enrich student’s odyssey storyline development. Teachers are able to readily adapt the material for non-Greek speaking students.

Greek Odyssey booklets

To support the simulation, a Greek Odyssey has been published at three differing learning levels. Each level consists of:

Plant information pages

Each of the 14 plants along the trail has a page of interesting Greek stories and information written in web-friendly, short discrete paragraphs. Much of the information is useful for students when developing their own odyssey at school after this excursion.

Activity pages

Each plant along the trail has an activity page that provides opportunities for students to practise Greek language skills with an emphasis on environmental- and sensory-related vocabularies.

Ancient Scroll

The Ancient Scroll is an engaging cartoon style map that traces your route through the Garden as if you were on an odyssey through an ancient Greek landscape. The scenes, stories and landmarks depicted in the Scroll relate directly to the plant stories and Garden features and have been given Greek identities and names.

Ancient Myth Cards

The plant myths for each plant provide a rich source of stories for exploring the culture, beliefs and history of ancient Greece. Students are encouraged to dramatize them and present them to the rest of the class while in the Garden.

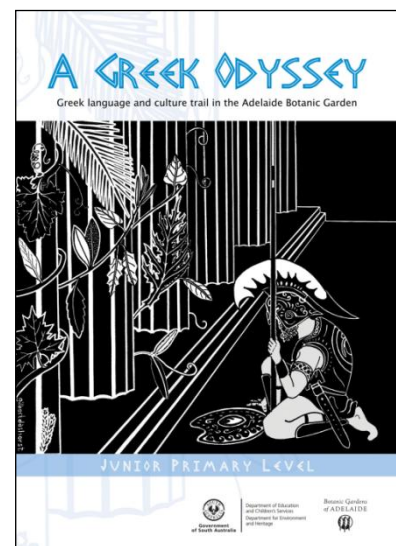
The booklets are available for download at: www.botanicgardens.sa.gov.au/education.

Quest benefits

Turning a visit into a quest or a mission rather than the more traditional teaching of a learning topic has had significant benefits for student motivation, engagement and ongoing learning post garden visit.

The quest approach provides a rich narrative for learning about the language, culture and environment of others through plants. It has also provides a diverse information palette for students to engage in literacy by developing and presenting their own version of a quest story when back at school.

The Greek Odyssey program attracted teachers who rarely, if ever, see the relevance of botanic garden’s to their teaching subject and by doing so provided a vehicle for integrating plants and the environment into the wider curriculum. One school has adapted an Italian version thereby turning it into a ‘Journey to Pompeii’



for Italian language students. A local performer has created a theatrical version of the trail in the Garden that was a hit as a part of a recent children's arts festival.

One participating teacher summarized the power of this approach to learning:

“ As the students participated in the activities, they came to see that, despite the centuries that separate us, that we speak another language and present ourselves a bit differently, we have very similar needs and experiences to those who lived in so many years ago.”

The quest approach has provided a motivational framework that highlights how botanic gardens can contribute to a greater understanding of how others live and view the world, past and present. In particular it makes the importance of the natural world clearer and more relevant when the threads of people, plants, culture and environment are drawn together into a complete integrated picture, reinforcing connectedness and sustainability.

Formal learning experiences in a Botanic Garden can take many forms depending on the purpose of the visit. Beyond providing facts and information is the importance of framing learning experiences that have the potential to create personal memories, values and attitudes that students take with them long after their visit. Using simulations and challenging scenarios as a vehicle for learning immerses students in an imaginative world that has the power to delight, motivate and encourage a life long learning and interest in plants.

A journey through time: the story of evolution brought to life

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Much has been written about the role of botanic gardens. Willison (2008) emphasises that they have never been so relevant to society as they are now, given the unprecedented environmental changes and increase in urbanisation. Maunder (2008) highlights the need to create landscapes and gardens that are attractive, vibrant and welcoming, as well as becoming sophisticated business entities. In 2005 the University of Bristol created a new Botanic Garden for the 21st Century focusing on evolution. Central to this project has been the creation of four core collections with the Evolution Collection being the largest and most important.

This paper reports the development of the Evolution Collection from its original concept and explains how the project enables the garden interpreters to interact with visitors: not only describing evolution and climate change, but also explaining the importance of conservation and natural history. A key element of the Evolution Collection is the Evolution of Land Plants Display (in the 'Evolutionary Dell'). This charts the most important stages in the evolution of plants on land, from green algae to flowering plants. Plants which particularly fascinate audiences as they have special stories to tell such as cycads, ginkgos and the Wollemi pine are critical to this display. Another core element of the Evolution Collection is the Angiosperm Phylogeny Display which explains the evolutionary relationships and classification of flowering plants inferred from comparisons of their DNA sequences according to A.P.G. II (Angiosperm Phylogeny Group, 2003). This Display is the first of its kind at a UK botanic garden and its development is summarized here.

Introduction

The University has had a botanic garden in Bristol in the south west of England since 1882; it has moved several times as the University has developed. In 2002, as a result on an estate-wide property review by the University of Bristol, it was decided to relocate the Garden to The Holmes in the centre of the main student residential community. The Holmes was constructed in 1879 and is set in 1.77 hectares of gardens typical of a Victorian family house of that time. Prior to its construction, the land formed part of an extensive Elizabethan park. The botanical collections were relocated in 2005 and have been integrated into the new Botanic Garden, which has been carefully designed to incorporate the best of the existing Victorian landscape which includes many fine trees, whilst providing room for completely new displays connected by an organic flowing network of paths.

The Holmes straddles the transition zone between two very different geological formations. From the dell northwards is Devonian Old Red Sandstone (370 millions years old), while underlying the majority of the garden to the south is Lower Carboniferous Limestone (350 million years old). It is thought that the dell was originally created as a result of stone being removed for building purposes.

The Core Collections

The relocation of the Botanic Garden allowed a review of the plant collections. After an extensive user study the existing plant collections were reorganised into four core collections now displayed in the new Garden.

- The Evolution Collection: comprising: the Evolution of Land Plants Display (in the 'Evolutionary Dell'), the Angiosperm Phylogeny Display, the Floral Diversity Display, and the New Zealand Display
- Plants of Mediterranean Climatic Regions: featuring displays of plants from the Mediterranean Basin, the Western Cape region of South Africa, southern and western Australia, central and northern Chile and western California

- The Rare and Threatened Native Local Plants Collection: home to the native flora of the Bristol area and the south west peninsular of Britain
- The Useful Plants Collection: displaying the European and Chinese Medicinal Plant Collections.

This paper describes how the Garden has developed its evolutionary collection to assist it in achieving the Communicating and Educating target (Target 14) of the Global Strategy for Plant Conservation (GSPC). The importance of plant diversity and the need for its conservation is being incorporated into communications, educational and public-awareness programmes. The literature researched in designing the Garden included that dealing with the role of, and problems with, interpretation; children's attitudes towards botanical gardens; Wandersee and Clary's (2006) theory of 'plant blindness' and the importance of 'marquee plants.' The paper finishes with an example of how Target 14 is being met through the Garden's 'Darwin 200 Season'.

The Evolution Collection

This Collection comprises the Evolution of Land Plants Display (in the 'Evolutionary Dell'), the Angiosperm Phylogeny Display, the Floral Diversity Display and the New Zealand Display.

The Garden has an evolutionary theme throughout. Honig (2000) proposes that themes make it easier for the audience to follow and understand. Also, people remember messages, not facts. Themes provide focus and help to organise the subject material and give it structure.

Evolution of Land Plants Display (the 'Evolutionary Dell')

'You change people by delight. You change people by pleasure' said St. Thomas Aquinas, the thirteenth century philosopher, cited in Edwards (2000). Aquinas understood that giving people a pleasant experience is more likely to put them in the mood for receiving some new ideas or information. As one enters the Evolutionary Dell, images of 'The Lost World' and 'King Solomon's Mines' spring to mind. The Evolutionary Dell has been designed to enable visitors to walk through millions of years of evolutionary history, from some of the earliest life forms to the more familiar flora of the present day. Plants are placed according to the earliest appearance of their peer groups in the fossil record. An added interest to geology enthusiasts is that the rocks found in each section data from that period, as a solid testimony to conditions at the time.

The first plants to be seen by visitors as they enter the Evolutionary Dell are a collection of mosses, inter-planted with liverworts, which represent plants that first colonised the land in the early Devonian period some 400 million years ago. While today's mosses are probably different from the species of long ago, we can still get a sense of how these plants would have appeared at that time. In the Devonian period the first vascular plants appeared and some, like the giant Lycophytes (clubmosses), reached heights of up to 40m and widths of 2–3m during the Carboniferous period (290–360MYA). Visitors are amazed to learn that today's clubmosses are the tiny cousins of these giant Carboniferous counterparts. A fallen oak tree that traverses the Carboniferous section of the Evolutionary Dell has been deliberately left as a sculpture to represent the size and magnificence of these clubmoss giants. To add to the atmosphere of a prehistoric world, a number of small pools have been created near the entrance to serve as habitats for Sphagnum mosses and algae.

The visitors then see cycads and ginkgos from the Permian, conifers from the Triassic and Jurassic, and flowering plants from the Cretaceous. The Evolutionary Dell climaxes with an explosion of flowering plants including a wonderful collection of magnolias. Children delight in the opportunity to hunt for fossils in the display of rippled stones which represents a prehistoric beach preserved in stone.

A useful concept when discussing interpretation and the Evolutionary Dell is Wandersee and Clary's (2006) theory of plant blindness which they originally defined 'as failing to see, take notice of, or focus attention upon the plants in one's everyday life.' Their research has revealed that providing garden visitors with a paleobotanic (deep-time) perspective of the plants they are viewing and offering simple classification

experiences, can increase the attention to, time spent, and appreciation of plant diversity in living garden collections.

Of even more relevance is their proposition that displays of what they call *marquee plants* can increase garden and arboretum attendance and diminish plant blindness. These plants represent selected specimens that have the ability to draw a crowd because ‘*they are the oldest, largest, smallest, widest, most massive, rarest, most odiferous, rarely blooming and so forth.*’

The Evolutionary Dell abounds with these delights for visitors, young and old, including Australian tree ferns which set the mood for the exploration of the Dell and add a heightened sense of drama; the rediscovered Wollemi pine; monkey puzzle trees (*Araucaria araucana*) and cycads, all carefully planted into the display.

The Angiosperm Phylogeny Display

This Display has been designed to reflect modern theories on the evolutionary relationships and classification of the many families of flowering plants, inferred from comparisons of their DNA sequences. The arrangement of the Display is based on the new A.P.G. II classification system developed by the Angiosperm Phylogeny Group (APG) and is synthesized in the on which the display is based. The paths within this Display take the form of a branching family tree (phylogeny) of the flowering plants starting with the most ancient (‘primitive’) groups, the ‘basal angiosperms’ from which the other major lineages of flowering plants, the monocots and eudicots have diverged. Common, unusual and exotic species are grown in a large display that now places close ancestors with one another in surprising juxtapositions, like the tropical semi-aquatic lotus *Nelumbo nucifera* alongside its close cousin, the London plane tree *Platanus x hispanica* and members of the exotic protea family.

The Floral Diversity Display

The Floral Diversity Display demonstrates the various pollination syndromes that have emerged through time. Plants are grouped to demonstrate pollination by wind, beetles, dung midges, wasps, bees, butterflies, moths, humming birds, Cape Sugar Birds, bats, possums and rodents. Visitors walk through the Display from the earliest extant plant–animal pollination relationships (beetle pollination) through to the more recent relationships of possum and rodent. Plants have been selected to provide the maximum length of seasonal floristic interest. All the syndromes are reinforced by willow sculptures of the pollinators.

Visitors are intrigued at these developments in nature. However, it is important to remember Edwards (2000) description of site interpretation as being ‘*the subtle art of educating people who didn’t come to learn.*’

The New Zealand Display

The New Zealand Display is arranged as a series of habitats, ranging from sub-alpine meadow to forest and scrub. Here many extreme examples of herbivore-evading strategies can be seen, including the divaricate *Corokia cotoneaster* and *Carpodetus serratus*, which together with the lancewood *Pseudopanax ferox* and its associated juvenile foliage, deterred grazing from the giant flightless moa birds that once fed on the New Zealand flora. The combination of extraordinary plant–animal relationship stories and extreme plant morphology captivates visitors and enables guides to convey an evolutionary message in a ‘naturalistic’ setting.

In support of the core collections and to provide facilities for tender plants a 604 sq metre Dutch Venlo glasshouse complex containing five different temperature zones has been constructed. Plants of particular interest to the evolutionary story on display here include the ancient *Sarcandra chloranthoides* and the most primitive flowering plant, *Amborella trichopoda*.

Interpretation

Ballantyne *et al.* (2008) suggest that visitors to botanic gardens have a variety of motives for visiting. They can be separated into different groups and gardens should consider ‘*designing a suite of experiences*’ to cater

for them. The Botanic Garden's Darwin 200: Voyages of Discovery, funded by a grant from the Biotechnology and Biological Sciences Research Council (BBSRC), has been an ideal opportunity to introduce the new Garden to different types of audiences, including groups of schoolchildren.

The Beagle Tour, led by the Curator, Nicholas Wray, appeals to all types of visitors because it focuses on the habitats and plants which Darwin encountered on his five-year voyage aboard the *Beagle*. Those with a deeper interest in Darwin's botanical research can attend the 'Darwin the Botanist', tour, led by the Garden's Director, Professor Simon Hiscock which focuses on flowering plants.

The third strand to the Darwin Season is a series of Science Picnics: informal evening events where members of the University's Biological Sciences Department interact with Garden visitors. Involving the university's scientists in public engagement has proved highly successful and supports Stokes' (2006) view that 'those who study living things are in the best position to communicate the excitement and wonder of the life they study.'

Another new development for the Garden is the provision of free tours for hearing-impaired visitors. The highlight of these events for all visitors is the opportunity to see Darwin's orchid *Angraecum sesquipedale* and hear the tale of the relationship with its pollinator the giant hawk moth *Xanthopan morgani praedicta*.

The *Evolution of Land Plants Display* is the first of the evolution displays to be interpreted by a series of interpretation signs devised by Year III Biological Science students as part of their final year practical project. The signs, which follow botanic garden best practise for interpretation boards, inform visitors of the key stages of plant evolution through each geological period. Associated web pages were written to support the signs and a booklet is in draft form that will, when complete, provide visitors with more information on the evolutionary processes highlighted in the Evolutionary Dell.

It seems fitting to conclude with the words of Stephen Hopper, Director of RBG Kew (2009): "In these challenging times we need to inspire, we need to demonstrate what plants have to offer, we need to show how a tree can be worth more alive than dead, we need to apply our knowledge, and we need to offer a sense of hope – especially to the young"

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Celebrating the 300th anniversary of Linnaeus at the Royal Botanic Garden, CSIC

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The Royal Botanical Garden of Madrid (Real Jardín Botánico, CSIC) is a small garden of eight hectares, situated in the centre of Madrid next to the Prado Museum. The Garden was founded in 1755 by King Carlos III, and has around 4500 plant species. The Garden preserves some singular and very interesting artistic, historical and scientific elements, such as the King's door, the vine arbour, and the Villanueva Pavilion, all from the eighteenth century.

The Royal Botanical Garden is a botanical research centre that belongs to Spanish National Research Council (Consejo Superior de Investigaciones Científicas). The most important lines of research include Spanish plant flora, Spanish fungi flora and plant evolution and phylogeny. The scientific collections are very important; for example the herbarium, which contains more than a million specimens of Spanish and Latin American plants, some of them introduced eighteen-century botanical expeditions such as those of Ruiz y Pavon, Malaspina or José Celestino Mutis.

The Garden also has an exceptional library and archives, with historically and scientifically important drawings of expeditions of the eighteenth and nineteenth centuries. The best known of these are the six thousand drawings from José Celestino Mutis's expedition to Nueva Granada, today's Colombia. The library is now being digitalized and it is possible to consult online more than a half a million pages of books related to Spanish and Latin American flora.

The Garden has a very active programme of activities for schools and the general public; the main aims of this programme are the dissemination of knowledge of the botanical sciences and the promotion of plant conservation.

In 2007 the Garden's Scientific Culture Unit prepared an activities programme to celebrate the 300th anniversary of Linnaeus' birth and the 250th anniversary of the first publication of *Species Plantarum*.

Linnaeus had a special relation with Spanish scientists, some of whom worked at the Botanical Garden of Madrid, and even named plant genera in their honour, such as *Minuartia*, *Queria* and *Ortegia*. Linnaeus sent one of his pupils, Pehr Löfving, to Spain to spread knowledge of his new system of classification amongst Spanish botanists. Löfving went on one of the first scientific expeditions organized by the Spanish state in the territory of present-day Venezuela. In the nineteenth century a pond was built in the most important part of the Garden, with a central sculpture dedicated to Linnaeus and to the most important Spanish botanists, among whom Löfving is mentioned.

The aims of the Linnaeus anniversary programme were to:

- popularise the figure of Linnaeus
- explain the importance of classification in botany
- explain the system of binomial nomenclature
- publicise the work of the Garden researchers among our visitors.

The activities of the anniversary programme included:

- an official commemoration

- workshops for school children and the general public
- guided visits to the Garden
- a Science Fair
- a Science Week.
- provision of teaching material
- online activities about Linnaeus and his classification system.

We began with the ‘Linnaeus visit’ on 27th February. This event was the initiative of a group of Swedish naturalists who were in Spain during this period, who came to the Garden with an invitation from the director of the Botanical Garden. In this event, one member of the Swedish group, dressed in Linnaeus’ wedding suit, placed a wreath of laurel in front of his sculpture, and gave a present to the director of the Garden in commemoration of the anniversary.

In March, coinciding with the 14th annual meeting of the European Horticultural and Botanical Libraries Group, an official commemoration was held, and the Swedish ambassador in Madrid attended the event. He and the director of the Garden planted a specimen of *Betula alba* in honour of Linnaeus, and also unveiled a commemorative plaque.

The activities for students and public general began with the Garden's participation in the Science Fair of Madrid. This was an event organized by the Regional Government of Madrid, with support from the Swedish Embassy in Madrid. A group of students and teachers from a secondary school in Guadarrama, a small village near Madrid, participated with us in this activity. The title of our stand at the fair was ‘Clasificación y Naturaleza, si Linneo levantará la cabeza’. This phrase is a Spanish play on words and it could be translated as ‘Classification and Nature if Linnaeus comes again’. All of the activities were about plant classification and four of the Garden’s research projects were involved:

- the flora of Equatorial Guinea
- studies of the *Geranium* genus
- studies of the *Bellis* genus
- the biogeography of Macaronesian fungi.

The first activity was very simple and consisted in classifying plant drawings, shapes, etc. It was designed for students of the first level of primary education, but it was very popular among general public as well.

The second activity we named the ‘Classifier’. It was a wooden box with compartments that works like a dichotomous key. Inside we placed different seeds (watermelon, pumpkin, chick pea etc) and the participant had to classify the seeds following the labels of the compartments: ‘with rind’, ‘without rind’, ‘flat’, ‘not flat’, etc.

The third activity had two dichotomous keys. The first part was designed for classifying leaves. Here the participants, with a photo of a leaf, had to follow the key on the panel, and at the end they could check the common name of plant. In the second more complex part participants used a dichotomous key to species of the genus *Pinus* from the Iberian Peninsula, and here the participants used specimens from the herbarium. Finally, there were three additional activities using a computer designed for the more advanced levels of students. Here the participant used different dichotomous keys of species belonging to the genus *Geranium*, ferns of the Flora of Equatorial Guinea and *Corticaceae* fungi, with the help of herbarium specimens and photographs taken with an electron microscope.

The same activities were adapted for the Science Week organised also by the Regional Government of Madrid. In this case, the programme was supported by the Spanish Foundation for Science and Technology (Fundación Española para la Ciencia y la Tecnología, FECYT) and the Ministry of Science and Innovation. Visits to the Garden were organized thematically with classification, visits to the Research Centre for general public and university students, and workshops for school children and the general public. The workshops consisted in the adaptation of the same activities of the Science Fair to be held in the Garden, with the addition of new didactic material. At the end of the workshop, the pupils could build their own dichotomous key with a set of very different plants. There were also workshops for families where adults and children learned together. In addition we installed in the Garden entrance a discovery station, where the monitors asked the visitors to take part in a game in the Garden. At the entrance a leaflet was given to them with a Garden map and a dichotomous key prepared for this occasion, and the public had to look for some plants and trees and try to verify with the key the name of the species. About five thousand people participated in this event in the Garden.

An online activity involving use of the Garden's web site was based upon these experiences. Entitled 'Linnaeus and plant classification', the web-based presentation has an introduction to Linnaeus and his nomenclature system and it presents three games, one to classify flowers from their colours and shapes, a second to classify seeds, and a the third to classify leaves and finally one to classify species of the genus *Geranium*.

These activities are now integrated in our programme for school groups and weekend public visitors.

Acting as ambassadors for conifers: learning and the GSPC at Bedgebury, the UK's National Pinetum

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Abstract

Conifers are a fascinating but very threatened order of plants – over a third of them are at the edge of extinction.

The National Pinetum at Bedgebury in Kent, England, is home to the world's most complete collection of conifers. Along with Westonbirt Arboretum, we form part of the National Arboreta, the UK's premier tree collections belonging to the Forestry Commission. We are also actively involved in international conifer conservation work in partnership with other organisations.

The Global Strategy for Plant Conservation (GSPC) is a major driver for our work and learning is an integral part of our response to it. This paper will examine some of the techniques we use in our work as 'ambassadors for conifers'. We aim to open people's eyes to these fantastic trees as well as to communicate the conservation work we do, and how people can help. What's a mapstick and who is Pirate Bill? All will be revealed.

Introduction to the National Pinetum

The National Pinetum has been described as the world's 'best' (most complete) conifer collection. It is located at Bedgebury in Kent, about an hour and a half's drive from London, and is owned and managed by the Forestry Commission, the UK Government department responsible for the protection and expansion of Britain's forests and woodlands.

At least a third of all conifer species are threatened in the wild, so conservation is an important part of the Pinetum's work. We are one of a network of 'safe sites' for conifers and our collection contains specimens from 91 threatened species. We also work with other organisations to collect seed from wild populations of conifers around the world. Some seed may get stored in places such as the Millennium Seed Bank at Wakehurst Place. Or we may propagate seed in our own nursery and share the new plants with other organisations or grow them in our collection. Bedgebury staff also sit on the IUCN's conifer specialist and tree specialist groups, helping to assess the conservation status of conifers, as well as sharing information and expertise with other organisations across the world.

The GSPC is therefore a major driver for our conservation work. However, ultimately there is little point in doing all of this without telling people what we are doing, why and how they can help. So Target 14, the Public Awareness element of the GSPC, is a central focus of the education and interpretation work at the National Pinetum.

Are conifers baddies?

Conifers have a bad press in the UK. Although they are a common sight in many gardens, they have a reputation as plants that grow out of control. There have been high-profile media stories of disputes between neighbours about overgrown *Leylandii* hedges. The same small number of cultivars also appear in gardens again and again, almost like 'green wallpaper'. This can make it hard for people to appreciate the range of conifers, their vital role in supporting our everyday life and the fact that many species are actually threatened in the wild.

This means that at Bedgebury we're not only trying to save conifers, we're also aiming to be ambassadors for them.

Acting as ambassadors for conifers

Our face to face work

A major part of our work is opening people's eyes to conifers, so that they stop thinking of conifers as being 'green wallpaper'. We believe that the best way to do this is to give people the chance to have direct, first-hand experiences of the trees in our collection.

We use various techniques and 'hooks' to get people looking at the trees more closely and enabling them to see conifers in a new way. Sensory activities are great for this because they give people the chance to see the trees up close and from unusual angles, as well as touching them and smelling them. For example, we might encourage people to search the trees for shades that match a range of colours shown on a paint chart. We might ask them to find natural objects that fit a descriptive word such as 'prickly' or 'tickly', and then challenge others to guess the word by feeling the objects. The works of educators like Steve van Matre and Joseph Cornell are worth checking out for really good ideas in this area.

Art activities give people of all ages an opportunity to connect with the trees at the Pinetum in a very personal way. Through annual events such as the Big Draw (a national UK event that Bedgebury joins in with every year) we have learnt that simple activities, such as mural-making, art outdoors using natural materials and bark rubbing, can draw large numbers of people and provide a useful way of helping them to see and connect with trees in a new way.

Another family holiday activity uses the 'hook' of Native Americans to connect people with the tree collection. Many of our trees are from North America and the rich traditions and stories of Native Americans can be a potent way of connecting children with trees.

A classic example of this is the mapstick, an environmental education technique which is based on a Native American navigational device. Basically it's a stick with five elastic bands wrapped round it. We use a mapstick to structure a walk round the tree collection. We stop at a tree, introduce a sensory activity, share some facts or tell a story about that tree and then students pick up one of its cones that has dropped to the ground and tuck it under an elastic band on the mapstick. At the end of the walk students have a lasting memory of the trees they have visited which they can take back to school. We have found that children really treasure this memento of Bedgebury and sometimes return months later, using the mapstick to teach their parents what we taught them.

Mapsticks are something we use a lot with school children. We currently lead visits from around 5000 school students each year, from preschool age (2–4 years) up to sixth formers (16–18 years) and beyond, although predominantly primary school age at present. The UK education system means that the schools programmes that we offer must clearly help to deliver schools' formal curriculum, and our task is to combine this with the messages we want to communicate about the site. Whatever programme that a group of school children comes to do, we make sure that all are aware of the Pinetum and the work that we do during the course of their visit.

Where possible, we'd like to involve children directly in our conifer conservation work. A lovely example of this is an event where 200 scouts came to Bedgebury to help us to plant threatened Chilean plum yews as part of a mass planting project. Each scout had the chance to visit the nursery, discover more about conifers, how we collect and germinate seeds from rare trees, and then plant a tree themselves. Bedgebury staff have been touched to see scouts returning to check 'their' trees. It seems that this direct experience of growing and planting trees has helped people to create a very personal connection to trees.

Written interpretation

Sadly, although face-to-face contact with visitors is the most effective form of interpretation, the education team at Bedgebury is very small. We cannot reach all of our visitors in this way, so we must use other ways of connecting people with trees.

In addition to a number of permanent display panels in the Pinetum, we also produce temporary seasonal trails. These are very low-cost: laminated A3 sheets produced in the Pinetum office, and stapled onto wooden A-frames that are made on site. Topics for the trails include our conservation work, the uses of the tree collection, climate change, why conifers are vital for humans and the features about staff members at Bedgebury.

The beauty of these temporary seasonal trails is that the lead-in time to produce them is much less than for permanent panels. This means that we can be much more flexible, and respond to current news issues and to management work taking place in the Pinetum. An unexpected spin-off has been the benefits to Bedgebury staff – they walk the trail before it goes ‘live’ with the public. This works well to iron out glitches but also helps to raise awareness of the Pinetum’s trees and our conservation work within the staff.

Pirate Bill and the Plant Hunters Play Trail

The Plant Hunters Play Trail was installed at Bedgebury in 2006 and quickly became a big hit with families. The play furniture, such as a shipwreck, was chosen to reflect some of the voyages taken by the original plant hunters. However, tight funding deadlines meant that interpretation was not installed initially, leaving the plant hunter title unexplained, and families puzzling over a shipwreck in the middle of a forest.

Plant hunters link into our work because Bedgebury staff, who travel all over the world collecting seed from wild trees, are the plant hunters of our day. But how to communicate that to families who really just want to either play or chat to other adults and keep an eye on their children? Should we even try?

Research also revealed that significant numbers of families who visited the Play Trail at Bedgebury did not visit the Pinetum and were unaware of its significance, or even what it was. In fact large numbers were not even aware of the scope of the Play Trail itself, sticking to the first couple of elements they found.

Our challenge was to produce interpretation to address all this. It gave us several headaches.

We chose a cartoon character, Pirate Bill, to link all the interpretation on the trail together. Bill was based on real-life plant hunter William Dampier, who had pirate connections (handy because observation suggested that much play, especially around the shipwreck, was already taking place with a strong pirate theme).

We had to bite the bullet and accept that children were not going to read panels. So we introduced a number of stainless steel discs, each featuring an item of equipment that modern plant hunters need to pack in their suitcases. Pirate Bill challenges children to spot as many of these as they can. The discs are spread throughout the Play Trail and also within the Pinetum, encouraging families to visit new areas. We know that children are looking for the discs – staff working in the area are often quizzed about their whereabouts!

Observation showed that adults spent a lot of time on the picnic tables, chatting to each other and keeping an eye on their children. We produced colourful, light-hearted panels with lots of cartoons and humour, and we sited them where they could be seen from the tables without people having to get up to see them. Many of these panels look as if they are aimed at children but they are not – they are aimed at adults. This tactic followed a revelation on a recent interpretation-training course that a lot of adults actually choose children’s interpretation because it is much simpler, more fun and easier to digest.

We have more work to do to discover exactly how effective the Play Trail interpretation is, but initial evaluation shows that awareness of the Pinetum and its work has increased by about 30% since the panels and discs were installed.

We are always learning and there is always much more to do. We are not saying that these ideas are the perfect or definitive way to do our 'ambassadorial' work. However, we have found that they are useful in our work to change people's perceptions of conifers from a source of garden angst to a source of appreciation and enjoyment. Perhaps they might help you too.

Endangered trees: a global story

Susan L. Wagner

The Morton Arboretum, Lisle, Illinois, USA

Introduction

Each breath we take, we owe to trees. Trees are critical to sustaining life on Earth, offering immeasurable benefits. They lower energy costs, control storm water runoff and erosion, and provide medicine, food, and timber. Trees create greener, healthier, and more livable communities. The effects of unsustainable harvesting, habitat destruction, and climate change are threatening many important tree species and the ecosystems that depend on them for survival. According to *The World List of Threatened Trees* (Oldfield, 1998), more than 8,000 tree species, 10% of the world's total, are threatened with extinction. Unlike their counterparts in the animal kingdom, very few endangered trees receive international conservation attention and fewer are top of mind for the general public.

Working in collaboration with Botanic Gardens Conservation International (BGCI), The Morton Arboretum will develop and produce a traveling exhibit and associated interpretive materials designed to educate people about the status of globally endangered trees and the important role they play in sustaining livable communities. This traveling package offers public gardens, arboreta, and nature centres across the United States the opportunity to host a pre-fabricated exhibit complete with integrated multimedia, and self-guided and facilitated interpretive materials featuring the work of the Global Trees Campaign. Exhibit visitors will experience compelling stories about the earth's most vulnerable trees and how to save them from extinction.

Key Collaborators

The Morton Arboretum is an active member of the Global Trees Specialist Group. Kunso Kim, Arboretum Curator and Assistant Director of Collections and Gerard T. Donnelly, PhD, Arboretum President and CEO convened a meeting with participants from seven countries in July of 2009 to consider the conservation status of the world's tree species. Information from this meeting and resources available through The Global Trees Campaign will be used in the development of this exhibit. Criteria for selecting featured trees will include:

- International Union for Conservation of Nature Red List threat status
- Geographic distribution
- Reasons for endangerment
- Significance or value to people.

The Global Trees Campaign is a joint initiative between Fauna and Flora International (FFI) and BGCI in association with other partners around the world. Their goal is to highlight the plight of the world's threatened tree species and initiate conservation action.

The Morton Arboretum

Since 1922, The Morton Arboretum has pursued a goal to 'create a greener, healthier, and more beautiful world.' Our mission is to collect and study trees, shrubs, and other plants from around the world, to display them across naturally beautiful landscapes for people to study and enjoy, and to learn how to grow them in ways that enhance our environment. With internationally recognized collections, leading scientific research, and pioneering education programs, The Morton Arboretum serves as a leader among public gardens and

arboreta. This project closely relates to The Morton Arboretum's mission and directly addresses two of three primary goals within our Strategic Plan: to advance the planting and conservation of trees; and to attract larger audiences and engage them in our mission.

To better understand public perceptions and establish baseline knowledge regarding threatened and endangered trees, The Morton Arboretum conducted initial front-end research with small groups of visitors and non-visitors. A total of 45 affinity groups (visitors, members, and volunteers) and 41 non-visitor/non-member groups were surveyed. Both affinity and non-visitor groups conveyed a basic understanding of the causes of tree endangerment, naming human impact (logging, deforestation, and rainforest endangerment) most frequently. Affinity groups were more likely to name insects, pests, and disease, while non-member groups were more likely to name fire, which is not a primary threat. Neither group showed significant ability to extend their understanding of the causes of tree endangerment to specific species of threatened trees - local or global. Both groups included a handful of trees that are not threatened or endangered. Trees mentioned most frequently by affinity groups (elm and ash) have been negatively affected in northern Illinois, but do not fall into federal or globally endangered categories. The vast majority of non-visitors (71%) were unable to name a single globally endangered tree.

Interestingly, both groups thought the issue was an important one, with affinity groups more likely to find it "significantly important" (58% compared to 37% of non-visitor groups) and non-visitor groups more likely to find it "very important" (46% compared to 31% of affinity groups). Research also revealed that both groups hoped to find advice on what they could do personally save threatened and endangered trees and a prevailing 'recycle/use sustainable materials' message. Based on this initial research, it is apparent that understanding the value of trees is a critical first step in developing public appreciation for endangered trees.

Across the globe, public gardens and arboreta are critical players in the effort to connect people with trees and nature. Through a wide variety of programmes, they provide the best combination of resources – beautiful natural landscapes, trained educators, and credibility within our communities.

Project Design

To reach a wide audience of people with the message that trees are critical to sustaining life on Earth, The Morton Arboretum proposes to develop a traveling exhibit about endangered trees and the people who hold the power to save them from extinction. The exhibit will deliver three key messages:

- Trees are critical to sustaining life on Earth.
- The future of trees and their ecosystems are in peril due to over-exploitation, habitat destruction, and climate change.
- People can become tree guardians by planting trees, volunteering with and supporting organizations that plant and protect trees, and sharing what they learn with others.

Our goal is to empower public garden and arboretum visitors across the United States, by encouraging them to take specific action as champions of trees.

Exhibit Description

Visitors will be introduced to the exhibit with a visually dynamic 7ft.-tall three-dimensional tree form. This engaging graphic will present the primary threats to trees and invite visitors to embark upon a global journey where they can explore ten to fifteen compelling tree stories from a diverse range of regions. Each story will be told from the perspective of people involved, using interpretive panels highlighting threats, on-the-ground conservation efforts, a map of species distribution, and tactile elements related to each tree's reason for endangerment. An interactive web page optimized for use with mobile smart phones will be developed to facilitate visitor engagement in deeper layers of content — whether on-site or on-line.

All exhibit components will be based on sound science and take account of the needs of local people, who are dependent on tree resources for their survival. The circumstances that pose threats to trees are often complex, sometimes pitting immediate human needs against long-term sustainability. For example, the African cherry is harvested for the medicinal properties of its bark, resulting in extensive deforestation. One villager used peeled bark from this tree to raise money for his brother's hospital bills, while another paid for his child's university fees with a plantation he sold for firewood and charcoal. Today, large African cherry specimens are only found in remote forests. The exhibit will also feature tree heroes in the form of individuals and organizations. For example, most Americans are familiar with the magnolia tree, but *Magnolia sinica* is possibly the most endangered magnolia in the world. Known only from a single population of less than 10 mature individuals on a forested mountain slope in China, its story illustrates real efforts and tangible results as part of the Global Trees Campaign. Conservation of this rare species includes 400 nursery-grown saplings planted and in a nature reserve, providing a critical lifeline for this tree.

Near the end of the exhibit visitors will discover another 7ft.-tall dramatic tree form, where graphics and text highlight the work of BGCI's Global Trees Campaign. Within its leaves and branches visitors will find specific action steps each of us can take to further tree conservation efforts, including planting trees, volunteering with and supporting organizations that plant and protect trees, and sharing what they learn with others. Indentations in the shape of hands will reinforce and encourage visitors to make a personal commitment. By placing their hand into the form as they take a Conservation Pledge: visitors will commit to specific actions steps that will change the future of threatened and endangered trees.

Design, Travel, and Promotional Information

The exhibit will be crafted for outdoor display at arboreta, public gardens, or nature centres. As an outdoor exhibit it will offer an immersive natural experience, enhance the compelling nature of each tree's story, and remind visitors of the direct relevance to trees and their integral link to the rest of the natural world. Engineering requirements necessary for a variety of host settings will be taken into consideration as the exhibit is designed and fabricated.

To expand the audience touched by the exhibit messages, The Morton Arboretum will produce two complete traveling exhibitions and one exhibit for display at The Morton Arboretum. Durable, exterior grade materials will be used to ensure that we meet the goal of seven to ten years of travel for the exhibit. While the initial expense of producing three identical sets of exhibit materials is higher, it will allow more than one venue to host the exhibit at the same time and enable smaller institutions without graphic expertise to stage the exhibit. Institutions with the resources to reproduce the exhibit will have the opportunity to access graphic files and detailed installation instructions free of charge. A kit will enable them to scale the design to fit their space requirements and display the exhibit indefinitely.

In addition to providing host institutions with the basic exhibit components, The Morton Arboretum will also offer a variety of programming options. Supporting resources may include: an installation manual; an integrated smart phone application; resource lists for obtaining living specimens of featured trees, relevant publications for sale, and a list of authors and authorities for lectures and/or classes; suggested hands-on activities for families; a teacher guide; a guide for science-attentive adults; a walking tour; and a media kit. An Arboretum staff person and staff educator will travel to each host venue to assist with installation and on-site educator training.

Each institution will have the opportunity to display the exhibit from three and twelve months, ensuring it is distributed geographically throughout the United States and reaches the broadest possible audience.

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A collaborative approach to programme development in public gardens

Kate Trzaskos

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Abstract

Prompted by Longwood's Centennial year, a strategic effort was made to develop formalized curriculum-based lessons for students (K-12). The education staff conducted over 20 focus groups with area educators, more than 15 one-on-one staff interviews, and offered a pilot program to the local school district. The knowledge gained through our formative research was invaluable and led to the development of the School & Youth Programs Unit. Engaging our constituents proved to be a very inclusive process whereby students and teachers' needs were addressed and met through programme development. Our goal is to nurture student curiosity while focusing on learning. The collaboration continues with our Curriculum Advisory Board of teachers, scholarships to low-income schools, and global outreach through online learning. A model will be presented that can be adapted to other public garden settings.

Background

Longwood Gardens is the living legacy of Pierre S. du Pont, inspiring people through excellence in garden design, horticulture, education and the arts.¹

Education programming at Longwood Gardens is a long-standing practice clearly outlined by Mr. du Pont's vision to establish "a school where students and others may receive instruction in the arts of horticulture and floriculture." Since 1958 some 1,000 students from all over the world have participated in one or more of seven intensive programmes, ranging from internships to a two-year professional-gardener training programme, to a master's degree programme in public horticultural administration. Additionally, Longwood's Continuing Education programmes for adult learners, both amateur and professional gardeners, have existed for over 50 years.

However, a large student audience was missing from the educational programme offerings. The Garden lacked programmes developed specifically to meet the needs of school-age students from kindergarten through to twelfth grade. School groups visiting Longwood typically had two options: a self-guided visit, or a one-hour garden highlights tour with a guide. These options provided little instructional or educational value.

To meet this need, focused front-end research was initiated during the summer of 2006, Longwood Gardens' centennial. As we planned for the next 100 years, defining our goals and identifying key audiences became a driving force for educational programme development.

Formative research

The first step in developing programmes for students was to talk with teachers. Hearing first-hand from classroom teachers provided a current assessment of their needs and perceptions about learning in a garden setting.

Recruiting participants for 90-minute focus groups was a regional effort. Teachers from Maryland, Pennsylvania, Delaware, and New Jersey representing all grade levels (K-12) and major content areas were

¹ Longwood Gardens Mission Statement

invited to take part in the formative evaluation process. Small groups of 10–12 teachers were asked to discuss specific topics as they related to a fieldtrip experience; describe their IDEAL TRIP, what concerns or ADMINISTRATIVE NEEDS make travel difficult, what LESSONS/ACTIVITIES are of interest, how CURRICULUM connections impact trips. The response was overwhelming. Approximately 200 teachers, 40 students, and 100 garden staff members participated in the process.

Common themes emerged across the participant groups. Key findings included:

- **Provide strong curriculum connections to state and national education standards.** Teachers are required to demonstrate how the trip will reinforce classroom learning in order to gain approval from the school administration.
- **Activities should be hands-on and interactive.** Engaging children so that they are active contributors supports learning.
- **Offer diverse programmes for all grade levels.** Multi-disciplinary programmes in Mathematics, Science, Arts, Social Studies, and Language Arts extend a garden's reach to more students and teachers.
- **Provide staff interactions and emphasis on career awareness.** Teachers are interested in exposing students to potential career opportunities whenever possible.
- **Affordable pricing is important.**

This initial feedback was used to develop the framework of the programme. In-depth conversations with staff members provided additional information on specific job functions related to the classroom curriculum. Linking lessons to careers found at Longwood presented a unique opportunity to highlight Longwood's talented staff, while focusing on practical applications of curriculum content.

Lesson development

Over the course of a year, lesson development and testing was ongoing. Lessons were developed in five major content areas: Mathematics, Science, Arts, Social Studies, and Language Arts; and extended through all grade levels to K-12. All lessons were connected to National Education Standards.

A Curriculum Advisory Board (CAB) comprised of local teachers, administrators and garden educators was formed. Many of the CAB members participated in the initial focus groups thus representing a similar concentrated sample of teachers surveyed. During monthly meetings, Board members offered feedback and suggestions for lesson activities, and helped differentiate the information appropriately for each grade level. This talented group of educators continues to advise on new educational initiatives.

Our local school district participated in a pilot programme serving approximately 700 students. Lesson assessments completed by teachers and students were based on curriculum connections, age appropriateness, relevance to classroom goals, and range of activities. Conclusion of the pilot programme led to additional programme revisions. The pilot programme also served as an initial marketing effort creating interest among teachers in the local and surrounding districts.

The outcome of this process is Nurturing Curiosity and the School & Youth Programs at Longwood Gardens. Nurturing Curiosity uses a variety of content delivery strategies such as engaging hands-on activities, positive environment, positive professional relationships, programming opportunities for cognitive growth and esteem building. This educational approach recognizes student differences, raises expectations for achievement, and provides for increased student participation to enhance student learning.

Action learning

Nurturing Curiosity launched during the 2007–2008 school year (September–June) with the following programme offerings utilizing key areas in the Garden that serve as inspiration and living laboratories for learning.

<i>Content area</i>	<i>Programmes</i>	<i>Programme activities</i>
Visual Arts:	<i>CaptureIt</i>	Students will embark on an artistic garden voyage that explores the enticing world of garden-inspired art. The study and interpretation of Impressionist artist Claude Monet will serve as inspiration for students to create their own garden-inspired work using developmentally appropriate media and techniques.
Language Arts:	<i>NatureVoice</i>	Inspire creative writing and appreciation of literature through exposure to nature in this imaginative, process-centred program for students. Through garden exploration, students record thoughts, feelings and words that capture the nature voice emerging from within.
Mathematics:	<i>GoFigure</i>	Uncover the mysteries of mathematics that lie hidden in the Garden with engaging activities highlighting geometry and measurement. Students will investigate gardens that exhibit the use of shape, pattern, symmetry and balance. After garden exploration, students will design their own garden plot for bulb “planting.”
Science:	<i>Operation Pollination</i>	Students discover the connection of living systems as they investigate why flowering plants have co-evolved with their pollinator partners for millions of years. By identifying adaptations of plants and pollinators, students will gain an appreciation of this delicate relationship.
	<i>LifeCircles</i>	Trace the life cycles of plants, trees and insects in this hands-on program connecting the cycles of nature with life science in the garden. Students are challenged to sequence the stages of insect and plant cycles as well as identify the interdependence of plants and animals in a garden setting.
	<i>H2O</i>	Dive into the study of water and the water cycle in this in-depth earth science program. Students are introduced to the clever ways in which plants and people use water at Longwood Gardens as they record their observations, conduct their own water-based experiment, and measure their impact on water usage.
Social Studies:	<i>LandMark</i>	Explore topography by using maps and other geographic tools that assist with the navigation and interpretation of Longwood’s section of the Earth’s surface. Age-appropriate activities challenge students to apply basic mapping skills as well as utilize geographic tools and technologies to locate specific areas in the Garden.

Our unique cross-curricular approach to teaching utilizes our 1050 acre “outdoor classroom,” while providing authentic learning experiences, inquiry-based lessons, and time for observation and reflection in

nature. Student groups of 15 or less are paired with a Longwood Educational Guide for a 90 minute garden lesson. Students are charged \$5.00 ea. while accompanying chaperones within the required 1:10 ratio are FREE.

Longwood also offers a Nurturing Curiosity Grant for low-income schools. This scholarship covers the programme costs as well as travel reimbursements of \$100.00 per bus. In an attempt to provide access to Longwood for students with financial restrictions, we hope to also expose children from diverse backgrounds to horticulture and the natural world.

The numbers

In the first year (2007–2008), the Nurturing Curiosity programme served 7,224 students and teachers. The most-requested lesson was LifeCircles and the most frequently visiting grade levels were 3rd-5th graders. In year two (2008–2009), attendance increased by 79% to 12,919. Two thousand eight hundred dollars of Nurturing Curiosity Grant monies were awarded, impacting the lives of 2,037 financially restricted students.

Evaluation results from teachers consistently scored lessons 3.5 or higher on the Likert scale of 1–4 on curriculum connections, age appropriateness, relevance to classroom goals, and range of activities.

Total Average Response (Teachers) n=170

Organization of programme	3.88
Length of programme	3.74
Standards/curriculum connections	3.81
Appropriateness for grade level	3.81
Tour activities/worksheet	3.83
Relevant to classroom goals	3.79
Programme was accurately described	3.79

Future goals

The success of the Nurturing Curiosity programme has led to additional program development. In June 2009 the Teacher Institute at Longwood Gardens was launched to provide professional development training for teachers in garden-based education. Specifically, we hope to inspire teachers to implement schoolyard gardens and make outdoor learning a central part of their teaching.

Additionally, Longwood is exploring online delivery of education programs through a Learning Management System and web conferencing solutions. The new generation of young people is more “plugged in” and technology-savvy than any previous – even being coined Digital Natives. “Today’s students – K through college –represent the first generations to grow up with this new technology. Computer games, email, the Internet, cell phones and instant messaging are integral parts of their lives” (Prensky, 2001).

As environmental educators, technology can be a fierce competitor! And yet we know that “children need nature for the healthy development of their senses, and, therefore, for learning and creativity” (Louv, 2005). A movement to reconnect children with nature is alive and growing around the globe. Our goal is to develop outreach programs using technologies that engage student interests, while presenting genuine learning opportunities and connections to nature.

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Big answers to big questions: are our tranquil green spaces the perfect places for public debate?

Janelle Hatherly

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Abstract

Today's society faces many complex social and environmental challenges and botanic gardens need to examine the role they can play as unique public spaces for exploring these divisive and contentious issues.

Like museums, botanic gardens are respected for their authoritative information, integrity in collections management and political impartiality. But how impartial and value-neutral are they or should they be? Should botanic gardens be non-judgemental, provocative or determinants of moral standards? As organisations most typically visited for their tranquil green spaces, should botanic gardens be taking an activist role to bring about predetermined changes in attitudes and behaviour?

This presentation will examine this dilemma for cultural institutions. It will draw on the lessons learnt from *Big Answers to Big Questions*, a holistic public programme of educational displays, activities, debates and resources developed by the Botanic Gardens Trust to tackle the contentious environmental issues of water, ageing heritage landscapes and genetically modified organisms.

Introduction

When Dr Tim Entwisle came on board as Executive Director of the Botanic Gardens Trust (the Trust) he wrote in the staff newsletter: "Our Gardens and Domain are often described as the heart and lungs of the city but they should also be part of the mind of Sydney". As well as telling great stories about plants and the environment through garden displays, public programmes and publications, Tim advocated that our organisation should be stimulating public debate about complex environmental issues – from nature conservation to urban planning.

The Trust's mission is to inspire the appreciation and conservation of plants and the environment and its staff are well placed to help the broader community appreciate their natural and cultural heritage, to learn to care for their local environment and to adopt sustainable lifestyles. The Trust's scientific research, horticultural practices and educational programmes are all designed to achieve this. But what role can organisations, like botanic gardens play in representing contemporary contentious issues – addressing the big questions related to such matters as the energy crisis, climate change and social inequity?

The museum experience

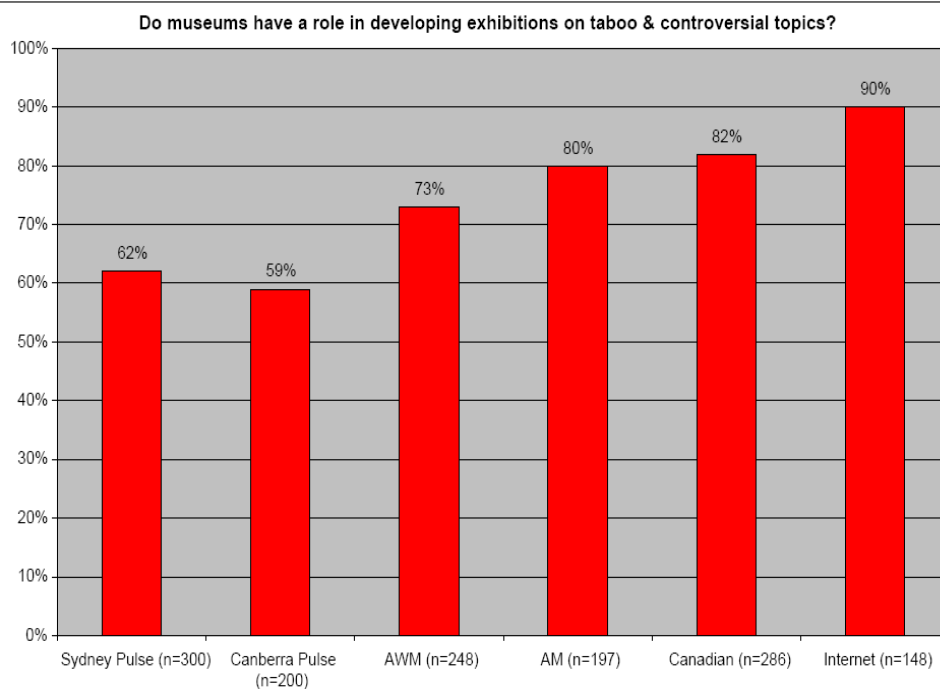
Much has been written about the changing role of museums. Over the past 20 years museums have been displaying controversial exhibitions and providing forums for public discussion and debate of sensitive cultural issues. Notable contemporary museum directors and consultants explain how museums are much more than collecting institutions and can be powerful agents of change. For example, Museum Director Dawn Casey sees museums as a forum for debate offering a reflective space in which people can consider issues in context (Cameron, 2003). Museum Director Robert Macdonald suggested in 1996 that in addition to being visually exciting, museum exhibitions and programmes have to be intellectually accessible, stir the emotions and evoke serious dialogue (Cameron, 2003).

Other experts cast museums as centres for tolerance, places for fostering critical thinking, problem solving and self-reflection, and for visitor participation through dialogue with the institution and other visitors.

Elaine Gurian characterised museums as safe places for unsafe ideas (Cameron, 2003). Museums are a major expression of cultural identity in every society, says George Hein (2005); In 2005 David Anderson described cultural institutions as corporate citizens with obligations to foster critical cultural debates and to protect society from damage to its cultural health (Cameron, 2003). According to David Fleming (2005), museums are social constructs, and powerful ones at that; and they assume their place in the mainstream of contemporary life, not sitting eccentrically on the margins.

A recent three-year research project with Australian and international partners investigated 'Exhibitions as contested sites: the role of museums in contemporary society (Cameron, 2000).' Table 1 shows results of this research, outlining the community expectations of museums.

Table 1
Museums, contentious topics and social responsibilities



Results from quantitative and qualitative research: omnibus, exit surveys of visitors at Australian and Canadian Museums and staff internet survey.

From this research, Fiona Cameron concluded that the public perceive museums as safe, scholarly, authoritative, trustworthy, impartial, accessible places for contextual learning. They are trusted incubators for social activism and can facilitate audience engagement on their own terms in their capacity as expert informants.

Botanic gardens as museums

Botanic gardens, with their living and preserved collections, are museums too. They fulfil the role outlined for museums by International Council of Museums (ICOM): commitment to the conservation, continuation and communication to society of the world's natural and cultural heritage, present and future, tangible and intangible' (Hein, 2005).

Sydney's Botanic Gardens Trust is highly regarded for its scientific and horticultural expertise as well as for its ability to deliver high quality education programmes. Trust scientists are often called upon to provide authoritative unbiased information on contentious contemporary scientific issues through a variety of media. The Trust's three botanic estates are in accessible locations and visitation numbers are high. They are ideally placed to facilitate public participation in discussion and debate surrounding the social implications of today's controversial scientific, environmental and technological issues.

In 2004 the Trust experienced the bitter-sweet taste of controversy and realised that its botanic estates were more than places for peace and tranquillity when 11 aged and unhealthy trees were removed from an avenue in the Domain, the 32 hectare heritage park adjoining the Royal Botanic Gardens. The attention raised in the media and the resulting legal action were stressful, to say the least, but there were some positive outcomes. The 33 young trees planted in their place are becoming well established and forming a distinctive and favourable landscape and there is now widespread recognition that the Trust, rather than the local council, is the steward of this historical site. The public were provided with an opportunity to think critically about the issue of managing decaying heritage treescapes – an issue currently faced all over Australia as trees in colonial parks and gardens are reaching the end of their lives.

The New South Wales Government has been conducting social research into people's environmental knowledge, views, attitudes and behaviours for several years now (NSW Dept of Environment and Conservation, 2003). The fourth triennial community survey in 2003 showed that:

- The environment is considered to be the 6th most important priority for government.
- After family and friends, the public consider the environment the most important thing in their lives.
- The public find environmental and conservation agencies reliable sources of information.
- The public are mainly informed about the environment through newspapers and television.

With the findings of this longitudinal study of popular perceptions and appreciation of the contemporary role of cultural institutions, the Education staff of the Trust set about planning a holistic public programme to address three contentious environmental issues. This marked the start of our commitment to Education for Sustainability (EfS).

'Big Answers to Big Questions' – a holistic approach

In 2004 we applied for and received an Environmental Trust grant of \$50,000 to pilot a holistic public programme called *Big Answers to Big Questions* (BABQ). The most significant environmental outcome for the programme was to "increase active and informed participation by New South Wales people in creating a sustainable future". Our aim was to provide balanced information and encourage public debate around three contemporary 'hot topics':

- *Water – Priceless or free?* explored water source alternatives, and built understanding of why decisions about water supply are so complex.
- *Urban Trees – Yours, mine or future generations?* examined the relationship between plants, people and urban culture – our love of old trees but reluctance to accept their renewal.
- *Genetically Modified Plants – Unnatural selection or improving on nature?* explored the links between traditional plant breeding and gene technology.

These hot topics highlight the importance of plants in our lives and the need for humans to actively protect the natural environment. We provided a wide range of learning opportunities whereby the general public could explore their opinions, shape their ideas in a safe non-threatening environment and make informed decisions about their lifestyle behaviours and attitudes to environmental policies.

The programme's mascot was a 'little green man', a stylised figure representing the balancing of facts and opinions. It formed an easily recognisable and appealing link to all BABQ events. Much of the \$50,000 grant was used to employ additional Community Education staff to coordinate BABQ. The Community Education team devised and implemented seminars and evening lectures, weekend events, children's theatre, outdoor debates in the Domain, tours and other public programmes between March to August 2005. Over 1,400 people participated in BABQ events; these were delivered alongside mainstream educational programmes

provided annually to approximately 65,000 people. A BABQ page, set up on the Trust's website, provided some 400,000 users with event details, additional information and relevant links. Media coverage was excellent (and essential) despite very little budget allocated to promotional advertising. Table 2 lists the outputs of the BABQ programme.

Table 2 Outputs of BABQ programme (March–August 2004)

- 17 weekly Domain Debates, each with 2-3 expert speakers
- 3 Dinner Debates with 3-4 expert speakers
- 2 evening lectures
- 2 BABQ weekend family fun days
- 3 self-guided walks through RBG
- Temporary display garden built at RBG
- 2 holiday programs
- 3 new school lessons related to BABQ program
- Poster competition and exhibition
- Sponsorship of Yr 11 school debating competition
- A public day-long seminar and a two-day professional conference
- A Council workshop
- 2 Saturday morning lectures/workshops
- A web page with debate transcripts, extra information and links

This varied approach enabled the Trust to trial a new range of interpretive strategies, with the plan to incorporate the most successful ones into future programmes. Familiar interpretive approaches, such as guided walks and children's holiday activities, tackled new EfS themes.

Domain Debates

Holding debates in the Domain at lunchtimes was a nostalgic reminder of the use of this park throughout the last century as a forum for impassioned opinion. Older Sydneysiders have fond memories of spending Sundays in the Domain listening to people exercising their right to free speech. Here they heard communism, capitalism and all brands of religions aired and shared. Referred to in newspaper accounts as far back as 1888, these public assemblies had their heyday between 1900 and the late 1960s. The debates died around the advent of television. Perhaps talkback radio, the internet and other forms of mass communication have permanently relegated this particular arena for serious public engagement to the past.

Our BABQ Domain debates were 'staged'. They were designed for walk-ups and attendees ranging from politicians from nearby government offices, to office workers and school children on lunch breaks, passers-by and joggers. For each of the debates, two or three experts were invited to address the public on a specific theme. The discussion was then opened to the public and moderated by a Community Education staff member.

While speakers found it challenging to get across complex ideas without access to PowerPoint, the result was open dialogue in a more relaxed environment. We also found that topics directly relevant to Sydneysiders e.g. managing water and old trees in urban environments, were better attended than regional issues such as land clearing, state and national forests. We concluded that staging debates on a weekly basis for four months was a very ambitious target and that future outdoor debates should be programmed on an opportunistic basis. There is real value in hosting public debates as an immediate and timely response to environmental and social issues.

We used this strategy earlier this year as part of the Trust's celebrations of Charles Darwin's bicentenary and 150th anniversary of the publication of *On the Origin of Species*. On 12 February (Darwin's birth date) over 200 staff, volunteers, Friends and members of the public gathered at the launch of a spectacular interpretive sculpture in the Royal Botanic Gardens comprising six mirrored letters, each two metres high, spelling out Darwin's name. As part of the celebrations Trust scientists took centre stage and talked freely about their research and the importance of Darwin's ideas and work on plants. This augurs well for plans to place scientists *en plein air* on future Science Open Days.



Fig 1 Acknowledging Darwin's 200th birthday – 12 February 2009

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Evening Lectures

Two themed evening lectures were held as part of BABQ and their very nature attracted a new and different audience to the Royal Botanic Gardens. Instead of attracting the typical plant and gardens lover, '*Water water everywhere, but for how long?*' with Richard Denniss, Deputy Director of The Australia Institute, drew people interested in stimulating analysis of the social, political and environmental agendas, while '*The Tree in Changing Light*' with author Roger McDonald, attracted book lovers as part of Sydney Writer's Festival.

Similar events have been held subsequently in conjunction with high profile 'umbrella' events such as Sydney Design Week, National Science Week and Sydney Writers Festival. This collaboration also opportunistically provides free wide-reaching promotion. This year, for example, our Darwin celebrations included another Sydney Writer's Festival evening with Roger McDonald; this time discussing his novel, '*Mr Darwin's Shooter*'. For National Science Week, Trust scientists and a well-known astronomer lead a discussion about how Darwin and Galileo transformed the thinking of their age at part of *The Sky's the Limit! An evening lecture and star-gazing*. The latter introduced yet another audience to the Gardens as a center for learning.

Dinner Debates

Dinner Debates were staged to complement each of the hot topics. The first two were held at Trust restaurants with the third taking place in a commercial garden centre with which the Trust has an educational partnership. The Dinner Debates appealed to adults, who could join in the dialogue in a relaxed atmosphere, facilitated by entertainers as well as experts.

A measure of the success of this approach is that we have held Dinner Debates subsequently. For example, the Trust launched its year of Darwin programmes on 11 February – the eve of Darwin's actual birth date. By holding it in partnership with the nearby Australian Museum we managed to attract 200 patrons to this income-generating event. The Trust and the Australian Museum plan to co-host debates about the changing role of taxonomists as part of our respective 2010 International Year of Biodiversity celebrations.

Premiers Debating Challenge for Year 11 Students

The Trust used some of the grant funds to sponsor high-school debating. School excursions must be linked to class work but extra-curriculum debating activities allow young people to explore ‘the bigger picture’. Through this forum, we were able to provide a selection of debating topics focusing on BABQ Hot Topics and other environmental issues to 16-18 year olds. We also sent participating schools educational materials to which they might not otherwise have been exposed. This relationship has continued to the present and raises the profile of the Trust as a thinking organisation in the minds of tomorrow’s adults. These particular students are potentially Australia’s next generation of politicians and policy makers. They will certainly influence their own generation and family with their opinions.

Programme evaluation

Evaluation is a vital tool for educators to ensure effective learning outcomes for all public programmes. As outlined above, front-end research was conducted for BABQ before the grant proposal was submitted. Formative evaluation was conducted throughout the programme, with modifications made along the way to meet the needs of the audience. Summative evaluation was carried out to find out if we achieved the Environmental Trust’s outcome – to ‘increase active and informed participation by New South Wales people in creating a sustainable future’. This served the dual purpose of satisfying end-of-grant reporting requirements.

We opportunistically took advantage of an approach by a university student to evaluate an environmental programme as a field assignment. Robert Wells conducted phone interviews with participants in the dinner debates and evening lectures approximately 8 weeks after the events. He found that 94% of respondents thought that botanic gardens provide suitable venues for debating and exploring complex environmental issues and all said they would come again for similar programmes. Table 2 summarises some of his findings and highlights effective EfS.

Table 3 Evaluation

On a 1-5 scale, how effectively did speakers get their message across; where 1 = not, 5 = very
3 = 12.50% 4 = 43.75% 5 = 43.75%

Do you think the speaker(s) presented a balanced point of view?
Yes = 75.00% No = 25.00%

Have you noticed any changes in your attitude or behaviour as a result of attending the program?
Yes = 68.75% No = 6.25% N/A = 6.25% Already committed = 18.75%

What changes have you made? **Water reuse = 36.36% Became more active = 36.36%**
Informed = 9.09% Confirmed opinion = 9.09%

On a 1-5 scale, how long lasting have these changes been; 1 = no change, 5 = permanent change?
N/A = 54.55% 1 = 9.09% 2 = 0.00% 3 = 9.09% 4 = 27.27% 5 = 45.45%

Do you feel you had the opportunity to participate in the discussion? Yes = 100.00%

Did you feel confident to express an opinion on the topic of discussion? Yes = 50.00% No = 50.00%

Robert Wells BSocSc, EnvMgt; Masters in Museum Studies student, Macquarie University NSW

We also posted out a drawing survey to 10% families who took part in the two holiday activities. We received informative drawings from the children as well as positive parental feedback. *The Magic Raindrop*, an entertaining musical journey with Captain Splash as he follows a single water droplet through the water cycle, drew the following response from one parent:

“My boys (Nicholas 7, Jean Luc 4) did the drawings when I wasn’t with them so some additional feedback from me as a parent who also attended the show. For a while, I thought ‘Captain Splash’ overshadowed the messages for them however the drawings indicate they got more out of it than just having a good time.”

This feedback reinforces the notion that even young children can effectively engage with complex ideas.

Conclusion

Mounting myriad events with a core theme in a short time (for example, in celebration of an international year) enables botanic garden educators to try new approaches and forge professional relationships with like-minded institutions. We’ve learnt many lessons from the BABQ experience and have incorporated ‘the best of BABQ’ interpretive strategies into subsequent programmes. BABQ changed the Trust’s approach to free-choice learning and has embedded EfS in our thinking. Most importantly we learnt that public awareness is better than public appreciation and public participation is more important than indoctrination.

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A children's gardening project model focused on sustainability

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Abstract

During the last decade, one of the most discussed issues was how botanic gardens can help to create and continue sustainable communities that meet the needs of the present without compromising the ability of future generations to meet their own needs (e.g. Willison, 2004; Fien, 1996). Children's gardening projects are one of the most common projects in botanic gardens that can obviously help to create sustainable communities (Capra, 2001, 2005). This paper examines how a children's gardening programme applied in a botanic garden can be modified to increase the success of the programs by contributing to address the 21st century's environmental problems and to develop more sustainable communities.

History of gardening projects

According to Shair (1999), western Europeans were the first to provide garden environments for children in the 19th century. In 1837, the German educator Friedrich Froebel made an important contribution to the gardening theme with the term 'kindergarten' – gardens for children. Shair also states that important events of the 20th century, industrialization and World Wars I and II, led to an increase in the number of children's gardens. In Europe, by 1905 there were more than 100,000 school gardens that were used to help 'green' industrialized cities. Seeing these garden project achievements in Europe, other countries also followed suit. It is well known that the first school garden in the United States of America was opened in 1891 (Trelstad, 1997). These programmes had many and varied aims. For example, in 1918, during World War I, one and half million children were trained by the U.S. School Garden Army organization (Shair, 1999). Some of the aims of the project were "to increase food production" (Shair, 1999, p.10), "to teach children about nature, to green the industrial city, to Americanise immigrants, and to instil the ethics of hard work and patriotism" (Trelstad, 1997, p.162).

Although in the 16th century, the first botanic gardens were established with the aim of teaching botany and the medicinal uses of plants (Willison and Greene, 1994; Heywood, 1991), the first gardening project for children in botanic gardens was started by Brooklyn Botanic Garden (BBG) in 1914 (Tims, 2003). The value and positive effects of the BBG gardening programmes were proved by many researchers (e.g. Conlon, 2005; Tims, 2003; Blandford, 2002).

In Turkey, Nezahat Gökyiğit Botanic Garden (NGBB) in Istanbul is the first, and still the only, Turkish botanic garden to have started a children's gardening project. It was started in 2006 as a part of a Darwin Initiative project with the Royal Botanic Garden Edinburgh entitled 'Horticulture and Education for Conservation in Nezahat Gökyiğit Botanic Garden'.

Today, there are many different institutions, schools, botanic gardens and nature centres that run gardening programmes for children. However, it can be said that the general aim of these programmes has changed over time. In the beginning, the aims of these projects were generally related to increasing food production, dealing with the effects of industrialization in cities and providing green environments for children to learn and discover. But the most outstanding aims of today's programmes are to teach children about nutrition, plant science, ecology and environmental education (e.g. Shair, 1999; Capra, 2005). Environmental problems have become more severe and so the aims have shifted from environmental education into education for sustainable development (Fien & Tilbury 1998, Willison 2004). So, how can these programmes be adapted to meet today's needs? First we need to understand the changing focus of needs.

Education for sustainable development

The literature gives several definitions of sustainable development but it is important to decide which features lies at the heart of sustainable development. According to Fien (1996), “reducing the impacts of humans on the earth” is the most obvious aim of sustainable development and he prefers to use the definition of the Brundtland Commission that defined sustainable development as: “Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (World Commission on Environment and Development 1987, p.43 cited in Fien 1996). The World Conservation Strategy (IUCN 1980), the *Caring for the Earth Strategy* (IUCN, 1991), Agenda 21 (UNESA, 1992) and the World Summit on Sustainable Development in 2002 have all made important contributions to the definition and the implementation of strategies for sustainable development.

During this process of definition, there has been agreement that education plays an important role in changing people's thinking, their attitudes, values and behaviour, of all which are essential in creating sustainable communities (Fien & Tilbury, 1998; Fien, 1996; Willison, 2004). However, it should be said that it is recognized that environmental education is not the solution, and so a new term and possible solution emerged: ‘education for sustainability’. UNESCO defines education for sustainable development as “an emerging but dynamic concept that encompasses a new vision of education that seeks to empower people of all ages to assume responsibility for creating a sustainable future” (UNESCO 2004 cited in Willison 2004). By considering their age-related capacities, each age group can be targeted. As this definition emphasizes, it is important to note that education for sustainability is a pedagogy that is participatory and multidimensional (Willison, 2004; Capra, 2005). Capra believes that “human design” should model “the ecologically sustainable systems of nature”. So he suggests that the basic principles of ecology should be the main issue of education for sustainable development. According to Fien & Tilbury (1998, p.21):

Environmental education for sustainability must differ significantly from the apolitical, naturalist and scientific work carried out under the environmental education banner of the 1970s and 1980s. Education with the objective of achieving sustainability varies from previous approaches to environmental education in that it focuses more sharply on developing closer links between environmental quality, ecology and socio-economics and the political threads that underlie these ...

From this, we can understand that one of the most important aims of education for sustainable development is to make people politically literate.

The role of botanic gardens for a sustainable future

So how can botanic gardens contribute towards a sustainable future? Willison (2004) gives a few principles which botanic gardens can emphasise. One of these is that life on Earth depends on plants, which are the main study topic of botanic gardens, and another is that botanic gardens throughout the world are visited by millions of people annually. As we can see, botanic gardens are one of the most appropriate institutions that can contribute towards sustainable futures. The connection between sustainability and botanic gardens was first mentioned in the *Botanic Gardens Conservation Strategy* published in 1989 (Willison, 2004). Today, the roles of botanic gardens are described as focusing on sustainability. For example, Willison (2004) gives an alternative mission for botanic gardens as: “challenging their public to clarify their own positions on sustainability and work towards finding viable solutions”. The staff of botanic gardens (especially educators) have to understand this mission of botanic gardens and to reflect this in their educational programmes. It is important for a botanic garden educator to know the philosophy, principles and approaches underlining education for sustainability. This will guide them when transforming old programmes and creating new ones, by looking at education from a sustainability point of view (Fien, 1996).

Transforming children's gardening programmes

So is it necessary to transform gardening projects as well? As already mentioned, Nezahat Gökyiğit Botanic Garden is the first and only botanic garden to apply a children's gardening project in Turkey. From the very beginning of the project, consideration was given as how the programme could be developed and enhanced to show participants how to look at environmental issues from a more holistic viewpoint and to contribute towards sustainable development.

Capra (2001) states that developing a garden and using it as a source of food can help people to understand the principles of ecology. He stresses that it is critically important to know the principles of ecology because using ecological models is the only way to design sustainable communities (Capra, 2005). Programmes should try to teach these principles as Capra suggested. Gardening and cooking activities are a very helpful way in which to study these principles. Also, the physical environment in which the programme is applied should be organized to help children to observe and study these principles. Botanic gardens have an obvious big advantage over schools and science centres. As already mentioned, education for sustainable development should also focus on targeting politically literate participants. So botanic gardens should not only include horticultural and cooking activities but also activities such as:

- debates on current environmental and social issues;
- meetings with botanists, local farmers, environmental activists, policy makers;
- visits to the field;
- studying the uses of plants in local cultures throughout the world;
- working towards solutions for environmental problems.

These activities can subsequently be integrated into children's gardening programmes in botanic gardens by considering the participants' ages, interests and needs. Although it is suggested that these activities be integrated into the gardening programme, as Capra emphasizes, that "there is no 'one-size-fits-all' sustainability curriculum" (Capra, 2005, p.25). So each institution needs to study the social, cultural, political and physical contexts in which they function before adapting their own individual programmes.

Conclusion

The basic principles of gardening programmes are very useful for helping children to understand the 'language of nature'. However, as history tells us, the aims of these programmes will inevitably change. Today is the time to consider how we can transform these programmes to create and continue sustainable communities.

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Beyond the garden walls: greening the urban environment and cultivating communities

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Abstract

Community gardens have long been a successful feature in community renewal projects. Beyond greening the urban landscape, community gardening builds social cohesion and develops community networks. People who might never visit botanic gardens are given the opportunity to gain an understanding of plants, recycling and sustainable horticultural practices. This presentation will examine the role of botanic gardens in the urban environment, not only as contributors to green spaces but also as catalysts for social change and community building.

The focus of the presentation will be *Community Greening*, an educational partnership established by the Botanic Gardens Trust in Sydney with Housing NSW. This outreach programme assists disadvantaged communities to develop communal gardens primarily in public housing estates, on Council land, around churches or around schools.

Since its inception in August 2000, the programme has gone from strength to strength and *Community Greening* has assisted well over 150 disadvantaged communities to develop communal gardens throughout New South Wales. Over 20,000 participants have received horticultural training and advice from Trust education horticulturists during their 1,500 sessions in over 1,000 garden visits. In the last twelve months it has spawned an offspring programme called *Youth Community Greening*.

Introduction

For many years until its commercialisation, the Royal Botanic Gardens in Sydney displayed the Wollemi Pine in a cage (the first ever, in fact, to be planted in the ground). The cage drew attention to this living dinosaur, one of the world's rarest plants. The Wollemi Pine was discovered as recently as 1994 in the Wollemi National Park just 150 km from Sydney – Australia's greatest conurbation, with a population of over 4 million people. Yet, despite this eye-catching enclosure and the pine's high media profile, it was not unusual to see children run up to the enclosure with excitement, look inside and exclaim "Mum, there's nothing in here!"

This reaction highlights the general attitude that 'plants don't matter' and the fact that urbanisation has desensitised many of us to our natural heritage. According to Jane Tarran, current social attitudes towards nature¹ include:

- 'Plant blindness' – an inability to notice plants and to recognise their importance to the biosphere and us.
- Nature haters – nature is messy, threatening and needs to be controlled
- Nature neutrals – comfortable in areas without nature
- Tamed nature – yards, high-density camping grounds and motorised outdoor recreation
- Renewal in nature – periodic contact with nature
- Love of and dependency on nature – wilderness dwellers.

Botanic gardens provide opportunities for immersion in the natural environment in an otherwise urbanised existence by catering to all the above attitudes. They provide an attractive green backdrop for social interactions. Gardens with pockets of remnant bushland assist people to experience 'real' nature while still staying 'in control'. And ideally botanic gardens are places for rejuvenating the human spirit in accordance with the Biophilia hypothesis proposed by Edward O. Wilson – that human beings subconsciously seek connections with other living things.

For those of us who work in botanic gardens, our challenge is to provide visitors with meaningful engagement with plants as well as peace and tranquillity. By educating people about the importance of plants to life and the need to conserve them and their habitats, we help the public value the natural world and adopt sustainable lifestyles. However many people find it difficult to visit botanic gardens for a variety of reasons – distance, lack of transport, financial or time constraints. For botanic gardens to be of service to the whole community, efforts need to be made to go 'beyond the walls'.

Taking the message to the people

Educational outreach programmes provide excellent opportunities for botanic gardens' staff to come face-to-face with residents in their local area. By having programmes take place where people live, local environmental issues can be addressed and relationships can be built up.

Special strategies are required for outreach programmes. In the case of the public who visit our gardens, visitor research gives us their demographics, reasons for visiting and even good understanding of their attitudes and values, but the community 'outside the walls' presents greater challenges. How does an organisation like a botanic garden promote appreciation, understanding and knowledge of plants, their conservation and importance for the population to a public of myriad interests, cultures and beliefs, ages and educational backgrounds? The answer lies in working within established frameworks in known communities and in establishing partnerships.

School-based programmes are effective because the target audience is clearly defined and the programmes can be tied into well-established curriculum frameworks. Outreach programmes delivered in schools enable effective learning throughout the community. Schools sit at the centre of community life, both physically and socially. Young children discuss their lessons with family members and teachers talk about school highlights when they socialize. Many parents and citizens are also involved in school activities and serve on school advisory committees. In fact, in a small country town a well-planned school programme can reach a significant proportion of the whole community.

The Botanic Gardens Trust in Sydney (the Trust) has been taking its educational programmes 'beyond the garden walls' since the early 1980s, when Community Education staff conducted a touring programme to schools called *RBG goes West*. Children were introduced to weird and wonderful plants, helped to green up their school grounds and their parents were assisted with their own gardening queries. Trust staff came face-to-face with the broader community, environment groups and local governments: together they tackled environmental issues, implementing sustainable practices along the way. Community links were strengthened as people came to appreciate that botanic gardens were interesting and relevant to their everyday lives.

The Trust also set up an annual outreach Arbor Day programme with nearby inner-city schools. Once again, the strategy was to work with an identified audience, tying environmental messages into established curriculum frameworks. For about six weeks before Arbor Day (the last Monday in July) the Trust education horticulturists worked out the a garden design with children and school staff and helped them select plants for learning purposes. On Arbor Day itself, every child and teacher planted a small tree or shrub as part of the new landscaping. Ongoing contact with the students, staff and local community was maintained through the establishment of school garden clubs.

To reach home gardeners, the Trust formed non-exclusive strategic educational alliances with the horticultural industry. For example, for the last five years we have been able to deliver our environmental

messages through Eden Education², a partnership programme with Eden Gardens, a commercial garden centre in suburban Sydney.

Two community greening initiatives

In 1999 the Trust explored the trend in communal gardening as a way of promoting environmental stewardship in disadvantaged areas. After studying outreach programmes offered by the Brooklyn and New York Botanic Gardens, the Trust became involved with Sydney's public housing communities.

In August 2000 a formal partnership was set up with Housing NSW (HNSW), the largest owner of urban land in NSW, a total of 70,000 hectares. An environmental education programme called *Community Greening* was developed to build social capital and promote communal gardening, especially in disadvantaged communities in urban and regional New South Wales. Both Eden Gardens and HNSW operate state-wide: the aim of the initiative was to encourage residents in social housing estates and associated school communities to take ownership of their local environment, to develop an understanding of sustainable horticulture and to make friends with their neighbours – often from different cultural backgrounds.

HNSW provided funding for Trust staff – education horticulturists – to 'go beyond the walls' to work with local communities, associated HNSW Regional Coordinators, other government agencies and businesses. Trust staff, arriving in a dedicated identifiable vehicle with donated plants, pots, seeds and other gardening supplies for the communal gardening project, were welcomed and encouraged to provide horticultural advice and environmental education. Eden Gardens has been a major supporter of the programme since its inception, providing about \$50,000 worth of plants annually. Rather than destroying 'past its best' retail stock, Eden Gardens make it available for community groups who are not in a position to buy plants. Other nurseries have followed Eden's lead and have come onboard in support of this community-based initiative.

The programme has grown steadily over the past nine years and over that time has helped over 200 disadvantaged communities to connect with nature. Currently there are 174 *Community Greening* projects up and running, in planning, or awaiting development. The aims of these programmes are to:

- improve health and community resilience
- green and renew the urban environment
- give a helping hand to communities in need
- increase gardening skills and employment opportunities
- promote recycling and sustainable lifestyles
- increase community ownership of public spaces, and
- encourage the community, especially children and young people, to value the natural environment.

With regard to the last point, *Community Greening* helped set up 26 community gardens in schools and 22 school garden clubs by building on the experiences of running *RBG goes West* and Arbor Day celebrations. Children today face many challenges for the future, including finding their identity in an uncertain and changing world. It became evident that so much more could be done with and for children (0-14 years old) and youth (15-24 years old). It is well established that early positive intervention in troubled young lives can arrest and turn around negative attitudes and behaviour.

Thanks to funds raised through the Trust's Foundation – *Youth Community Greening*, an offspring programme was born in 2008. *Youth Community Greening* is an environmental education programme specifically targeting urban and rural youth with the most need, throughout New South Wales. Its aims are to:

- Assist the most needy young people in society
- Build self-esteem and youth resilience
- Create opportunities for young people to connect with nature
- Increase youth ownership of public spaces
- Develop gardening skills and enhance employment opportunities
- Green the urban environment and promote sustainable lifestyles.

In its first year, an additional 27 schools were added to the programme and a School Garden Teacher In-Service programme upskilled 82 teachers from 50 disadvantaged schools. *Youth Community Greening* has proved so popular that 10,000 students have benefited from 250 sessions with Trust educational horticulturists who are now working with 68 schools and youth programmes. A student Expo at the Royal Botanic Gardens is planned for November 2010.

Starting small with one part-time education horticulturist, *Community Greening* and *Youth Community Greening* now employ four full-time Trust education horticulturists. A short video highlighting these programmes can be found on the Trust and HNSW websites³.

Elements of a successful community programme

If botanic gardens are to do anything of consequence ‘beyond their garden walls’ then they must work together with local communities, businesses, Councils and other State government organisations towards a common goal. Partnerships – both formal and informal – make this possible. Partnerships create a working environment of mutual trust where decision-making, management, benefits and costs can be shared. Forming partnerships has additional relevance in the current political and economic climate where most organisations are being asked to do more with less. By coming together for a common goal desired outcomes are achieved more efficiently or effectively, while all the partners can still fulfil their individual missions.

In order to build community capacity communities must be empowered and allowed to decide what they want to do. If a community is not interested in a programme, or it is imposed on them from above, then it will not work. Through the experience of a decade of *Community Greening*, we have learnt that to build community engagement involves:

- Supporting the community champion/dynamo/spark. There is generally one individual in the community who is highly motivated and keen to implement the idea. If that person is supported and encouraged then the rest of the community is more likely to become involved.
- Delivering on promises and not over committing. Community respect and trust are built this way; small successes breed involvement.
- Taking excursions to beautiful botanic gardens. Inspirational standards are set when the community ‘plays at your place’. This will also reduce their sense of constant intervention by authorities in their lives.
- Holding regular garden planning and management meetings. This gets the dialogue going and the community comes up with the ideas. By involving representatives of all community groups or at least consulting them, a project is more likely to be accepted and not vandalised by non-participants.

Gardening as a community serves many purposes. The communal gardens that work best are the ones that are more than just beds of plants. They include items such as shaded areas, art works and barbecue sites: these are places where people come together to socialise. Garden settings relax people and give them a break

from the harsher realities of daily living. Community gardeners are more likely to be tolerant of differences and accommodate them by coming up with their own sets of rules and regulations as to how their community garden will operate and what they expect of each other. Good outreach programmes attract funding; however this can and does take a long time to achieve! If programmes are well received and are of real value to society, then organisations and benefactors are more likely to give money and in-kind support and the community as a whole is happy to give that most precious commodity – their time and interest.

The most important element of any successful community programme is that it is underpinned by a learning ethos – providing positive esteem and meaningful engagement. ‘Learning by doing’ comes naturally with horticulture. By doing, the community can ask for guidance when *they* need it. Training sessions by skilled educators can then be tailored accordingly. One size never fitted all. As educators we always seek feedback, going so far as to hand out evaluation sheets, so that we can improve our own skills. This builds everyone’s esteem. A non-learning situation is one where we provide training that *we think* they need. This is a recipe for failure. It is interesting to note that programmes run within botanic gardens involve a top-down approach (designed to contribute to the planned work of the organisation) whereas the best outreach programmes are community owned and driven from the bottom up.

Those of us involved in botanic education always marvel at how easy it is to get kids excited about plants and gardening. Gardening is hands-on and truly interactive and can be done by people of all ages, backgrounds, social status, interest levels and abilities. The rewards and sense of achievement are instant – (the satisfaction of successfully planting something) and ongoing (watching it grow and produce flowers or fruit). If the key to education for sustainability is to be ‘futures focused’, then what could be more optimistic than undertaking a garden project? Imagining the future and planning for change – whether it is next week, next season or next year⁴.

Conclusion: an optimistic future

Governments the world over are embracing strategies to green the urban environment and make cities more aesthetic and sustainable places to live. Visionary architects are coming up with building designs that incorporate plantings so that gardens cover the equivalent footprint of land that their new buildings will extract from nature. Urban planners are developing green corridors through suburbs to link native habitats, provide cycling and walking routes and green spaces for public enjoyment. And the interest in, and the benefits of, communal gardens are on the increase.

With inspirational ideas such as these, and commitment from all kinds of decision-makers, the stage is set for open and effective communication that will result in a greener urban landscape. By bringing together communities, governments and businesses there are triple bottom-line benefits: for society, the environment and the economy. Botanic gardens’ educators should be proud to be involved in this process.

Notes

1) Urban Forests Forum Dr Jane Tarran University of Technology, Sydney (UTS), and Philip Hewett, Newcastle City Council http://www.science.uts.edu.au/des/StaffPages/JaneTarran/jane_tarran.html.

2) Eden Education at Eden Gardens <http://www.edengardens.com.au/>.

3) *Community Greening* www.rbg Syd.nsw.gov.au/education/community_greening and www.housing.nsw.gov.au/.../Community+Greening+Program.htm.

4) *Community Gardens as a Platform for Education for Sustainability* Linda Corkery.

5) *Effective Sustainability Education: What Works? Why? Where Next? Linking Research and Practice* 18-20 February 2004, Sydney, Australia.

Theme gardens in the National Botanical Gardens of South Africa: interpreting biodiversity and climate change and empowering visitors to make a difference

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Introduction

Every one of South Africa's nine National Botanical Gardens is a place of outstanding natural beauty incorporating a cultivated garden and a protected natural area. Each one is a special place to visit, showcasing some the wealth of southern Africa's plant life and providing a refuge for indigenous plant and animal life. Most of the Gardens employ an interpreter, whose job it is to use interpretation to increase meaning and value for visitors, to enhance the visitors' experience, and to inspire visitors to appreciate and care about indigenous plants, animals and the environment and to carry that love of nature through to their everyday lives by making changes in their lifestyles and acting in an environmentally responsible way. This is a huge task, and made more challenging by limits on budget and staff.

The method that has proved to be a most cost-effective and efficient way of accomplishing this task at the National Botanical Gardens is the use of interpretive signs and themed gardens. Interpretation gives us the tools to take subjects like biodiversity and climate change, which are huge, confusing, scientifically impenetrable and daunting subjects, and break them down into manageable, clear, easy to understand, non-threatening themes and narratives, and to pass it on to the visitors in an engaging, creative, stimulating and educational way. This paper looks at one of the theme gardens at Kirstenbosch National Botanical Garden, the Garden of Extinction, which tackles issues related to both biodiversity and climate change, examines the aims and objectives of the garden, and discusses how signage and language are used to convey the theme.

What is interpretation?

One of the most useful things that interpretation has taught me is to always keep the end product in mind, and in this way remain focused on the objective and not get lured down too many interesting rabbit holes. I also find it useful to do quick refresher courses on the basics of interpretation every so often; it helps keep me on the right track. Interpretation is the communication link between the garden and its visitors, but it is more than just presenting facts and information to the visitor, it is about revealing meaning and relationships.

We aim to capture attention, to entertain, to arouse curiosity, give new insights and understanding and to excite and enthuse. Interpretation should therefore be enjoyable, informative and meaningful.

Breaking down huge subjects

We are dealing with huge subjects and we have a great deal of information to share. We can never tell everything about everything; even if we tried we would end up being a mind-numbing encyclopaedia and our audience would have long since wandered off to do something else. To reach our audience we have to be able reduce the information, to streamline it, cluster it and break it up into small, digestible chunks. The best tool to help us do this, so that we know what to tell and what to leave out and still have a meaningful, informative product, is to use themes.

Using a theme

A theme gives the interpreter focus, it enables us to convey the message more effectively by selecting and presenting the information that relates to the theme. Most importantly, it makes it easier for the visitor to follow and understand because most people remember messages, not facts.

If there is no theme then the visitor is presented with a random selection of unrelated facts, and it will very likely cause them to speak the words that no interpreter wants to hear: “So what?” or “What’s the point?”

Themes and subjects

A theme is the main idea or take-home message. It is not the same as the subject or the topic. A theme is a specific message or aspect of the subject, and one subject can have many themes. Identifying the theme is often the most difficult part of the process of designing suitable interpretation, but it is important to identify a theme; once it is done, it makes the rest of the process much clearer.

Your theme should become clear when you complete the following sentence: When the visitors have walked through the garden, I’d like them to know or to understand that ...

For the Garden of Extinction at Kirstenbosch, our subject is Threatened Species, and the theme we chose was: Wild plants and animals are dying out because of mankind and our lifestyle, we must act to prevent this.

Our approach

The objective of the Garden of Extinction is to promote awareness amongst the public about the plight of South Africa’s flora, to highlight the threats to plants, to explain why it is important to save plants from extinction, to suggest what ordinary people can do to help, and to show that many of the threatened plants are also good horticultural subjects.

The Garden of Extinction is located near the Centre for Home Gardening and gets a lot of passing visitor traffic. It has an attractive footpath through it but it is not accessible to wheelchairs because the footpath includes many steps, due to its relatively steep slope. The visitor profile at Kirstenbosch is on average 85% adults and 15% children under 18, including school groups. Our target audience is thus primarily non-captive. Most of the visitors are on holiday, or have come to relax, not necessarily to learn, and our signage has to capture their attention and get its message across as fast and as easily as possible.

We decided on a thought-provoking rather than fun approach because this is a serious subject. Since extinction is about death of species, we created a memorial (Figure 1) to an extinct species of *Erica* to link the shock or surprise of seeing a gravestone, and the thought of death it invokes, to an extinct species. While this is an effective feature in the Garden, it may have been even more effective if it could be seen from outside the Garden, which would bring people in to investigate.

Language

The subject of plant extinction carries many technical terms and scientific jargon words, which need to be translated or explained. The style of writing we use is simple, everyday, spoken language that foreign tourists and school children can understand. According to SANBI’s language policy, the main body of the text is translated into Afrikaans and Xhosa, the most widely spoken of the official languages in the Western Cape.

Signage

All plantings at Kirstenbosch have a conventional plant label, giving the family, scientific name, vernacular names and locality. Theme gardens use ‘interpre-labels’ instead (Figure 2). These are labels that give the

information about each plant and a piece of information relevant to the theme of the Garden. The interpretive labels for the Garden of Extinction give the plant's threatened status and a sentence about the threats that endanger the plant, in a large, easy-to-read font. The threatened status is in red type to make it stand out and link to the Red List. Interpretive labels in this and other theme gardens have proved to be very successful and are taken more notice of by many visitors than the storyboards. It is an effective way to give direct information about a plant and to relate the plant to the theme, with the plant in front of the visitor.

A suite of red mini-signs (Figure 3) was also created to reinforce the theme, red being the colour of the Red Listed species, and they attract the eye. They are the same size as the interpretive labels (160 mm x 100 mm), but are silver text on a red background, and carry a single thought-provoking quote or statement relating to the theme. They are a very useful way of including additional facts and detail that could not fit onto the storyboards. These too are noticed and read by visitors.

Six storyboards were developed, in black and white, using an in-house system that has proved to be very long-lasting and is therefore less expensive to maintain than colour prints.

Storyboards

The introductory storyboard (Figure 4) outlines the theme of the Garden, telling the visitor what they can do and see in the Garden. The heading aims to shock and catch the attention of passers-by. Even if they don't read the whole text, which is long, the heading and subheadings convey the theme and objectives of the Garden.

Most plant and animal species, including threatened plants, do not have obvious medicinal or other uses, and it is a challenge convincing many people to care about plants that have no obvious use or measurable value to them, particularly where housing and food production are concerned. Why should Mr. Smith care about some plant that he can't eat, use for fuel or medicine, when his family needs the land for their house? This was the question we tried to answer on the storyboard entitled 'Why conserve plants?'. (Figure 5) We were initially going to present the usual reasons why people should care about plants because of what plants do for people, but thought that this distracted from the core message, which is that plants are dying, plants are essential, we must conserve them. This also seemed to be the perfect place to illustrate the importance of plants using the ecology pyramid (see Fig. 5.)

The next storyboard (Figure 6) immediately outlines the threats to plants. The illustration echoes the ecology pyramid but shows it in disarray, with mankind having the same effect on the natural environment as a nuclear explosion. It aims to express a feeling of disharmony and distress, that all is not well and that it is our fault.

How threatened species are evaluated is explained on the storyboard that also defines the different Red List categories (Figure 7). This is the most technical and least attractive of the storyboards, but it conveys important information and links to the interpretive labels.

Subjects like threatened species and climate change are bad news, doom and gloom with large doses of blame and shame, which makes people depressed and hopeless, or angry and upset, and on the defensive. The storyboard entitled 'What can we do?' (Figures 8, 9) is the one that people see as they leave the Garden. It is there to inspire people to act, but also to give encouragement, hope for the future and comfort, in that however little they feel they can do, it will make a difference. We focused on getting people to examine their own lifestyles and suggesting relatively easy things that they can do rather than vague, good intentions statements. To illustrate this board we used the view of Earth from space to borrow the feeling that Earth is finite and vulnerable that the image invokes.

We had a notable success story where a species of *Erica* once abundant in parts of Cape Town went extinct in the wild and was thought to have gone extinct altogether, but plants had survived in cultivation in various gardens and the species has now been re-introduced to Kirstenbosch and to the wild. The good news story of

Erica verticillata is told on a separate storyboard on the edge of the garden (Figure 9). It also functions as an overview of the Garden's theme.

Conclusion

South Africa's National Botanical Gardens have long been beautiful places where both adults and children come to see and learn about indigenous plants. They are also the ideal place to expose the public to the destruction and devastation of the natural world caused by humankind and the resultant threats to biodiversity. The challenge is to communicate the message in an effective manner and to garner people's support to confront the problems without alienating or overwhelming them.

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Fig. 1 Memorial in the Garden of Extinction: "In memory of *Erica pyramidalis* last seen in 1907 and all other extinct plants".



Fig. 2 Interpre-label for *Leucospermum formosum*



Fig. 3 Red mini-sign for *Erica verticillata*

Plants and Animals are Dying Out

Plants and animals are disappearing faster than at any time in the past. If this continues half of the species that were alive in 2000 could be extinct by 2100. The survival of many thousands of plants and animals is under threat. The highest concentration of threatened plants in the world is in southern Africa, and many of them are in the Cape Floral Kingdom. Scientists predict that 4 out of every 10 species of the protea family will be extinct by 2050. In the Garden of Extinction, you will see some of these rare and threatened plants, find out what is threatening them with extinction and what you can do about it.

Plante en Diere is Besig om Uit te Sterf

Vandag sterf plante en diere vinniger uit as ooit in die verlede. As dit so voortgaan sal net die helfte van die soorte wat in 2000 bestaan nog oorleef teen 2100. Duisende plant- en diersoorte word bedreig. In suidelike Afrika, veral in die Kaapse Planteryk, word die grootste konsentrasie bedreigde plante aangetref. Wetenskaplikes waarsku dat 4 uit elke 10 protea-soorte teen 2050 reeds uitgesterf sal wees. In die Tuin van Uitsterwing sal jy party van hierdie skaars en bedreigde plante sien, uitvind waardeur hulle bedreig word en wat jy daaromtrent kan doen.

Wamkelekile kwi-Gadi Yentshabalalo

Izityalo nezilwanyana zinyamalala ngokukhawuleza kunalo naliphi lesha lamandulo. Ukuba aku kuyaahubeka isiqingatha sezityalo nezilwanyana ezaziphila ngonyaka ka 2000 zakube zitshabalele ngonyaka ka 2100. Ukuphila kwe zityalo nezilwanyana ezininzi kusemgciphikweni. Uninzi lwezityalo ezisemngciphikweni ehlabathini zise Mzantsi Afrika. Ezininzi izikwi Cape Floral Kingdom. Iinzulu-wozi zithi isine kwezilshumi indizi ze protea zakube zitshabalele ngonyaka ka 2050. Kungenzeka uyagqibelsa ukuzibona ezityalo zisemngciphikweni wentshabalalo. Khangela ukuba yintoni ezibeka emngciphikweni wentshabalalo.

This may be your last chance to see some of these rare and threatened plants.

Look for the threatened status of the species on the plant labels, and find out what is causing them to die.

Try to find some of the critically endangered members of the protea family, like the Kraaifontein Spiderhead (*Serruria furcellata*), and Cape Flats Conebush (*Leucadendron levisanus*).

Learn how scientists can work out if a species is in danger of going extinct and how much danger it is in.

Discover how one Cape heath was saved from extinction, but another was not.

Find out why plants and animals are dying and what you can do to stop it.

Why Conserve Plants?

The fact that species are going extinct faster than anything we've ever seen in the past, tells us that things are going very wrong in nature. If we don't fix these problems soon, they will get even worse and life on Earth, as we know it, could come to an end. While we take steps to fix the big problems, we must also preserve threatened plants and their habitats, and the community of animals, insects and other plants that live with them, and make sure that they are not lost forever.

Waarom Plante Bewaar?

Plantspecies sterf vinniger uit as in die verlede, en dit dui aan dat daar groot fout is in die natuur. As ons nie dié probleme vinnig oplos nie sal hulle vererger en die lewe op Aarde, soos ons dit vandag ken, sal verdwyn. Terwyl ons optree om die groot probleme reg te maak moet ons bedreigde plante en hul habitats bewaar, saam met al die ander plante, diere end insekte wat daar leef, om te verseker dat hulle nie vir altyd verlore is nie.

Kutheni Zilondolozwa Izityalo?

Into yokuba izityalo zitshabalale ngokukhawuleza kunayo nanonini na eyakhe yabonwa mandulo, isixela ukuba kutho into engalunganga kwindalo. Ukuba asizilungisi ingakho ngoku, ziyakuba ngaphuzulu, njengakuba sizazi ubomi emhlabeni bungo kilekela estshelweni. Njengokuba silhlabatha amanyathelo ukusombulula iingakho ezikhulu, maziindolozwe izityalo ezisemngciphikweni, nendawo esikhula kuzo, nezilwanyana, nezihlabazane, nezinye izityalo eziphila kunye nazo, ukuze zingalahleki kuphele.

We depend on plants

Plants are essential to life on Earth

Tertiary consumers: large carnivores (meat eaters) - the larger animals, birds, and reptiles that prey on other large animals, birds and reptiles.

Secondary consumers: small carnivores (meat eaters) - animals, birds, insects, reptiles, frogs etc. that prey on the smaller herbivores and insects.

Primary consumers: herbivores (plant eaters) - animals, birds insects, frogs, reptiles and other creatures that feed on the leaves, fruits, bark, seeds, bulbs, nectar etc. produced by plants.

Primary producers: green plants convert the energy of the sun into leaves, fruits, nuts, seeds, nectar, bulbs, bark, wood, etc. that provide food for us and millions of other creatures. Plants also release oxygen that we breathe.

What threatens plants?

The place in nature where a species lives and grows is called its **habitat**. When a habitat is damaged or changed, the plants and animals that live there lose their home, and many of them die. A species is **threatened** with extinction if it is losing its habitat, many of the plants have died, and it is possible that all of them could soon be dead. It is the actions of people that are causing most of the damage in nature and the changes to habitats that are threatening the survival of so many species.

Hoe word plante bedreig?

Die **habitat** van 'n spesies is dié plek waar dit in die natuur voorkom. As die habitat verander of beskadig word sal die plante en diere wat daar voorkom moontlik nie kan oorleef nie. 'n Spesies word **bedreig** met uitsterwing wanneer sy habitat vernietig word, baie van die plante sterf, en almal moontlik gou sal verdwyn. Die meeste skade aan die natuur word deur mense gedoen, deur die habitats so te verander dat 'n menigte spesies bedreig word.

Yintoni ebeka izityalo emngciphikweni?

Endalweni indawo into ephila ehlala kuyo yi **habitat**. Xa le ndawo ilhe ya moshwa okanye yatshintshwa, izityalo nezilwanyana ezihlala apha zitshabalelwa ikhaya, ezininzi ziyafa. Into ephilayo isemngciphikweni wentshabalalo xa lalshabalelwa yi ndawo, izityalo ezininzi zifike, kungenzeka zonke zife. Zizenzo zabantu ezibangela lemashaiha kwindalo kwaye olutshintsho lwendawo lubeka ukuphila kwendalo emngciphikweni.

The actions of people damage nature and change habitats, which is killing many plants and animals.

Invasive Alien Plants: Some introduced plants become weeds, invade natural ecosystems, take the place of native plants, change the soil fertility and pH, use up too much water and increase the fire hazard.

Urban Sprawl: Cities, towns, industrial areas and golf estates are expanding rapidly, swallowing up large tracts of land and changing it forever.

Farming: Farming and forestry destroy natural habitats and degrade the land.

Harvesting: Wild plants are collected or parts of them harvested for the medicinal plant trade and for the gardening industry. Over-collecting is greatly reducing the populations of many species.

Climate Change: Changes in temperature and rainfall makes some habitats no longer suitable for its species and if they can't adapt fast enough, or migrate, they die.

Mining: Open cast mining and mine dumps destroy large areas, mining uses lots of water, pollutes streams, lakes and underground water and causes the water table to drop.

Figs. 4-6 Storyboards for introduction, conservation and threats to plants

When is a plant a threatened plant?

A species is made up of a number of individual plants, known as a **population**, and the area of land that a population covers is known as its **distribution range**. To find out if a species in the wild is in danger of going extinct in the near future, it is assessed according to the IUCN Red List Criteria. This assessment is based on:

- the number of mature (seed-producing) individuals in the population;
- the size of the distribution range, and if it covers an unbroken area or is split up into patches that are cut off from each other (fragmented);
- whether or not there are fewer plants than there were ± 10 years ago.

A species that has been evaluated is placed in a Red List category. Knowing its category helps us develop a strategy to conserve and protect it.

Wanneer word 'n plant beskou as bedreig?

'n Plantspesies bestaan uit 'n getal individuele plante, bekend as 'n **bevolking** en die gebied waar die plante groei is bekend as die spesies se **verspreidingsgebied**. Om te bepaal of 'n spesies met uitsterwing bedreig word, word dit volgens die IUCN Roolys-standaarde ondersoek. Die ondersoek word gebaseer op:

- die getal volwasse (saad-vormende) individuele in die bevolking;
- die grootte van die verspreidingsgebied, en of dit 'n aaneenlopende gebied is of uit geïsoleerde fragmente bestaan;
- of daar meer of minder plante is as ± 10 jaar gelede.

'n Spesies wat ge-evalueer is word in 'n Roolys-kategorie geplaas. Dit stel ons in staat om 'n strategie te beplan om die spesies te bewaar en beskerm.

Kunini xa isithyalo sisemngciphekweni?

I spesies sensitive linani lezithayo, zaziva njenge **population**, ubungakanani bomhlaba apho le population ikhona khona yaziwa ngokuba yi **distribution range**. Ukufumanisa ukuba i spesies endle sisengozini yentshabalalo kwixa elizayo siphononngwa ngokwemigaqo yeIUCN Red List Criteria:

- inani lezithyalo ezivela imbewu kulo population;
- ubungakanani bomhlaba, nokuba ngumhlaba oqngqekileyo, okanye ngamantshu ontlantshi uhleliweyo;
- izithyalo ezithyalo zimbalwa na xa uhlangahlengisa nakwi 10 yeminyaka egqathileyo.

I spesies esiyi saphononngwa sibekwa kwi Red List Category. Ukwazi uluhlu esikulo kunceda ekumiseleni isitoko sokusulundolozo nokukhuseleka.

IUCN Red List Categories:

The IUCN, or World Conservation Union, is the world's largest conservation network. It was founded in 1988 for the conservation of nature and natural resources.

- Extinct (EX):** the last known individual has died.
- Extinct in the Wild (EW):** no longer known in the wild but survives in cultivation.
- Critically Endangered (CR):** faces an extremely high risk of extinction in the wild.
- Endangered (EN):** faces a very high risk of extinction in the wild.
- Vulnerable (VU):** faces a high risk of extinction in the wild.
- Near Threatened (NT):** not at risk but likely to become threatened in the near future.
- Least Concern (LC):** not threatened.

(Adequate Data) (Threatened)

(Evaluated)

Data Deficient (DD): not enough information to make an assessment of its risk of extinction.

Not Evaluated (NE): not yet evaluated.

Rare is applied to species with a small population or distribution range and

Critically Rare to species that occur at a single site, which are not threatened but are at risk from sudden or unexpected changes and need to be protected.

Declining species are not threatened but threats are reducing the population and need to be monitored.

What can we do?

We must stop thinking that the Earth has a never ending supply of resources for us to use and unlimited space for us to dump our rubbish. We have to find ways to grow our food, build our houses, dispose of our waste, keep cool or warm, and drive our cars without destroying the world around us. We must learn to use our resources more wisely and preserve and nurture what is left of nature. We must act now. The future of Earth is in our hands.

Wat kan ons doen?

Ons moet besef dat die Aarde nie 'n onuitputlike bron is vir al ons behoeftes nie, en dat dit ook nie al ons afval kan hanteer nie. Nuwe maniere moet gebruik word om kos te lewer, huise te bou, koel of warm te bly en rond te ry sonder om ons planeet te vernietig. Ons sal moet leer om hulpbronne met groter wysheid te gebruik en die natuur te bewaar en te koester. Nou is die tyd vir optrede. Die planeet se toekoms is in ons hande.

Singenza ntoni?

Masiyeke ucukinga ukuba umhlaba unemfuno zethu ezingasoze ziphele, nendowo unkuhi yokulahlala inkunkuma. Masifumane indlela zokulima ukutya, sakhe izindlu, siphole, sifudumale, siqhube inqwelomafutha ngaphandle kokutshabalalisa okusingqongileyo. Masifunde ukusebenzisa iziseko ngononophelo sikugcine okuseleyo kwindalo. Masenze intshukumo ngoku. Ikamva lihlabathi lisezandeni zethu.

Tread lightly:

How much **IMPACT** does your lifestyle have on nature?

- How much stuff do you throw away?
- Do you support sustainable harvesting?
- Do you drive a low-emission car?
- How big is your carbon footprint?
- Do you support organic farming?
- How much power do you use?
- Do you recycle?
- How much water do you save?
- Do you grow water-wise plants?
- Do you grow invasive weeds?

Are you part of the problem or part of the solution?

If we pass on our planet in the fullness of her beauty and natural richness, we will be serving the children of the future.
Nelson Mandela

Protect and restore nature:

Support conservation organisations & programmes, e.g. join the Botanical Society of South Africa.

Grow threatened plants especially those indigenous to your area. Buy them from a reputable nursery, don't take them from the wild.

Adopt & conserve a reserve or natural area near home.

Volunteer your time, e.g. join a hacking group.

Spread the word, involve the kids, family and friends.

Keep watch on developments, are they doing environmental impact Assessments (EIAs)?

Support ethical companies, factories and mines that clean up and restore.

We must be the change we wish to see in the world.
Mahatma Gandhi

You can make a difference

Plants and Animals are Dying Out

Plants and animals are disappearing faster than at any time in the past. If this continues half of the species that were alive in 2000 could be extinct by 2100. The survival of many thousands of plants and animals is under threat. The highest concentration of threatened plants in the world is in southern Africa, and many of them are in the Cape Floral Kingdom. Scientists predict that 4 out of every 10 species of the protea family will be extinct by 2050. In the Garden of Extinction, you will see some of these rare and threatened plants, find out what is threatening them with extinction and what you can do about it.

Plante en Diere is Besig om Uit te Sterf

Vandag sterf plante en diere vinniger uit as ooit in die verlede. As dit so voortgaan sal met die helfte van die soorte wat in 2000 bestaan nog oorleef teen 2100. Duisende plant- en diersoorte word bedreig. In suidelike Afrika, veral in die Kaapse Plantek, word die grootste konsentrasie bedreigde plante aangetref. Wetenskaplikes waarsku dat 4 uit elke 10 protea-soorte teen 2050 reeds uitgestorwe sal wees. In die Tuin van Uitsterwing sal jy party van hierdie skaars en bedreigde plante sien, uitvind waardeur hulle bedreig word en wat jy daaromtrent kan doen.

Wamkelekile kwi-Gadi Yentshabalalo

Izithyalo nezilwanyana zinyamalala ngokukhawuleza kunalo naliphi ikhona lamandulo. Ukuba oku kuyaqhubeka isiqingatha sezithyalo nezilwanyana ezaziphila ngonyaka ka 2000 zakube zishabalele ngonyaka ka 2100. Ukuphila kwe zithyalo nezilwanyana ezininzi kusemngciphekweni. Uninzi lwezithyalo ezisemngciphekweni ehlalathini zise Izantsi Afrika. Ezininzi zikwi Cape Floral Kingdom, linzulu-lwazi zithi isine kwezilwanyana ezininzi zakube zishabalele ngonyaka ka 2050. Kungenzeka uyogqibellisa ukuzibona ezithyalo zisemngciphekweni yentshabalalo. Khangela ukuba yintoni ezibeka emngciphekweni yentshabalalo.

This may be your last chance to see

some of these rare and threatened plants.

Look for the threatened status of the species on the plant labels, and find out what is causing them to die.

Try to find some of the critically endangered members of the protea family, like the Kraaifontein Spiderhead (*Sarruria furcellata*), and Cape Flats Conebush (*Leucadendron levisanus*).

Learn how scientists can work out if a species is in danger of going extinct and how much danger it is in.

Discover how one Cape heath was saved from extinction, but another was not.

Find out why plants and animals are dying and what you can do to stop it.

The botanist spiderhead is threatened by urban sprawl, agriculture, alien invasion and grazing. It is now critically endangered.

Kraaifontein Spiderhead (Sarruria furcellata)

Erica verticillata

Figs. 7-9 Storyboards for Red List categories, user actions and individual threatened species.

Programme enrichment during tough times: how do you turn your vision into reality?

Sharon A. Myrie

Brooklyn Botanic Garden, Brooklyn, New York, USA

Introduction

As educators, we constantly strive to build and strengthen programmes to serve the needs of our visitors on-site as well as in surrounding communities. We recognize that to remain relevant and connect with our visitors, we have to be creative in ways to deliver the message of the importance of plant diversity and its conservation. But what happens when you are just about to launch a new initiative; you've developed a plan, identified seed money to help launch the project and without warning, your institution, along with organizations across the country, is immediately affected by the financial crisis that the nation hasn't seen since the 1930s?. How do you keep the programme vision alive? What measures can you take to ensure manageable growth during these tough times?

All of us are suffering in this challenging funding climate. Not-for-profit organizations are forced to reduce programming due to loss of funds. Private foundation giving is down; corporate giving has almost come to halt as a result of mergers and companies folding; endowment income is volatile and dropping; and government funding, is dramatically reduced overnight. Yet, we continue to see the needs growing in our communities. Visitors want to learn more about plants in an age when 'green is in'. Funders continue to want to see innovation – new thinking – ways to demonstrate that our programmes remain on the 'cutting edge'.

At Brooklyn Botanic Garden (BBG) we face the dilemma of strengthening programmes while recognizing the fiscal challenges that are before us. This paper focuses on one special programme, GreenBridge, that works directly in the community and is charged with nurturing and supporting a love for greening within the context of building a strong community network of organizations and individuals who share the same common goal. In 1993, BBG launched GreenBridge, its community horticulture programme, to promote the greening of the urban environment through education, conservation and partnerships, and involves more than 50,000 Brooklyn residents each year in community horticulture and neighbourhood greening projects throughout the borough.

Background

Beyond BBG's 52 acres of lush gardens, the role of GreenBridge is crucial to its surrounding community. Lack of access to green space and high-quality environmental education is a fundamental environmental justice issue in low-income, urban communities, such as those surrounding BBG. According to the New York City Open Space Coalition (www.treebranch.com) New York City has fewer acres of green space per capita than any other major American city. Brooklyn is home to 2.5 million residents and is the most populous county in New York State and the second most densely populated county in the United States after New York County (Manhattan). If Brooklyn were an independent city, it would be the fourth largest in the nation. One of the greatest challenges that GreenBridge faces is how to most effectively focus its efforts and limited resources to reach its primary audience. With this in mind, in 2006–2007 GreenBridge undertook an extensive, year-long strategic planning process to identify community needs and key opportunities for growth. Facilitated by a planning consultant, GreenBridge gathered valuable input from 60 leaders of primary constituencies, representing block associations, community gardens, and other key community stakeholders and officials. What evolved was a document featuring more long-term focused support to community gardens; creating networking opportunities for block associations, community-based organizations and community gardens to share ideas, tools and resources; and identifying a new urban gardening training programme.

A new mission for GreenBridge emerged:

GreenBridge, the community environmental horticulture program of Brooklyn Botanic Garden, promotes the greening of the urban environment through education, conservation and creative partnerships. GreenBridge is building a vibrant network of people, places and projects dedicated to making Brooklyn a greener place.

Inspiring community residents to create green spaces block by block

As part of the strategic process, GreenBridge staff reviewed existing programmes to ensure that they were still relevant and still addressed the current needs of constituents. **Making Brooklyn Bloom**, a BBG tradition, serves as the annual kick-off event for the spring gardening season. Since 1982, it has provided a day full of activities at BBG and excellent horticulture information for the gardening public. What makes this annual event special and sustainable is that we look inward to identify the enormous resources that exist among our partners, identifying individuals and organizations that are ready, willing and able to share their knowledge and best practices among their colleagues. By providing them with a platform to share their secrets and creating ample networking opportunities, we have established a winning formula that not only keeps the event fresh each year but also makes it an affordable and manageable event.



Fig 1 Hollenback Community Garden: this is a photo of a local Brooklyn community garden that includes a composting site. One of the community gardeners is sharing tips with residents from other community gardens how they might set up their own composting system.



Fig 2 A workshop at BBG's Making Brooklyn Bloom events where a group of BBG teen volunteers (Garden Apprentices) are learning how to make 'compost tea'.



Fig 3 MacDonough Street. This is a block located in the Stuyvesant Heights Historic District of Brooklyn (part of Bedford Stuyvesant). MacDonough Street contains 1860s villa-style mansions and 1890s brownstones; it has been a frequent winner in the Greenest Block in Brooklyn contest and is a shining example of how residents can 'green up' their blocks in an urban setting. MacDonough has a high percentage of residents who participate in greening their block and are well known for selecting a wide variation of plants and a robust collection of hydrangeas.

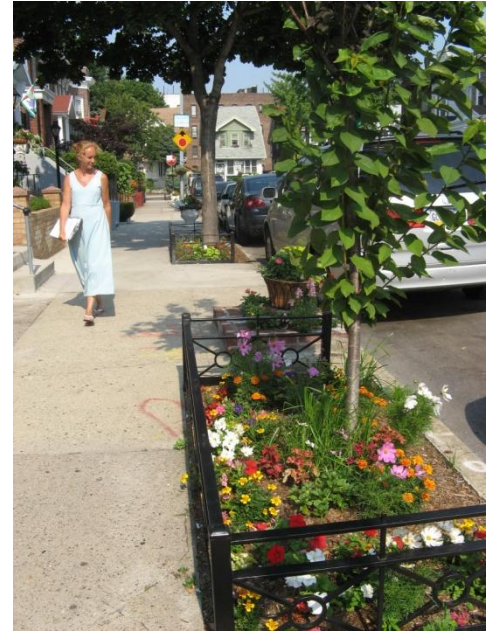


Fig 4 Tree Beds at Vanderveer Place: Another block that entered the Greenest Block in Brooklyn Contest. One of BBG's judges is admiring an example of how this block is caring for its street tree beds. Participants get extra points in the contest if they can show that they are taking care of their street trees.

Another standing tradition is the work that we do with community gardens. Since the late 1980s GreenBridge has provided resources to community gardens in New York City, providing plants and tools and, in the mid 1990s, advocating for the protection and preservation of hundreds of community gardens targeted for demolition by city officials. Recognizing that the needs of community gardeners has changed, GreenBridge re-evaluated how best to serve these neighbourhood gems, ultimately replacing GreenBridge's Community Garden Registration Program with the newly-created GreenBridge Community Garden Alliance (GCGA). GCGA is designed to focus on promoting sustainable gardening practices to support healthy communities of people, plants and wildlife. GCGA has a set of key principles that community gardens have to acknowledge that they will uphold. A list of skill sets for each participating garden is created, where we can identify unique specialties and features such as incorporating rainwater harvesting systems in the gardens, or engaging youth such as the East New York Farms, located in one of the poorest communities in New York City where youth get to design, plant, grow and harvest fresh food to sell at a local market. GreenBridge then works with community gardeners to identify an area where they would like support and offers workshops led by members of the Alliance with expertise in that area. Celebrations are an important part of strengthening the Alliance, offering events all year round: the Summer Garden Party, Harvest Pot Luck, and Winter Holiday Greens. Additional benefits include giving away lots of plants through donations from nurseries or after BBG's very popular plant sale. In addition to relying on its members to help other members, GreenBridge has also learned to tap into other BBG educational programmes. In the summer of 2008, GreenBridge formed a small internship programme with Brooklyn Academy of Science and the Environment (BASE), a local public high school that was designed and created by BBG and another

partnering organization. Through this initiative, BASE students work with GCGA to support summer projects such as building drip irrigation systems for community gardens. All gardens that sign up as part of the GCGA receive a sign recognizing its partnership with BBG. Building on its expertise in the field, in 2008, GreenBridge worked with BBG's Publications Department to publish an all-region guide highlighting Community Gardening programmes across the country.

The history of BBG's community outreach efforts could not be told without acknowledging the original project that started it all – the **New York City Compost Project in Brooklyn**, a long-lasting partnership with New York City's Department of Sanitation. Created in 1993, the Brooklyn Compost Project promotes compost outreach and education throughout the borough. Through the efforts of the Compost Project, we have improved soil in Brooklyn, diverted waste from the municipal waste stream, and increased community leadership through public education. This has resulted in increased composting in community gardens and households. Over 100 Master Composters, each required to provide 30 hours of service, have come through an intensive training session and have received certificates of completion. Partnerships have been formed, such as with Greenwood Cemetery, a nationally-renowned cemetery, to host annual Christmas tree recycling where trees are mulched and offered to the public.

One of GreenBridge's best-known initiatives is **The Greenest Block in Brooklyn Contest**. Established in 1994, this contest, a unique programme among botanic garden outreach, makes horticulture important to homeowners, stores and neighbourhoods. This friendly contest – where everyone is considered a *winner* – started on a very modest scale, with 50 participating blocks and a window box distribution programme. Co-sponsored by the Brooklyn Borough President, the programme is funded by a local foundation, Brooklyn Community Foundation. Since its inception, the contest has grown in leaps and bounds. In 2009, over 270 blocks and businesses entered the contest and 331 window box kits were sold. Block associations, block greening groups, or merchant associations can enter the contest simply by registering on-line. The judges – BBG staff, trustees, and leaders of partner greening organizations – canvas miles of blocks using specific criteria to come up with winners. Criteria used for judging are colour and total visual effect, citizen participation, variety and suitability of plants, care of street trees, soil condition, use of mulch and other good cultural practices. Care of street trees is a new added criterion to support an important plan led by the City's Mayor Michael R. Bloomberg to plant one million trees by the year 2020. GreenBridge, along with several other partners, is collaborating with New York City agencies to educate the public about caring for new and existing trees so that they survive the tough urban conditions for years to come.

During this careful and thoughtful strategic process, we re-affirmed our commitment to strong existing programmes. But, the voices of stakeholders who participated in our focus groups also revealed to us how much they desired a training component that weaved together our different workshop offerings into one cohesive curriculum to provide them with more opportunities to learn and bring this information back into their communities. The Brooklyn Urban Gardener (BUG) project emerged, specifically targeting individuals working in community gardens, block associations, and other community-based organizations, many of whom have participated in GreenBridge programmes. By the fall of 2010 BUG will provide intensive training to twenty community residents annually, through an eight-week course in which they will receive leadership training in such topics as sustainable gardening and tree stewardship. The project will allow an active trained volunteer corps the chance to share skills with a broader audience and foster greater diversity within the horticultural community.

The harsh realities

How can we implement such a sweeping new initiative in these difficult economic times? First, coming out of a strategic process carefully aligned with the mission and goals of BBG, the project is deeply rooted within the institution and is acknowledged as a high priority for BBG through its *Green Garden, Green City Centennial Campaign*. By clearly defining this project as an institutional priority, it paved the way for us to identify seed-funds to support the launching of BUG. Within a year of announcing the project, BBG was awarded a three-year prestigious grant from the Institute of Museum and Library Services' (IMLS) Museums for America to help BBG develop the institutional capacity to strengthen its community horticulture programmes, including meeting the growing demand by community residents for more intensive training in

community horticulture within an urban environment. Second, while the support of IMLS to jump-start BUG was invaluable, a significant aspect to realizing our goals will come through the support and guidance of community residents directly. And just as we have learned over the years how important it is to build our programming by engaging the community throughout the process – whether through Greenest Block in Brooklyn, Making Brooklyn Bloom, or training Master Composters – BUG will prosper only if the local community partners with us in the design and support of this initiative. We know that we face a tough road ahead during these troubled fiscal times, but by bringing our most valuable resources (community partners) to the table, we will not only strengthen the project but will keep it relevant and survive the test of time no matter what challenges may exist down the line that are beyond our control.

I want to leave you with a quote from Ellen Kirby, first director of GreenBridge, who addressed a 1997 BGCI audience in Cape Town:

In spite of the concrete, the potholes, the crowded conditions and the blowing horns of too many cars, we are hopeful because of the urban gardeners who are transforming their neighbourhoods with a green calm that soothes, teaches and heals.

Ellen Kirby

Plant-based education: can we see any progress?

Alla Andreeva

Botanic Garden of Moscow State University (“The Apothecary Garden”), Moscow, Russia

Since the international workshop on GSPC Target 14 held in Moscow in 2006 with support from BGCI, there have been some positive and encouraging changes in attitudes towards plant-based education and towards plants in general. Many of these changes have been in the area of informal education, in which botanic gardens play a very important role.

In Russia, thanks to international cooperation programmes and support from major companies such as British Petroleum, as well as a re-allocation of internal resources, virtually all botanic gardens now have a much stronger focus on education and public information programmes for professionals, schoolchildren and the general public. For many university gardens, such as Moscow University’s Apothecary Garden – which I represent – this has become their central mission. Even the academic botanic gardens, such as the Main Botanic Garden of the Russian Academy of Sciences in Moscow and the Central Siberian Botanic Garden in Novosibirsk, have begun “courting the public”, setting up educational centres and courses for different interest groups.

But it would not be true to say that this has all happened since 2006. By 2006, the building blocks were already in place – a platform had been created to underpin the gardens’ rapid development over the past 3 years. And most importantly for Russia’s botanic gardens, there has been a sea-change in the way garden specialists and administrators think about education and public information.

This has not been an easy process. It has required a great deal of coordination, both at the international level – by the BGCI, for example – and at the domestic level, with garden specialists networking and collaborating through dedicated conferences and workshops and the publication of a variety of manuals and textbooks. Over the past few years, for instance, the Council of Botanic Gardens of Russia has set up an Environmental Education Commission and run a series of education conferences and workshops with invited experts – including BGCI staff – to showcase the most successful experiences and development strategies. A dedicated methodological website has also been created.

All this work inevitably required serious funding and was only made possible thanks to support from international programmes. For us, the key programme has been Small Environmental Projects Scheme (SEPS), which was administered in Russia by the British Council with support from the UK Government (Defra), together with BGCI programmes and projects.

These efforts have set the wheels in motion, and the momentum is now building.

I would summarize the current status of education in Russia’s botanic gardens as “**understanding the process, building the resources and seeking new opportunities**”. Almost every garden has been faced with the question of where to go from here. There are various ways of approaching this, which is why, especially at this stage, new ideas, projects and programmes are needed and why networking and opinion sharing are so important. We are seeing that active development of the gardens’ educational profiles cannot be a unilateral process, though of course the gardens themselves need to initiate this. But there also needs to be a demand from society and a readiness to take up what the gardens can offer. In other words, this is a two-way street: there must be a match between demand on the one hand and capacity on the other.



View of the Apocathery Garden

So what are the social trends we are observing today? We are observing a change in the way modern city dwellers think; they are forging new values; they are seeking a better quality of life; they have a greater desire for beauty and to live in a healthy environment and eat healthy food. In line with these new values attitudes towards plants have also changed. There is a new appreciation of plants for the positive ways in which they affect our emotions, embellish our daily life, save us from depression and provide medication and food. People seem to be rediscovering the natural world – not through books, but through real-life experiences. And this is bringing people into the gardens.

This trend is something that we are seeing very clearly in the Moscow Botanic Garden and is probably typical of Russia as a whole. In 2008–2009, our visitor numbers increased by hundreds of times. The Garden has become an important and popular cultural and educational space for the people of Moscow.

Having so many visitors creates an excellent platform for developing education and public information programmes. Responding to the demand, the Garden is therefore prioritizing its efforts to create an information and educational space. But it's no longer enough simply to put up signs displaying the plants' names and classification. People expect more information. And so we are now focusing on producing interesting and accessible interpretation, usually highlighting ethnobotanical or environmental protection aspects, such as climate change.

This upsurge of interest in plants has given a strong boost to education and public information programmes: existing activities have been expanded, new excursions have been introduced and relationships are developing with schools and other public institutions. This has resulted in a seven-fold increase in demand for tours.

Since last year, in addition to the academic excursions, we have been offering tours of the garden for the general public. These are now run almost daily during weekday evenings and at weekends. Last year we sold over 20,000 tours. The tour programmes and topics are constantly changing and new formats are being pioneered. We are trying to add interactive elements, as well as literary, artistic and historic angles. For example, during some tours we offer tasting of vegetable oils and show items made of various types of trees and photographs of natural habitats. Our "Tulips in History and the History of Tulips" tour is very popular, as is a tour focusing on early-flowering plants that we run in the spring as part of our "Spring Flower

Festival". To support this growing level of public interest the Garden has published a number of new books and leaflets on plants and their importance.

The age profile of our visitors has also changed, and now embraces everyone from toddlers to pensioners. This year we have begun offering interactive subscription tours for children between the ages of 5 and 8, who come to the tours together with their parents. The course consists of 2 cycles of 4 tours each and has quickly gained popularity. It currently covers 8 subjects, but we are working to expand it further. Educational programmes for kids have now become one of our focus areas, though until recently the younger audience, together with pensioners, was virtually ignored.

There has also been progress on formal education, as the botanic gardens become more involved. The Apothecary Garden's education programme is expanding into new areas with an initiative to pilot a school garden collaboration scheme.

Schools are also making much more use of the Garden: in addition to the "Lessons in the Botanic Garden" cycle, they are working with Garden staff to develop a school curriculum in fields such as ethnobotany, studies of local flora, and setting up "local flora corners" and "apothecary gardens" within their own school grounds. In addition to tours around the Garden, the school lessons include plant identification, an introduction to flower structure, microscope studies, observation of pollination, phenology etc.

There was enormous interest from schoolchildren and teachers in a plant interpretation competition entitled *My Page in Moscow's Green Book*, which we ran for the first time this year as part of Plant Conservation Day. It was centred around medicinal and endangered plant species in the Moscow region. Entries consisted of projects portraying in artistic form (drawings, photographs) the ways in which the plants are used (for medicinal plants) or the reasons why they are endangered (for endangered plants), and illustrating what is being done – or needs to be done – to save them.

More than 100 entries were received from 5th and 6th-form pupils and reviewed by a jury. The Botanic Garden then organized an exhibition of competition entries. This exhibition opened on 16 May 2009 as part of the festival and ran until the end of the month. It was supported by the Moscow City Government. We have decided to make it an annual event, announcing the results on 18 May and running a similar exhibition in the Garden each year. We thought the title of the competition was a fortunate choice, as it encouraged young Muscovites to become active in nature conservation.

Schools that had been active in the competition were invited to take part in the Discovery Game during the Plant Conservation Day Festival. The game was about endangered plant species in the Moscow region, medicinal and useful plants. It involved performing tasks, finding plants using a route map and following clues set up around the Garden. This provided the kids with a lot of new information about plants and their uses, and introduced them to local endangered species. One very important aspect of these events is that they formed part of a shared international programme involving gardens from different countries around the world. This is like a magnet to which, I think, other gardens too will be attracted. The interest shown in the Plant Conservation Day event and creativity competition represents a real step forward in both formal and informal plant-based education.

The successful development of plant-based education is impossible without creating new educational resources such as manuals, textbooks and reference books. Our greatest achievement in this area has been the publication, this year, of Endangered-Species Lists for the Moscow Region and Russia as a whole, and also a book on Moscow flora. The editorial work on these vital publications was led by Moscow University's Botanic Garden, though unfortunately, due to financial constraints, the print-runs were very limited. And this is another big problem – finding the resources to publish and distribute these important books and publications in sufficient quantities, as well as providing access to them via the Internet. Another step forward in formal schools education is the Garden's role in running classes and giving lectures to teaching staff under a city-sponsored skills enhancement scheme, together with pilot developments of educational programmes and textbooks.

The Garden is also used to teaching students from pedagogical institutes – future teachers. We regard our lectures for teachers and teacher trainers as an important step in promoting plant-based education. One of the aims of these lectures is to introduce teachers to actual topical issues such as climate change or invasive plants. Plant invasion has become a global issue. As international tourism continues to expand, the danger of invasive flora penetrating natural communities is increasing fast. As a result, invasion not only needs to be studied, but the public needs to be made aware of the dangers and possible consequences of attempting to grow exotic plants at home. This is an issue that also needs to be addressed in school biology lessons. We have therefore now begun focusing on this in our lectures for teachers and students and are putting together a special interpretation course for them entitled “Plants in the World around Us: Topical Environmental Issues”

With so much going on, the Garden has attracted a lot of attention from the media. We work closely with television, and a number of features have been filmed in the Garden for popular children’s education programmes. To begin with, a huge amount of effort and money was needed to develop these programmes, which were only made possible by substantial support from sponsors. But already some of the activities listed above are starting to earn income for the Garden.

So to answer the question “Can we see any progress in plant-based education in Russia?”. I can definitely say “Yes!”

We see new challenges on the way ahead and need the resources to develop new ideas, projects and programmes for deeper cooperation and next steps.

Jewel of Arabia: developing education at the Oman Botanic Garden

Sarah Kneebone

Oman Botanic Garden, Sultanate of Oman

Abstract

Oman is home to over 1,200 species of plants: 79 species are found nowhere else in the world. They have been used as food, shelter, medicine, animal fodder, dye and perfume and each has its own traditional stories. However, society is changing; people are losing their connection to the land and ancient knowledge is being forgotten. The plants too are threatened, as their homes are fragile and easily damaged. Over 20% of Oman's plants are at risk from problems such as over-grazing and construction.

This paper presents an overview of the iconic new Oman Botanic Garden, which is being created to help protect Oman's plants and heritage. To be opened in 2012, it will be a 420 ha world-class facility, developed to conserve, display and research the botany and ethnobotany of Oman, and designed to become a destination for local and international visitors for learning, recreation, fascination and fun. In this paper we will present the processes we have been through so far, our ideas and hopes for the project and outline the challenges, both those that have been overcome and those we are still working on for the Garden as a whole and the education programme in particular.

What is the Oman Botanic Garden?

The Oman Botanic Garden (OBG) is a 4.2 million m² (420 ha) facility currently being developed to conserve, display and research the plants and ethnobotany of Oman. The Garden will become a destination for local and international visitors as a centre for learning and recreation. Established by Royal Decree in 2006, it is the responsibility of the Office for Conservation of the Environment, part of the Diwan of Royal Court.

The Garden will bring habitats to life from all over Oman. Visitors will be able to experience the seasonal fog forests of Dhofar all year round, walk through baking sand desert, see unique juniper forest, arid salty Sabkha, dry gravel desert and beautiful wadis in one day in one place. All of Oman's plants, from the dramatic to the beautiful and the tiny will be on display among carefully created naturalistic habitats. An extensive nature reserve surrounding the constructed Garden will provide a stunning backdrop, as well as providing facilities for *in situ* conservation.

The second purpose of the Garden is the researching and display of the rich cultural and ethnobotanical heritage of Oman. A 'heritage village' containing a series of workshops and exhibition areas will illustrate the traditional crafts and skills connected with Omani plants, from weaving to dyeing, perfume-making to herbalism, through live demonstrations, practical hands-on workshops, displays and interactive sessions for the visitors. The village is surrounded by agricultural terraces, complete with a traditional 'aflaj' irrigation system, a date palm grove, and a cultivated crops exhibit to illustrate stories of farming, life and survival in the harsh climate of the country. The aim is to not just provide an immersive sensory experience for visitors, but to encourage and enable them to become part of the story, sharing their own tales and skills to help preserve Omani heritage.

Why the interest in the plants of Oman?

Oman is home to over 1,200 species of plants; about 79 of these species are found nowhere else in the world. Southern Oman has been identified as one of the world's 35 endangered biodiversity hotspots.

Oman's plants have been used by its inhabitants for over 5000 years, as food, shelter, medicine, animal fodder, dye and perfume, as well as being the main source of wealth for the country before the discovery of oil. Omani traders sold frankincense in huge quantities to the Egyptian, Roman and Greek empires, along trade routes stretching halfway around the known world, and dates were Oman's main export before oil. Today, Omani plants and herbs can still be bought in the souk (market), for flavouring, perfume or medicine.

What does this have to do with the conservation and the environment?

Oman's society is changing; people are losing their connection to the land and ancient knowledge is being forgotten. As is the case in so many countries, people, especially the younger generations, are moving away from their villages to seek opportunities in the cities. This physical separation from older members of the family, parents and grandparents who hold and use traditional knowledge, makes it much harder for stories to be passed on. So this knowledge loses its relevance and significance outside of the village community; the plants may not be found in the cities, and synthetic alternatives are readily available.

The plants of Oman are also threatened, as many of their habitats are extremely sensitive to change and damage. Over 20%, or one in five, of Oman's plants are at risk from problems such as over-grazing, climate change, inappropriate development and habitat degradation, such as that caused by through off-road driving – a popular pastime. Obviously for the endemics especially this is deeply concerning. Oman could be said to have a duty to conserve them for the world, not just the county.

Oman Botanic Garden – 'green' beyond the plants

Oman Botanic Garden aims to promote and demonstrate best practice in sustainability, so that we 'walk the talk' for our visitors and also help protect the global and local environment. We are aiming to be the first project in Oman with international sustainability certification and recognition through the US Green Building Council's *Leadership in Energy Efficient Design* (LEED) programme. This has implications for the design, construction and operation of the Garden so that it uses water efficiently, uses recycled, locally produced and safe (e.g. low volatile organic compound content) materials, minimises its energy use, invests in renewable energy sources (primarily solar) and minimises resource use. We will use our sustainable activities to promote best practice to our visitors and to share this practice with Oman's construction and other industries as a whole, through conferences, workshops and site visits. One of the central aims of establishing the Garden is to act as a model for sustainability for Oman.

What are we doing with the education programme?

Over the last 18 months the education programme has been gradually evolving and growing. With the help of Leigh Morris of the Royal Botanic Garden, Edinburgh, who works with OBG for 6 months a year, we have devised a simple strategy for the education department, identifying our main aims and objectives for the Garden's educational output:

- Developing the OBG education team.
- Establishing an informal education programme, including interpretation provision.
- Establishing a formal education programme.
- Ensuring integration with OBG's other departments.
- Raising awareness of OBG's education provision.

This strategy was fleshed out to form the basis of a three-year strategic and operational plan, with activities identified to support each target and with a named individual responsible to take each target forward by a specified date. This initial plan is still ongoing: the main challenge to realising it is our limited team size; our

recruitment for more members of the education team has taken over a year and the new recruits will not be in post until the beginning of the year 2010. However, we have had some successes:

Developing the OBG education team

Dareen Mehdi, the environmental education specialist at OBG and Zawan Al Qasabi, the herbarium specialist, have formed the backbone of the education department so far. They have been working on a variety of activities, from events to presentations to the rest of the team. Recently they have been on classroom observation placements at the American and British Academy, an international school in Muscat. Earlier in the year we had a three-day trip to Sharjah, one of the United Arab Emirates, to meet the education team of Sharjah Museums Department, a governmental organisation responsible for the formal and informal education provision at 15 of Sharjah's museums, including the Science Museum, Sharjah Aquarium, the Museum of Islamic Civilisation, the Natural History Museum and the Botanical Museum. In 2010 we will run training workshops for the new members of the team and conduct more visits to other similar institutions. This is very important, as many of the team have never visited a botanic garden and these visits will help to orient and inspire them.

Establishing informal education programmes, including interpretation provision

For the past couple of years OBG has been working with an interpretation design company to develop the interpretive content of the site. Our available space includes the exhibition space in the orientation building and the individual habitat interpretation centres, plus the workshop space in the heritage village, so that our total interpretation space is the area of a medium-sized museum. When an interpretation design company were contracted to the project, their client brief was very sparse and did not outline the aims and outcomes of the interpretation, so they had to be creative in thinking about both what and how the Garden could communicate to visitors. Part-way through the process, reviews of designs demonstrated that it was important to add some clarity to the designs in order to aid development in line with the Garden's main objectives. Therefore, using the technique of Generic Learning Outcomes (GLOs), as developed by MLA (Museums, Libraries and Archives) we developed a series of key points, based on the vision and mission of the project, that interpretation of and within the site should communicate to visitors. Each of these was then broken down to identify which stories of the site would fit and which areas they would physically be included in. We hope to be able to use these clear objectives and outcomes to evaluate our interpretation both in the prototyping stage and when they are on site:

OBG's vision

- That the Omani botanical heritage is conserved and cherished.

OBG's mission

- The Oman Botanic Garden, as a new world-class botanic garden, will work to conserve the unique botanical and ethnobotanical heritage of Oman and to ensure that the flora, heritage and ecosystems of Oman are valued by all.

The central themes and messages needed to achieve OBG's goals:

- The plants of Oman are important to us and to our lives.
- The plants of Oman are special, both within Oman and in a global context.
- The plants of Oman are threatened by a range of environmental, social and economic issues.
- There are many practical things that people can do to help save protect the plants of Oman.
- OBG is working in a variety of ways to help protect the plants of Oman.
- The ethnobotanical heritage of Oman is relevant and important to us.

- The ethnobotanical heritage of Oman is threatened.
- OBG is working to conserve the ethnobotanical heritage of Oman.
- There are many things people can do to conserve the ethnobotanical heritage of Oman.

It is not the intention that every area of the Garden communicates all of these messages, or even that visitors are exposed to or retain all of these messages; rather that each learning outcome can be held against them to check whether it supports or does not support the aims of the Garden as a whole. We can also use them in evaluation to uncover what visitors have taken away from the site. Now that we have a detailed concept for the interpretation provision we shall be going to tender, with a detailed scope of work that includes the GLOs to ensure that the interpretation detailed-design and build stage underpins the aims of the Garden throughout.

Establishing a formal education programme

This has been a challenge due to staffing numbers, and personal linguistic ability (i.e. I can't speak Arabic – yet!). However, we have made contact with the Ministry of Education, who have provided some useful information and pointers. The education system in Oman is very different to that in the UK: it is highly centralised, with decisions over teacher training, school trips and even permission to make contact with schools coming from a regional or national level, rather than by the individual school. This means that for any programmes we run, or indeed any contact with schools in the state system we have to go through the ministry. This can be extremely helpful in, for example, distributing materials, or ensuring that all teachers will know about the project and what it can offer, but also can delay the process somewhat. This term has presented an additional challenge in the form of swine influenza; the state schools have reopened after summer about six weeks late. In the meantime, we have been building relations with the international schools community, working with them to develop ecological field studies and environmental awareness programmes. We hope to expand these to the Omani state schools over the coming year. We are focusing on very engaging and interactive programmes to foster an emotional connection between students and the environment. The OBG site is so beautiful and offers a great opportunity for children to experience nature without being overwhelmed or isolated.

Ensuring integration with OBG's other departments

Certainly this is one of the easier targets to work towards. As the Garden staff comprises a small team of 33 in total, there is a good amount of interaction between the three departments (botany and conservation, horticulture, and communication and education). We have weekly management meetings to address general issues and queries, and many people in the horticulture and botany departments help out with special events, such as staffing stands at environment day, or in festivals. The whole team has also been involved with group visits, with guided tours of the nursery facility, and some education staff have been on field trips to understand the work of the botany team. We have also been collecting stories from the plant teams to use in guided tours and ensure that we stay up-to-date with all that is happening at the Garden. In addition, most training involves all graduate-level staff. Despite an element of geographical separation (some of the botany and education team are housed in portacabins away from the nursery offices), meeting facilities are shared.

Raising awareness of OBG's education provision

This is one of the tasks that has expanded exponentially, to include not just raising awareness of the education provision but also the marketing of the Garden as a whole. This task has included the following activities:

- Developing a database of contacts, through personal meetings, engaging with existing networks and the website sign-up form
- Creating a regular newsletter with information about the Garden, its activities and the Garden team

- Developing relations with the local Arabic and English-language newspapers, distributing regular press releases with images, inviting journalists to visit the Garden and arranging press-friendly events, following up each event to ensure inclusion.
- Running events at exhibitions and festivals
- Making presentations about the Garden to various organisations, including the Ministry of Tourism, the Environment Society of Oman and the Historical Association
- Establishing a temporary visitor centre on-site to host groups and schools for an introduction to the Garden
- Working with external contractors to build a temporary website and create a new logo, brand guidelines and a marketing and communications plan
- Developing a plan for the roll-out of the marketing and communications plan, with a 3-year, phased approach, including a new website

Challenges in awareness-raising have been very interesting; methods for reaching local and international markets are varied, and of course the Oman domestic market functions in a very different way to, for example, the UK market. The population size and the strength of community relationships means that word-of-mouth is a very important medium of communication, and one that is yet to be tapped into by the Garden.

Summary

In conclusion, the establishment of the Oman Botanic Garden is a huge project with many associated challenges and issues, stemming from its innovation and novelty, both as a new project but also as one of the first botanic gardens in the region. This means there is little infrastructure already established to assist with development, and there are extremely limited markets for sourcing material and only a small group of associated organisations. However, the project as a whole has achieved a huge amount since its inception in 2006, and the education department is part of this achievement. The next 2–3 years will prove a very exciting time as new staff come on board and programmes are trialled, tested and established, along with the development of the interpretation and marketing resources.

For more information about the project, please see our website, www.oman-botanic-garden.org, or contact Sarah Kneebone directly on sarah.kneebone@oman-botanic-garden.org.

Parque do Povo – the People's Park

Andre Graziano

Sao Paulo City Hall, Sao Paulo, Brazil

Introduction

The People's Park is a public park in the City of Sao Paulo; it has an area of 112,000 m² and is located in the central part of the City, near major traffic routes such as Avenues Nações Unidas (Pinheiros River's Marginal Highway), Juscelino Kubitschek and Cidade Jardim. Sao Paulo has today about 11 million people and a great lack of quality green spaces. Many of these areas are not easily accessible. In this sense, the location of the People's Park is privileged. People can get there by train or bus smoothly and unrestrictedly. The Park caters for the needs of a large number of residents living around it, besides ensuring leisure areas for a great number of workers of the many companies located around the Park.

Historically, the public lots that today form the Park were invaded by various sports groups who traded erratically urban space for profit. This practice continued for 20 years, without the City administration doing anything to prevent it. In 2006 the City began the removal of those illegal occupations for the unrestricted use of the area by the population through the creation of a park. One site, where 13 sports and cultural associations held their meetings, held about 90 families in substandard housing, the result of illegal invasion. Many criminal activities also took place there, especially those related to drug trafficking and prostitution.

Concurrently with the actions carried out to clear the area of all these irregular occupations, the landscape architecture team of the Secretaria Municipal de Coordenação de Subprefeituras (SMSP) at Sao Paulo City Hall started the detailed design of the Park. The main aim was to transform the area into a large green area with several attractions for sports, leisure and recreation, in a way that would coordinate all its elements into an overall educational framework.

In 2007, it was possible to implement the project through a partnership with an engineering company whose offices were next door to the site (W Torre S/A). With their support, the City of São Paulo managed to erect the civil constructions (buildings and facilities); these occupy about 70% of the entire park project. All the construction work was carried out following eco-design guidelines and with material recycling.

Since 2008, the Park has been enhanced in accordance with the original design guidelines, with the particular vegetation originally specified and with equipment and furniture. Another way of complementing the project is to seek private and public partnerships that would enable the development of a great deal of the cultural, sports and educational potentialities envisaged for the Park, in order to meet the needs of the Sao Paulo metropolis. Currently it is possible to note that without the participation of civil society it would not have been possible to complete the Park and that these contributions enhanced the Park in a way that made it an example of community work and engagement.

The environmental perspective

As a basic premise of the project it was established that, since it's beginning, the People's Park should be a model of quality and respect for the environment, based on the principles of material reuse and recycling, as well as the reduction of potential pollutants and the unnecessary use of raw materials.

In the lot owned by W. Torre S/A by the side of the Park, there was an enormous unfinished concrete building which, after being acquired by the above- mentioned-company, had to be partially demolished to be revitalized to serve as a commercial building. This would create a substantial amount of debris. This information led the project work team wanting to recycle this material and use it in the Park. The idea was eagerly accepted by the company and by the municipality. Overall, the demolition of part of the building created sixteen tonnes of waste concrete. The City contributed with four more tonnes from other public

demolitions carried out downtown. After appropriate processing this material was reused in the Park, being transformed in 1,600 m (approximately 6,000 m²) of draining sidewalks, 1,650 m of pathways, 1,320 m of cycle paths, as well as being used in the construction of superficial drainage.

The use of this waste concrete represented approximately an 18% saving in raw material which did not have to be acquired, representing also an energy saving in sand and stone mining which initially would be used in the construction of sidewalks and pathways. There was also a large reduction in emissions of greenhouse gases from transportation – be it of the debris disposal, be it of what would be necessary to bring materials eventually bought in the market. The distance between the demolition site and the Park lot is six hundred metres – the distance between the Park lot and the official debris disposal site is about 32 km. It was also important to reduce the amount of material sent to landfills, the usual destination of construction waste, freeing up space for other urban waste that cannot be processed for reuse.

One of the most significant gains observed was symbolic, for the debris-recycling process was carried out in the urban environment, in a responsible and controlled manner, showing that this recycling process is a 'clean' form of environmental sanitation; also, that if it is well conducted, there are no pollution risks to the community. It is remarkable that in about five months work of rubble crushing and reuse, there was no record of complaints from the neighbours. Thus it was possible to show society that even materials considered disposable and useless could be recycled and provide environmental and financial gains for all, benefiting many people. To demonstrate the use of construction waste on site, the Park hosts several 'testimonial' points, where people can see the recycled material, and the process of building the Park and its environmental role in the City is shown.

The Park design was based on spaces and permeable areas, clearances which were previously occupied by illegal sports courts and some buildings. A small part of the Park lot was designed to host formal sports activities, close to where two avenues with intense traffic meet; the choice of this location enables the localisation of the noise produced by the traffic and the noise due to the sports courts. The main building of the Park, where the administration office and the toilets/changing rooms for sports courts users are located, is also in this area. This building deserves to be highlighted since it is environmentally sound: minimizing energy consumption, favouring natural illumination and ventilation, as well as using material from recycled debris in the form of paving and wall coatings.

The Park areas were arranged to allow all kinds of different uses to occur simultaneously. The paths allow easy and unmistakable movement of people throughout the whole Park in such a way that the whole landscape is not necessarily perceived in just one glance.

A main design priority was user safety, especially from the immediate surroundings, which were not felt to be safe when the area was illegally occupied. The design aims also prioritised the creation of features that would elicit visitors' interest and curiosity. This effect was achieved by using existing natural slopes and by adding vegetation that seeks to create different, healthy and cosy areas for the users; the goal is to diversify the sitting and leisure areas of the Park as much as possible.

Even with the various gaps and irregularities of the ground, softened by the civil work executed, it is in full compliance with accessibility issues. All access and internal paths were built with the intention of allowing anyone to use them. There is still a need for some permanent signing that will allow the Park to be accessible to those with visual disabilities, but by the end of the current administration that should be done.

Vegetation constitutes the main guideline of the project and all the Park areas were designed to show particular botanical collections. The plants are distributed so that in each area they promote beauty, aesthetical differentiation and show some special feature of that place. Thus the collection of tall-growing trees and Brazilian hardwoods are planted by the main lawns, so that in the future, when those big trees have matured, people can enjoy them at the appropriate distance; this will allow them to see them in their true splendour. As well as the tall-growing trees, there are palm trees and herbaceous plants which will play the role of capturing the visitor's eyes while big trees grow, allowing access to the very beautiful tropical vegetation, little used in the City.

All around the perimeter of the Park there is the collection of ornamental trees – natives and exotics – which are fully adapted to the urban situation of Sao Paulo. The purpose of this planting is to show visitors which plants can be used in urban landscape design, either on public roads or in public parks, or even in private land, in order to obtain a great ornamental and environmental effect. The fact that all plant groups are identified should serve as a reference for their propagation throughout the City. Amongst the ornamental tree collection, profiting by the shade of large trees, there is the collection of shade plants, including ferns, many orchids, palms, bromeliads and *Marantaceae*. These plants are little used in public gardens but have great potential for wooded areas as in some of the older parks in the City.

The Park playground includes a collection of climbing plants, with about thirty-five distinct varieties. There are eucalypts whose trunks support a network of steel cables and iron rods normally used in construction. This network supports other plants, always changing according to the pattern of flowering varieties; thus hanging flowers provide shade under which people can rest. The plants that grow upwards use the iron rods supported by the eucalyptus poles; and the plants whose branches tend to grow laterally are supported by clusters of trunks that form vertical surfaces. These methods of support seek to value each one of the plant species used, looking for the best ornamental effect. The equipment and toys in the playground have the shape of animals that pollinate, feed on the climbing plants, or use them as shelter; this helps the visitor, adult or child, understand the relationship between the components of the playground and its setting.

The collection of aromatic and medicinal plants is located in a specific garden, fully adapted to the needs of visitors with disabilities, especially blind people. It was named 'Garden of the Senses', and seeks to highlight the potential of plants in awakening curiosity. There, plants can be touched, smelled and eaten, because they do not receive chemical pesticides and this enables the visitor to have physical contact with them. The whole area of this Garden is adapted for people with impaired vision; the physical facilities provided enable them to visit without the need for personal assistance.

Between the playground and the Garden of the Senses lies the collection of ornamental trees, which is specifically intended to show plants that do not normally occur in the City. The collection is also intended to highlight plant diversity and allow greater freedom of interpretive work by teachers with school groups, taking into consideration the different characteristics of each species present. Outstanding among them are *Amherstia nobilis*, *Parmentiera celeifera*, *Brownea grandiceps* and *Polyalthia longifolia*. Next to the multi-purpose lawn which caters for different activities, from soccer to various cultural events, there is the collection of Brazilian and foreign fruit plants, with a great diversity of species, but particularly natives. Throughout the Park there are more than 1,200 trees (including palms) of various species, and about 250 thousand shrubs and herbaceous perennials, with enough diversity to provide displays of flowers in all seasons.

Space management

The way the Park is managed is unusual in Brazilian public parks. Considered innovative, it brings together public and private organizations in determining priorities for action in the Park. For this Park, as in all other parks of São Paulo, there is a legally elected and constituted Managing Council, which brings together members of the municipal administration and of civil society. The Council is mandated to set guidelines and priorities of the Park and to oversee their implementation. In the People's Park there is a non-governmental organization, the People's Park Association, tasked to implement the decisions of the Managing Council, through a partnership with the municipal administration which is exempt from that responsibility. The Association is of a Brazilian legal type called a Civil Society Organization of Public Interest (OSCIP). OSCIPs are allowed to receive funds from private companies which may be deducted from income taxes, because it has to be a non-profit organization, in addition to being subjected to a special form of control of the use of the raised funds. This status allows the People's Park Association to assume responsibility for its main goal, the future financial sustainability of the Park.

Because of this management structure, still unusual in Brazil, it will be possible to ensure the smooth operation of recreational and sports equipment and the Park's existing furniture, and still invest in new opportunities that aim to make a visit the People's Park a special experience. As a possible additional benefit,

there is a possibility of providing the Park with an infrastructure to support educational activities, either by a team of park workers or others interested in doing this. This infrastructure might also include specialised interpretation systems, providing assistance to visiting groups, facilities for cultural activities, technical assets, among many other possibilities.

The educational proposal

The use of a garden's space as an educational attraction is common in many botanical gardens, but the People's Park is the only one in Brazil to have such a facility, where access is unrestricted and free of charge. The City's initiative has attracted several companies and associations who have helped the Park through donations of plants, materials or services, which are fundamental to the implementation of the Park's facilities and cultural activities. The record of donations to the Park has made many companies, who were interested in alternative investments with socio-environmental concerns, to channel donations to the People's Park. The investment in the Park ensures the publicity wanted by the donating partner, while providing improvement for visitor facilities, the aim of the municipal administration.

The prospect of being able to count on various outreach activities and the joint action between public and private organizations guarantees the sustainability of the Park, without affecting the Park's mission, and also enables the Park to constantly create new schemes. The Park can also be used as a vast store of information, which can be used by schools, groups of interested people, and botany professionals, among many others.

The Park offers teachers the opportunity for educational activities, as a reference example in relation to the official education syllabus where this relates to environmental issues, especially in regard to vegetation and its role in Brazil's economic life or in visitors' everyday lives. Other relevant educational topics are recycling, reuse, and all their technical and social implications. To facilitate these topics, the signing in each area of the Park has an important role, as well as identifying plants, because it provides information about important aspects of the project and its construction which would not commonly be accessible to visitors.

The technical monitoring team will enable the Park to fulfill its social role in a wider sense, for it will include members interested in meeting and assisting the visitors on a permanent basis to acquire environmental information and receive advice on sports and recreation. There are now about thirty groups of professionals who are willingly engaged in providing recreational activities on site, such as yoga, pilates, running, walking, tai chi chuan, among others. This makes the Park unique and special in the City of Sao Paulo. The technical monitoring team will organize and reconcile the daily use of the Park with its use for specific events previously approved by the Managing Council.

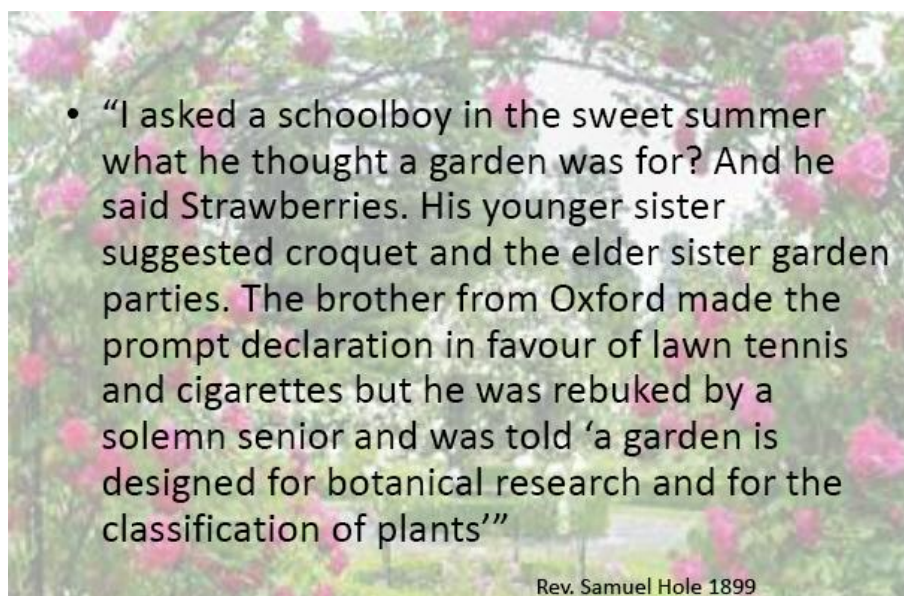
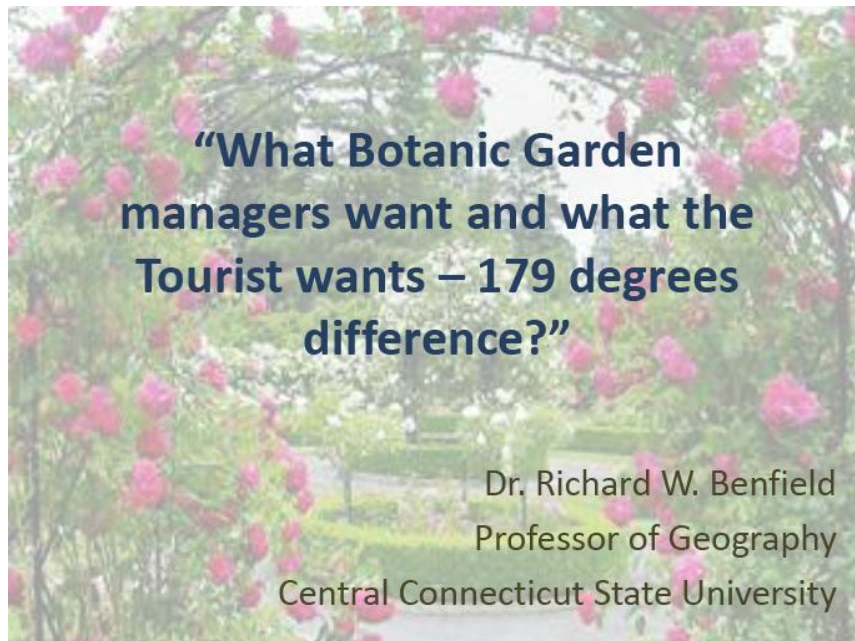
There is the promise of allowing cultural, educational and sports activities to occur in the Park as occasional events, always with the aim of expanding the service to the public. Examples of activities which have already taken place in the Park are: demonstration and training of boomerangs and frisbee throwing; activities aimed at improving food and nutrition for children; a carnival parade by an association of mentally-handicapped people who use the Park every week to exercise, among others. All these unique events should serve to complement the Park's educational actions, promoting the awareness of visitors and their growing knowledge that helps in the preservation of the Park itself and the City.

Given the high rate of building in the City, which restricts the existence of, and citizens' access to, quality green spaces, we can see that the environmental benefits of the People's Park affect not only local residents but also the most remote communities, given the ease of access and the amount of cultural, recreational or leisure activities offered. The Park is the evidence that a reputable project becomes feasible when it proves to be open, innovative and flexible, making a collective dream into reality. It is noteworthy that the direct participation of civil society, either in the definition of guidelines for the use of the space or in sponsoring the construction is a symbolically important event, for it highlights some possible forms of public engagement that are still only beginning in Sao Paulo; however, it indicates that they exist. This can give hope for other projects that are still being developed to have the same success as the People's Park.

What botanic garden managers want and what the tourist wants – 179 degrees difference?

Richard Benfield

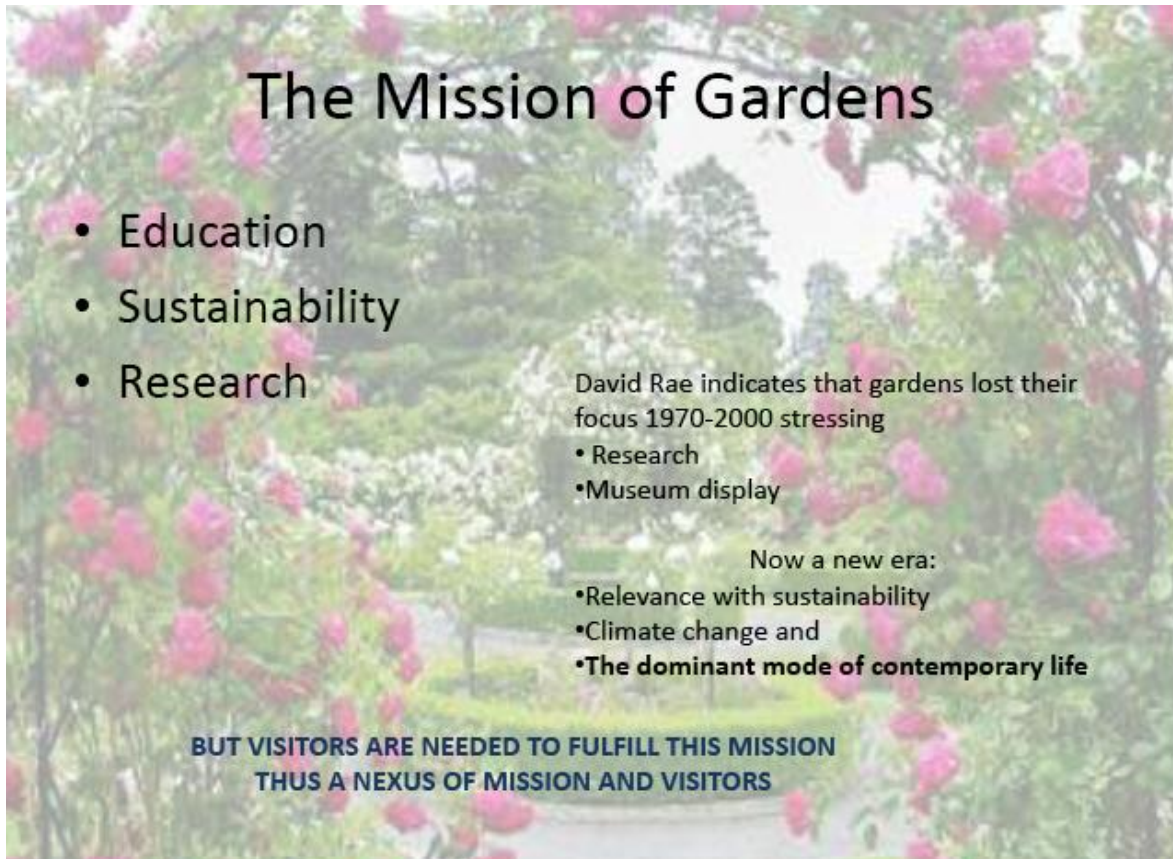
Central Connecticut State University, New Britain, Connecticut, USA



Tourism and Gardens

- 300 - 500 million visits worldwide
- 40 million visits in one year in US
- More popular than Disneyworld and Disneyland combined in the US
- Gardening and demographic change linked
- 4 and 7 in top UK attractions with > 1 million
- In South Africa of 8 million tourists, 750,000 to Kirstenbosch and 1.3 to the nine national botanic gardens
- In the case of South Africa and Australia a Flower and a Garden is an iconic symbol of nationalism and unity
- Highly labor intensive





The Mission of Gardens

- Education
- Sustainability
- Research

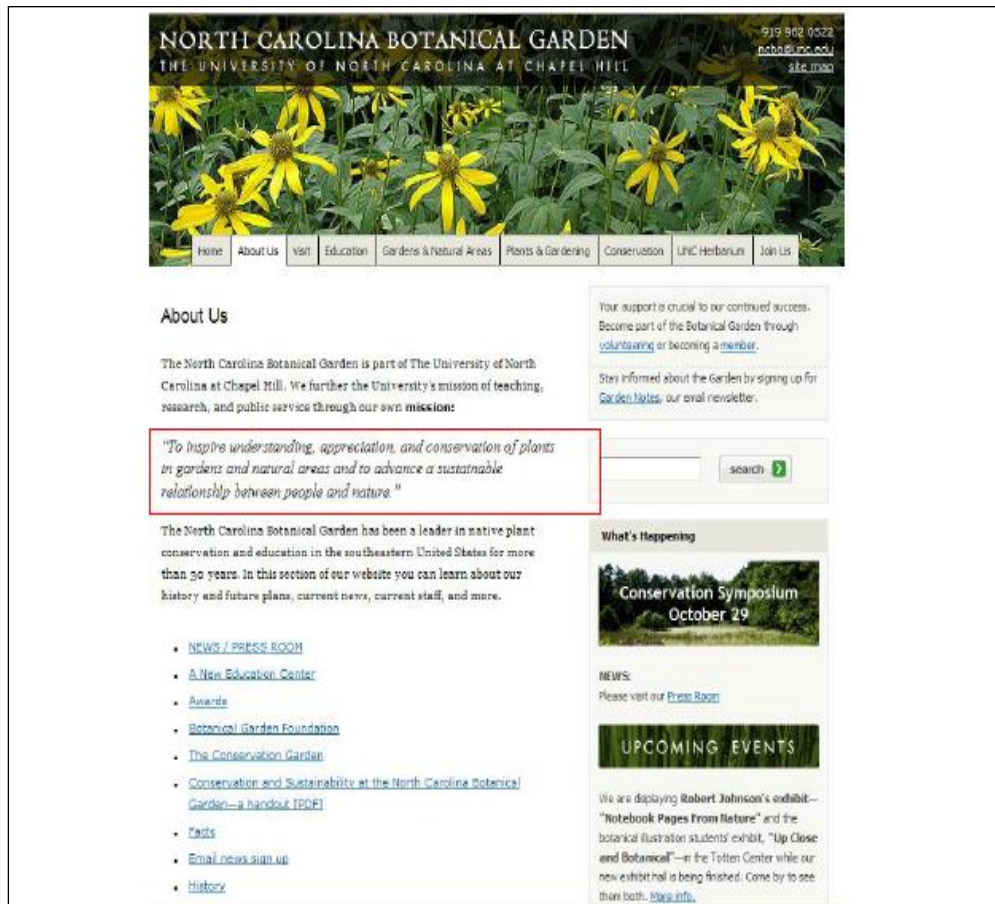
David Rae indicates that gardens lost their focus 1970-2000 stressing

- Research
- Museum display

Now a new era:

- Relevance with sustainability
- Climate change and
- **The dominant mode of contemporary life**

**BUT VISITORS ARE NEEDED TO FULFILL THIS MISSION
THUS A NEXUS OF MISSION AND VISITORS**



NORTH CAROLINA BOTANICAL GARDEN
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

919 962 9522
nobot@unc.edu
site map

Home About Us Visit Education Gardens & Natural Areas Plants & Gardening Conservation UNC Herbarium Join Us

About Us

Your support is crucial to our continued success. Become part of the Botanical Garden through [volunteering](#) or becoming a [member](#).

Stay informed about the Garden by signing up for [Garden Notes](#), our email newsletter.

"To inspire understanding, appreciation, and conservation of plants in gardens and natural areas and to advance a sustainable relationship between people and nature."

The North Carolina Botanical Garden has been a leader in native plant conservation and education in the southeastern United States for more than 90 years. In this section of our website you can learn about our history and future plans, current news, current staff, and more.

- [NEWS / PRESS ROOM](#)
- [A New Education Center](#)
- [Awards](#)
- [Botanical Garden Foundation](#)
- [The Conservation Garden](#)
- [Conservation and Sustainability at the North Carolina Botanical Garden—a handbook \(PDF\)](#)
- [Facts](#)
- [Email news sign up](#)
- [History](#)

What's Happening

Conservation Symposium
October 29

NEWS:
Please visit our [Press Room](#).

UPCOMING EVENTS

We are displaying Robert Johnson's exhibit—*"Notebook Pages from Nature"* and the botanical illustration students' exhibit, *"Up Close and Botanical"*—in the Totten Center while our new exhibit hall is being finished. Come by to see them both. [View info.](#)

Core Values

The Garden is committed to:

- Serving the public
- Displaying, interpreting, and promoting the diverse flora of the southeastern United States in a well-maintained and beautiful garden
- Being a leading center for research and education on the flora of the southeastern United States and the relationship between plants, environment, and the quality of human lives
- Reaching diverse audiences with rich experiences and opportunities for learning, contemplation, and respite
- Conserving biological diversity, using natural resources sustainably, and integrating a conservation ethic in all we do
- Incorporating a sense of place, at scales ranging from the local to the regional, in order to reflect our garden, our land, and our community
- Building a sense of community and collaboration with other horticultural and conservation organizations
- Participating in university research, teaching, and other academic programs
- Celebrating and building on the botanical legacy of the University of North Carolina at Chapel Hill
- Honoring and respecting, staff and volunteers, members, and visitors

To receive a full copy of the Garden's Strategic Plan, please contact Dr. Peter D. White via [email](#).

Last updated by Laura Cottaman on March 12, 2019 at 6:29:50 pm.

month) in the form of an abbreviated e-mail newsletter called "Garden Notes."

A Wish List

A Wish List for the new Education Center—Seeking Your Help!

There are many new spaces inside and outside of the new three-part Education Center (Classroom wing, auditorium wing, and information/exhibits wing) that require furnishings and appliances. We are seeking contributors with which to purchase the following items.

Please call [Charlotte Jones-Bow](#) if you would like to help: 919-962-9458.

- Landscape plants and materials
- Deer fencing
- Irrigation system
- Microscope and flat screen TV monitor for the Green Gardener reference desk (Many thanks to Byron & Deborah Harry!)
- Furnishings for the Children's Discovery Room
- Shelving for Children's Discovery Room storage area
- Furniture for the lobby and for the Green Gardener Room (bookshelves, tables, chairs)
- Shelves for classrooms
- Furniture for the lobby/reading room
- Washer and dryer for cleaning tablecloths (Thank you Barbara and Bob Warford!)
- Electric Gator (utility vehicle)
- Electric, rechargeable leaf blower

Mission reflects roles in society

- Education
- Sustainability
- Research
 - But what about other roles?
- Entertainment? Longwood and Fountain show
- Stress relief? Kaplan, Ulrich
- Romance and Cultural reinforcement
 - Courting Jews and Mormons
- Beauty? Chris Wood and an esthetic across the ages
- Shopping
- Psychological? Flower colors for Chinese/Koreans?
- Cultural reinforcement?

What do tourist's want? And how does it affect gardens (General findings)

- # 1 Stress relief
- #2 Family time
- Females are the strongest motivators on all travel decisions
- Water an essential element in leisure (Ulrich)
- Participation in activities increasing
- Higher education (28%-33%) correlates with higher participation in Leisure
- Domestic tourism growing/International bearish forecast

Tourist Motivations (to Gardens)

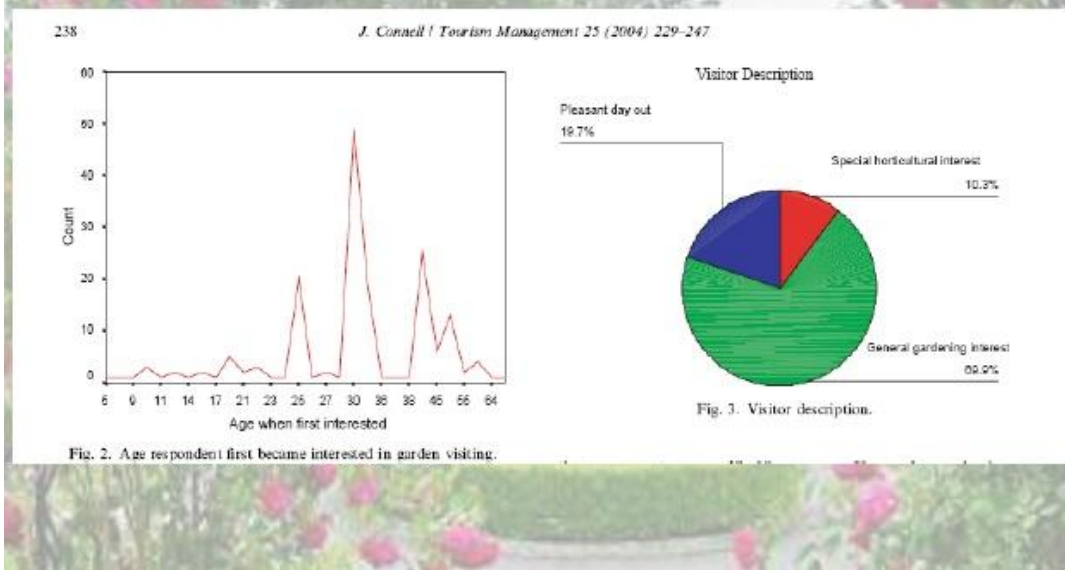
- After Joanne Connell (2004/05)

Table 11
Motivation for visiting gardens* (per cent of visitors)

Motivation	Tranquillity	Horticultural aspects	Somewhere to go	Nice environment to visit	Be with others like me	Visit as part of a group	To get ideas for own garden
<i>Age</i>							
18-39	97.6	78.0	65.9	93.9	11.4	12.5	65.5
40-60	95.8	93.0	59.1	94.9	29.6	10.6	87.5
Over 60	95.3	93.4	58.9	96.1	46.5	27.4	88.4
p-value	0.192	0.000	0.162	0.615	0.000	0.000	0.000
<i>Occupational grading</i>							
AB	94.4	91.1	60.2	95.1	27.1	12.0	80.9
C1C2	95.4	90.1	62.7	89.7	37.8	19.7	89.1
DE	100	100	47.1	95.0	43.8	31.3	100
p-value	0.968	0.228	0.814	0.752	0.020	0.007	0.132
<i>Garden owner</i>							
	94.5	91.4	59.4	95.0	31.7	16.3	87.5
p-value	0.788	0.004	0.476	0.948	0.953	0.576	0.000
<i>Type of visitor</i>							
Special horticultural interest	92.4	98.1	28.5	84.0	21.5	25.5	92.1
General gardening interest	94.3	95.1	57.4	95.2	34.6	15.9	92.1
Just seeking pleasant day out	97.0	70.1	83.1	98.9	23.4	12.9	51.5
p-value	0.248	0.000	0.000	0.012	0.017	0.091	0.000

*Note: Percentages indicate strongly agree and agree responses for each factor.

How do visitors describe why they are at a garden?



Motivations for garden visiting indicates that three components explain 67% of the variation in the data. The three dimensions of garden visitor motivation are

- **Social (28%)**
 - Enjoying the company of others (family, group)
- **Horticultural (21%)**
 - related to their own garden
- **Setting (16%)**
 - Sensual emersion, peace, tranquility

• **NOTE: NOT EDUCATIONAL!**

Tourist Motivations (to Gardens) after Ballantyne *et al*, (

Table 4
Conservation interests and commitment by site (measured on a 7-point scale)

	Botanic gardens	Whale watching	Turtle hatching	Aquarium	Marine Park
I am interested in learning about environmental issues	4.41	4.85	5.01	4.86	5.10
I often think about whether my actions harm the natural world	4.74	4.66	4.93	4.83	5.13
I actively search for information about environmental conservation	2.77	3.39	3.61	3.46	3.70

Table 5
Personal goal subscales by site

	MU	AG	WC	AQ	HS	NP	MP	EC	BG
Enjoyment	4.28	4.33	4.80	4.41	4.60	4.23	4.82	4.37	4.42
Learning and discovery	4.69	4.46	4.31	4.24	4.38	3.89	3.98	4.21	3.23
Restoration	3.08	3.29	3.94	3.86	3.85	4.10	3.87	3.74	3.94
Social contact	1.99	2.04	3.03	2.73	3.44	3.12	2.79	2.37	2.47
Self-fulfillment	2.56	2.73	2.42	2.46	2.33	3.27			2.04
Learning about plants/gardens									2.51
Enjoyment of plants/gardens									4.74

Note: MU = museum; AG = art gallery; WC = wildlife centre; AQ = aquarium; HS = heritage site; NP = national park; MP = marine park; EC = ecotourism experience; BG = botanic gardens.
Blank cells were not measured.
Items were rated on a 7-point scale from 0 = 'not important' to 6 = 'extremely important'.

Findings from Mt Coot-tha BGBrisbane Aust.

2.3. Implications for the design and development of interpretation in botanic gardens

The major findings from this research were:

- Botanic gardens visitors reported having a relatively low level of interest in and commitment to conservation issues.
- The most important reasons given for visiting the Botanic Gardens were to enjoy oneself; to admire the garden's scenery; to spend quality time with family or friends; and to enjoy being outdoors/in nature.
- Botanic gardens visitors were similar to National Park visitors in that they rated Restoration as more important and Learning and Discovery as less important as motivations for visiting. Frequent visitors in particular were more likely to be motivated by restorative factors.

The Dichotomy

Tourists


- Stress release
- Family time
- Females score higher on all motivators than men
- Relaxation
- They like Museums (58% visited a museum in the past six months)
- Ecologically aware ((Soft) Ecotourism)

Gardens

- Education
- Sustainability
- Research

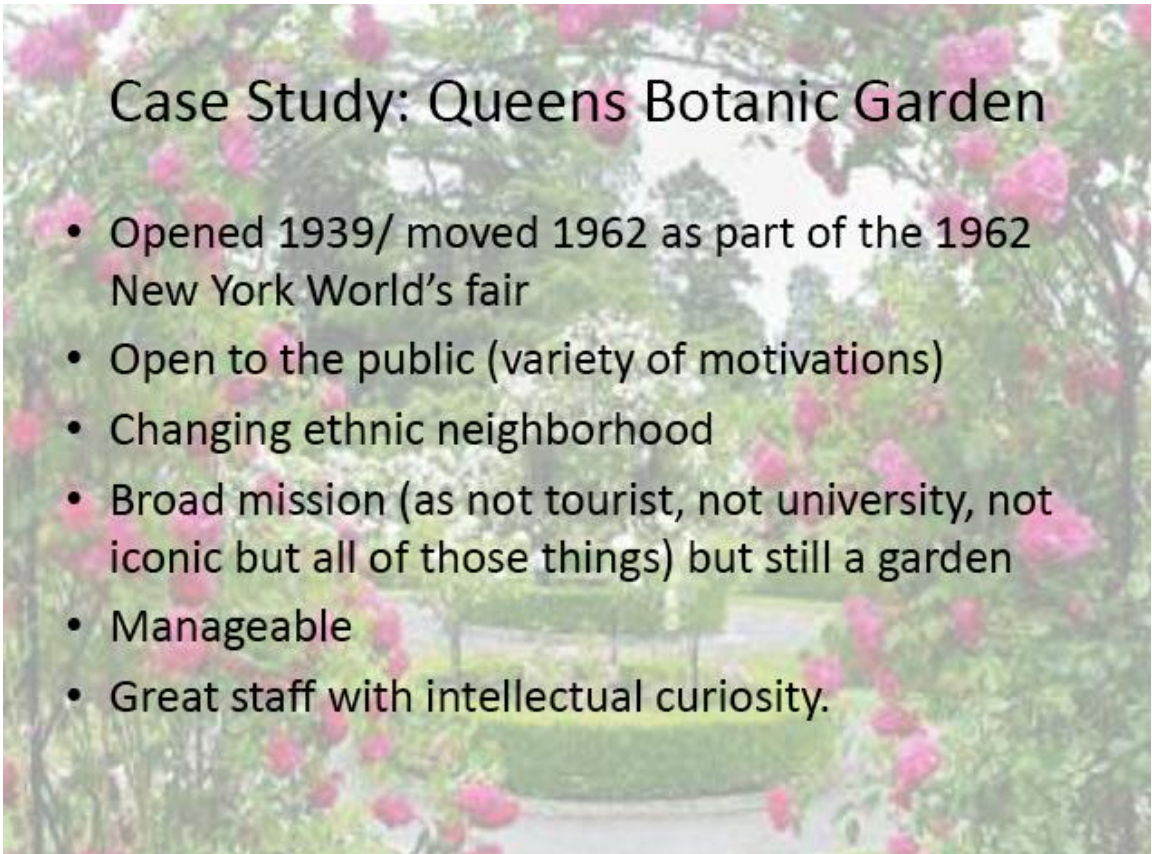


179 degrees?



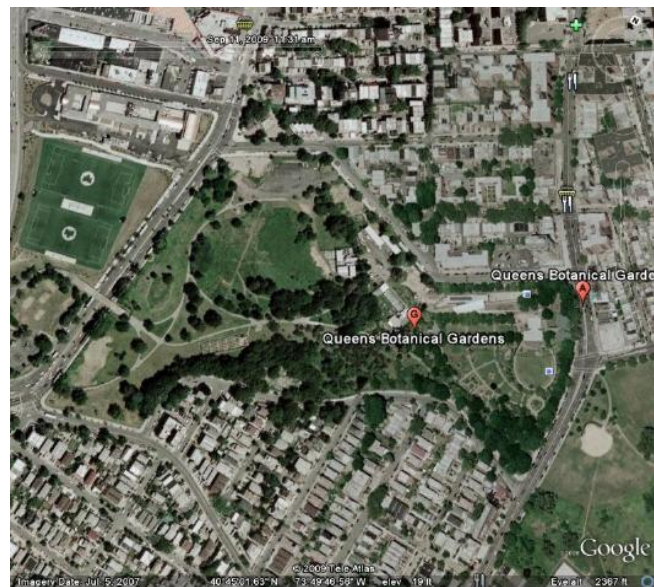
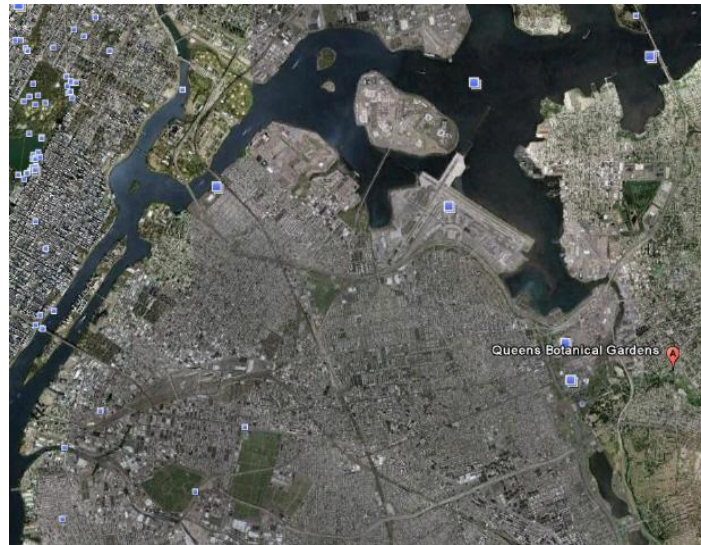
Lets see how we can marry the two in the case of one garden Motives

- Students who need exposure to industry
- A free garden
- Go beyond typical survey research
- Why do they come
 - Before and After



Case Study: Queens Botanic Garden

- Opened 1939/ moved 1962 as part of the 1962 New York World's fair
- Open to the public (variety of motivations)
- Changing ethnic neighborhood
- Broad mission (as not tourist, not university, not iconic but all of those things) but still a garden
- Manageable
- Great staff with intellectual curiosity.



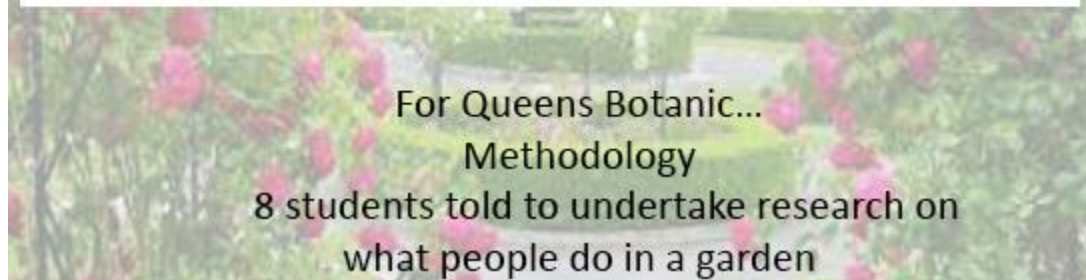


Lets see what people do in the Gardens

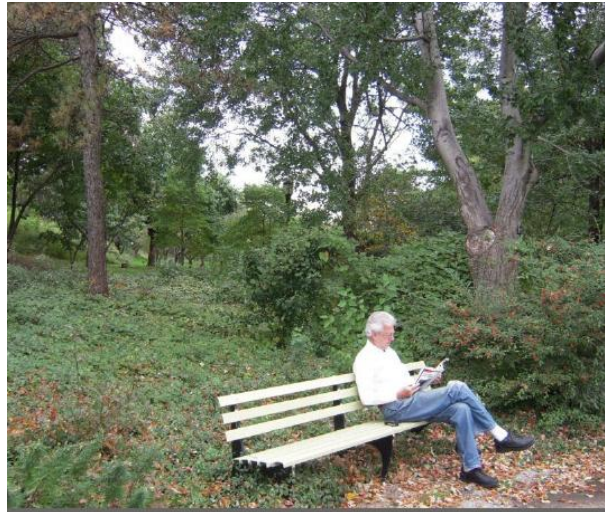
- ...for surely what they do is, in part, what their motivation for coming is.
- In the UK, Connell found...

Table 9
Analysis of garden visit behaviour (per cent of visitors participating by category)

	Photography	Nature study	Painting	Picnicking	Sitting	Chatting	Taking notes
<i>Age</i>							
18–39	43.4	27.7	4.8	44.6	73.5	59.0	25.3
40–60	51.3	43.7	8.0	28.7	76.6	49.0	49.4
Over 60	47.7	34.4	3.6	27.2	72.8	47.2	56.4
<i>p</i> -value	0.417	0.015	0.123	0.10	0.624	0.180	0.000
<i>Occupational grading</i>							
AB	44.7	39.6	5.8	28.7	74.5	48.0	48.7
C1C2	53.3	40.2	6.7	30.7	76.5	49.7	47.5
DE	43.9	21.8	9.5	38.1	76.2	71.4	42.9
<i>p</i> -value	0.076	0.335	0.769	0.634	0.887	0.117	0.861
<i>Type of visitor</i>							
Special horticultural interest	48.1	51.9	7.4	14.8	61.1	37.0	75.9
General gardening interest	51.2	35.9	5.5	27.1	74.8	47.9	51.2
Just seeking pleasant day out	35.9	35.0	6.8	48.5	83.5	64.1	17.5
<i>p</i> -value	0.023	0.066	0.786	0.000	0.008	0.002	0.000



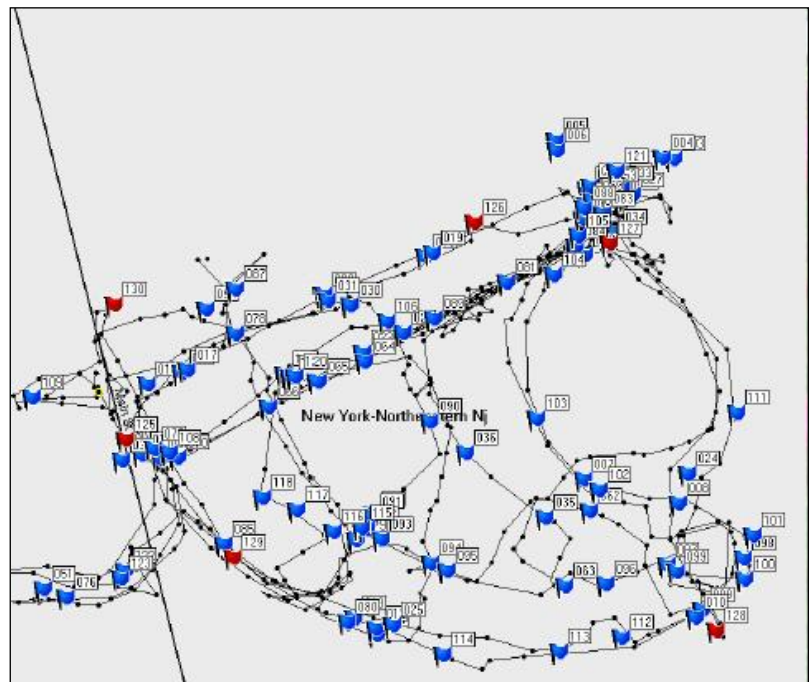
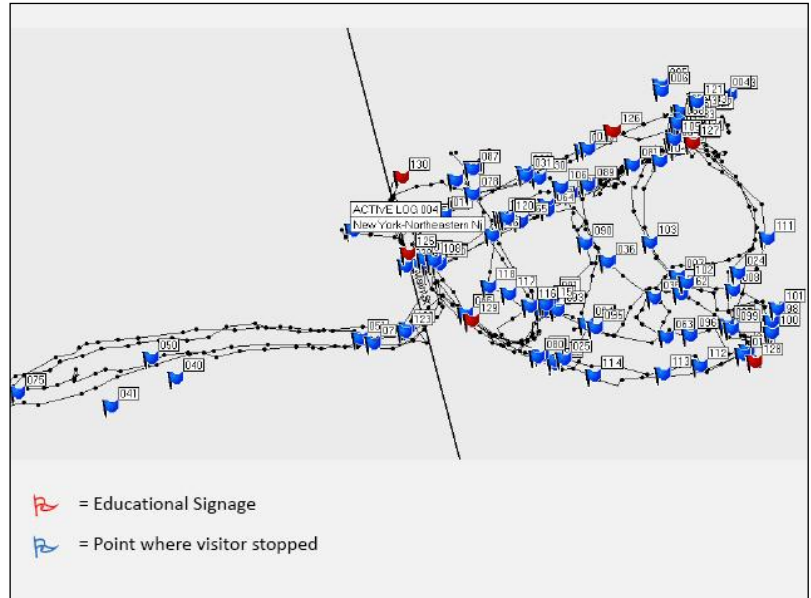
For Queens Botanic...
Methodology
8 students told to undertake research on
what people do in a garden



Participant Observation in Queens Botanic garden

- GPS (The Stalking Pervert!)
- Video
- Photographs
- Semi-Structured interviews
- Survey





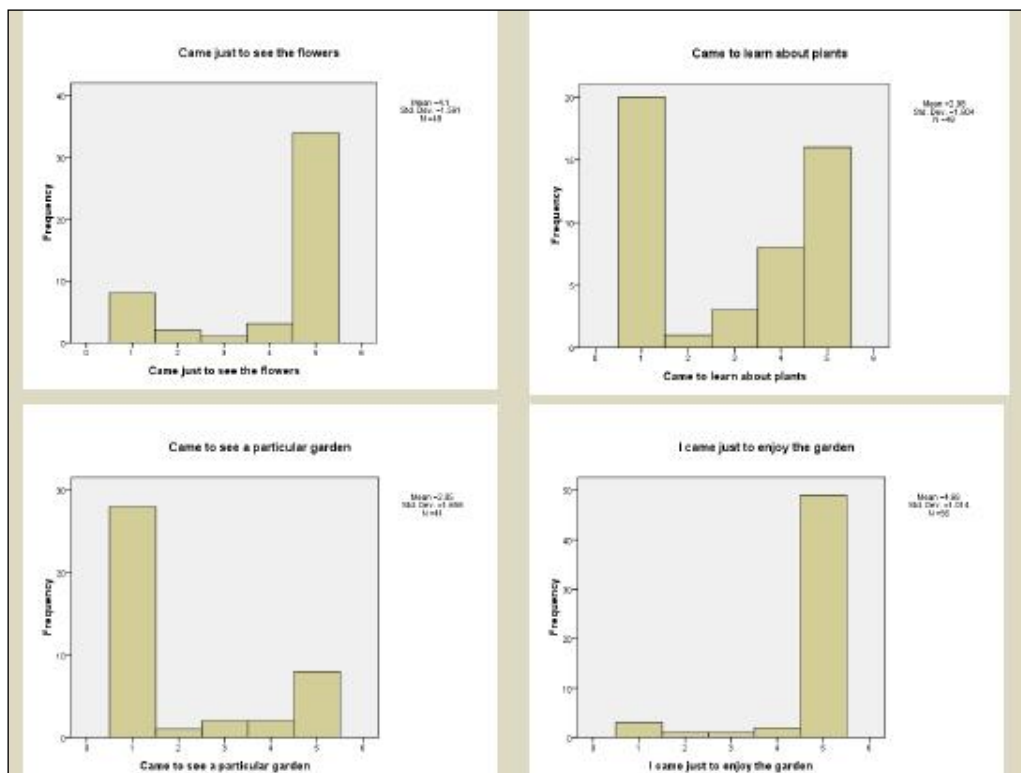
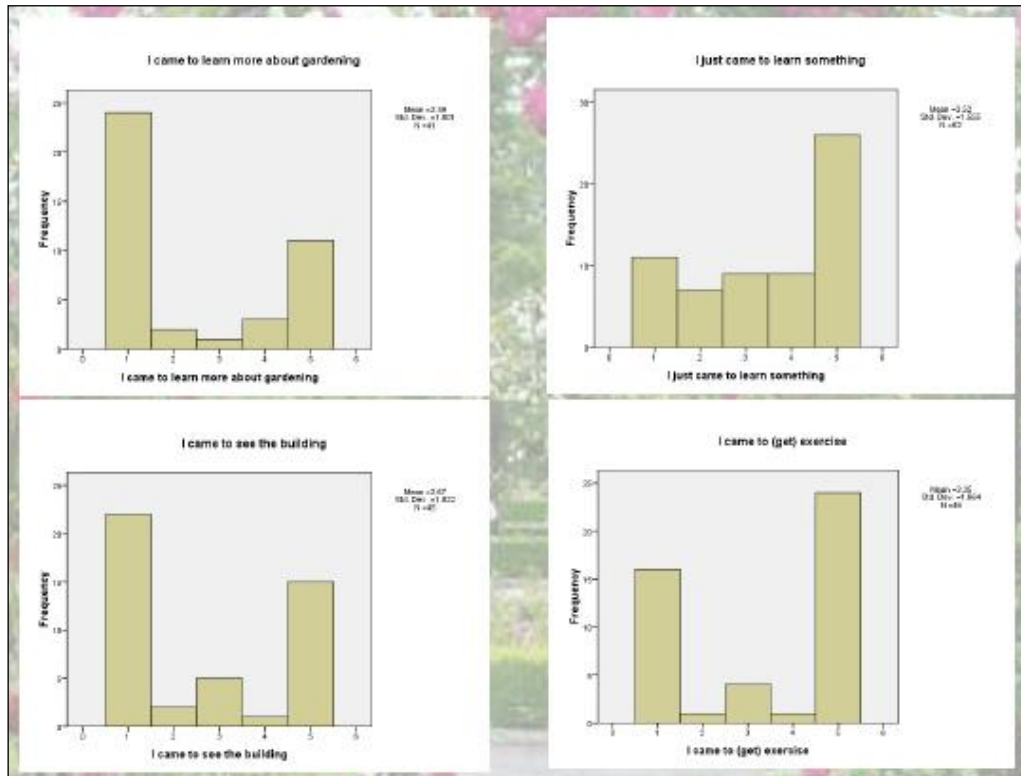



Video to Face book and Delphi Technique



Survey

- Before and After • Likert Scale





Findings, Conclusions and Recommendations

- Visitors just not stopping at the signs
- Visitors seem to have a singular reason for coming to the garden (Event, passive recreation, photography)
- Little sign of attitude change before and after
- Do we put signage by the unique and not the mundane?
- What happens when you charge a fee?

Environmental education from an Islamic perspective: a panacea to sustainability

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Introduction

As the population of the world continues to grow, the pressure being exerted on the natural resources of the Earth continues to mount. Thus governments, non-governmental organisations including educational institutions, international organisations etc. are still battling with understanding and solving the problems that are threatening the environment and the very existence of life on Earth. Anthropogenic factors are seriously contributing to the degradation of the vulnerable environment, leading to a disruption in the harmony that previously existed between the living things and their environment; to this end there is a concerted effort globally to solve the environmental problems of the planet.

One significant reason being advanced for the non-sustainable exploitation of environmental resources is lack of education or awareness of the problems. Where this exists, the need for economic development has largely overshadowed the need for the preservation of the environment. There is a need for people to understand the extent of the harm they are causing to the environment so that a lasting solution can be found. As one educator put it at the 3rd World Environmental Education Congress held in Turino, Italy in October 2005:

'I think that the long-term solution is to give people the chance to gain awareness of the consequences of their actions. Environmental education is not about telling people how to act in the right way, and we don't have the right to change people as we want. Only through personal thinking and reflection can change be lasting. I think the key words are understanding, thinking and awareness'.

(Salmone, 2006)

A large proportion of the countries that are at high risk of environmental decay are developing countries. Although they were not responsible for many of the factors that has brought the Earth to its present stage of degradation, e.g. global warming, the fact that some are now emerging economies makes it all the more reason why they need to contribute their own contribution towards sustainable development at the individual, group, governmental and institutional levels. A substantial number of these countries are adherents of religions such as Islam, Christianity, Hinduism and Buddhism. The current trend of environmental management is not to rely exclusively on finding technical solutions to environmental problems, but also to include an ethical aspect. Ethics lies at the heart of all human endeavours, from the foundations of human civilisation and the great religions, to the day-to-day decisions we all make in the course of our lives (Salmone, 2006). In countries at risk religion remains a leading institution that shapes the thoughts and actions of many people, yet many biodiversity programmers are based on the secular Western science pattern. As a result, Western scientists (and Western-trained scientists) often avoid considering any relation between religion and conservation science (Barium, 2004).

The holy book of Muslims, the Qur'an, is replete with verses illustrating the concept of the environment and its sustainability and denounces the overuse or misuse of natural resources. This paper illustrates some of this knowledge and suggests its possible incorporation into the systems of formal and non-formal environmental education for sustainable environmental development, especially in the Muslim and developing worlds,.

The environment: concepts and problems from a Western secular perspective

The environment has been defined as all external conditions and factors, living, and nonliving (chemicals and energy), that affect an organism or other specified system during its lifetime (Miller, 2004). Another definition (Swarup *et al.*, 1992) says that environment refers to the complex of physical, chemical and biological factors affecting human and non-human beings. Within the ambit of the environment, a host of ecosystems are functioning in which particular groupings of life forms interact with the environmental segments. The world's environment and the resources therein are currently facing a lot of problems; these can be grouped into five broad divisions (Miller, 2004):

- Biodiversity depletion:
 - Habitat destruction
 - Habitat degradation
 - Extinction
- Air pollution:
 - Global climate change
 - Stratospheric ozone depletion
 - Urban air pollution
 - Acid deposits
 - Outdoor pollutants
 - Indoor pollutants
 - Noise.
- Water pollution:
 - Sediments
 - Nutrient overload
 - Toxic chemicals
 - Infectious agents
 - Oxygen depletion
 - Pesticides
 - Oil spills
 - Excess heat.
- Waste production:
 - Solid waste
 - Hazardous waste.
- Food supply problems:
 - Overgrazing
 - Farmland loss and degradation
 - Wetlands loss and degradation
 - Overfishing

- Coastal pollution
- Soil erosion
- Soil salinisation
- Soil waterlogging
- Water shortages
- Groundwater depletion
- Loss of biodiversity
- Poor nutrition

These problems are said to be caused basically by five causes which comprise (Miller *et al.*, 2004):

- Rapid population growth
- Unsustainable resource use
- Poverty
- Not including the environmental costs of economic goods and services in their market prices
- Trying to manage and simplify nature with too little knowledge about how it works.

The environment from an Islamic perspective: a select literature review

Many writers writing from an Islamic perspective view the Western secular perception of the environment and its problems as incomplete. A review of some literature in this area will be important towards understanding this viewpoint. Akbar (1992) notes that technological progress is responsible for disturbing the equilibrium of nature. He underlines the importance of changing beliefs and traditions so that human beings live responsibly with the rest of the creation. Chapra (1993) traces the ethical foundations for the protection of the environment under the principle 'no injury'. According to this principle, Muslims are prohibited from harming others. He contends that environmental degradation harms both present and future generations. Therefore, it is an obligation of the individual and society to protect it. Nasr (1990) holds a similar viewpoint. He says that in Islam, man and cosmos are in a state of unity, harmony, and complementarity. He maintains that planting trees, treating animals gently and avoiding pollution in water are deeds as good as feeding the poor and attending to the sick. Moreover, he emphasizes the spiritual significance of Nature. For the solution to the environmental problem, he specifically suggests an expansion of general awareness regarding Shariah's teachings about the ethical treatment of the environment. Husaini (1980) provides valuable insight. He believes that a Muslim grows by submitting himself to the will of his creator. The universe has been created as a necessary environment in which he might fulfil his mission. As a vicegerent of God on Earth, Man must recognise the right of all creatures to the environmental resources. He argues that environmental disruption of any kind must be avoided for two reasons. Firstly, it is an ethical command of Shari'ah, and secondly, it is essential for protecting the public interest and universal common good of all mankind and other 'people' of Allah (Akhtar, 2006).

Qur'anic teachings on the environment and sustainable development

Sustainability has been defined as a characteristic or situation whereby the needs of the present and local population can be met without compromising the ability of future generations or populations in other locations to meet their needs (Wikipedia, 2009). Another definition says it is improving the quality of human life while living within the carrying capacity of supporting ecosystems (IUCN/UNEP/WWF, 1991).

As described above, the focus of environmental education nowadays is mostly on the Western secular understanding of the environment and its problems. This is, however, not enough to solve the problems of

degradation facing our environment. There is a need, therefore, to shift focus as advocated by UNEP (Salmone, 2006) towards an ethical perspective. An alternative is the adoption of an Islamic approach to understanding and solving the problems of our environment. Barau (2004) identified areas in the Holy Qur'an where the Creator describes the relationship between humankind and the environment. These he grouped into eleven broad divisions:

i) Origination

This concept is built on the belief that the universe is not an accidental or spontaneous creation, as mentioned in the Qur'an:

Do not the unbelievers see that the heavens and the earth were joined together (as one unit of creation)... (21:30)

He who created the heavens and the earth and all that is between, in six days, (25:59)

and that there is an inseparable bond between humankind and the environment; humankind originated from the Earth, created from the Earth and draws its sustenance from the same Earth and will go back to it at death. Thus, whatever affects the Earth will invariably affect humankind. This is exemplified by the following verses of the Qur'an:

From the (earth) did we create you, and into it shall we return you, and from it shall we bring you out once again..(20:55)

(Allah) said: Get ye down, with enmity between yourselves. On earth will be your dwelling-Place and your means of livelihood,-For a time"..

He said: Therein shall ye live, and therein shall ye die: but from it shall ye be taken out (at last)"(7:24-25)

ii) Interdependency

Interdependency means that there is a mutual relationship between mankind and other living organisms. This interrelationship governs the functioning of an ecosystem. An example of a verse of the Qur'an that talks of this is the following:

And thy Lord taught the bee to build its cells in hills, on trees, and in (men's) habitations..

Then to eat of all the produce (of the earth), and follow the ways of thy Lord made smooth: there issues from within their bodies a drink of varying colours, wherein is healing for men: verily in this is a sign for those who give thought.. (16:68-69)

iii) Equality

The Qur'an talks of the relationship of equality between humans and other creatures, both living and non-living, which work together to form a functioning ecosystem. The following verses are illustrative:

There is not an animal (that lives) on the earth, nor a being that flies on its wings, but (forms part of) communities like you. Nothing have we omitted from the book, and they (all) shall be gathered to their Lord in the end.. (6:38)

Both humankind and other creatures are said to be servants of God whom they glorify and that the Earth was created for the entire creatures of God:

Seest thou not that to Allah prostrate all things that are in the heavens and on earth,-The sun, the moon, the stars; The hills, the trees, the animals; And a great number among mankind but a great number are (also) such as unto whom the chastisement is justly due. And such as Allah shall disgrace,-None can raise to honour: for Allah carries out all that he wills.. (22:18)

It was we that made the hills declare, in unison with him, our praises, at eventide and at break of day,

And the birds gathered (in assemblies): all with him did turn (to Allah)..(38:18-19)

It is he who has spread out the earth for (his) creatures:. (55:10)

iv) **Perfection**

The Qur'an also speaks of the creation of the Earth and all that it contains in a perfect and organised way for the benefit of all organisms including human beings. For example:

He who created the seven heavens one above another: no want of proportion wilt thou see in the creation of the most gracious. So turn thy vision again: seest thou any flaw?

Again turn thy vision a second time: (thy) vision will come back to thee dull and discomfited, in a state worn out.. (67:3-4)

v) **Dignity**

Respect was accorded by God to all His creatures irrespective of their size or nature, the Qur'an says for example:

We have honoured the sons of Adam; Provided them with transport on land and sea; Given them for sustenance things good and pure; And conferred on them special favours, above a great part of our creation.. (17: 70)

In his interpretation of the Qur'an, Abdallah Yusuf Ali explained that the philosophy of such adjurations is for humankind to know that God has accorded respect for everything He creates.

v) **Subjectivity**

God has subjected nature to human beings, but they have been warned that this subjectivity is merely an endowed privilege, i.e. it is not for mankind to plunder but to use wisely because ultimately there is a supreme owner of these natural resources. For example:

Seest thou not that Allah has made subject to you (men) all that is on the earth,... (22:65)

See they not that it is we who have created for them-Among the things which our hands have fashioned- Cattle, which are under their dominion-

And that we have subjected them to their (use) of them some do carry them and some they eat:.

And they have (other) profits from them (besides), and they get (milk) to drink. Will they not then be grateful? (36:71-73)

...and say, Glory to him who has subjected these to our (use), for we could never be able to do it.. (43:13)

To Allah belongeth all that is in the heavens and on earth. (2:284)

vii) **Reflections**

This is a principle mentioned in the holy Qur'an that calls upon mankind to reflect on its environment and what it contains. These are meant to serve as signs to justify the fact that all creatures have a common creator.

Do they not look at the camels, how they are made-.

And at the sky, how it is raised high-

And at the mountains, how they are fixed firm-

And at the earth, how it is spread out. (88: 17-20)

*....And contemplate the (wonders of) creation in the heavens and the earth, (with the saying):
Our Lord not for naught hast thou created (all) this!....(3: 191)*

*Do they see nothing in the kingdom of the heavens and the earth and all that Allah hath
created? ...(7: 185)*

*It is Allah who hath created the heavens and the earth and sendeth down rain from the skies,
and with it bringeth our fruits wherewith to feed you;...(14: 32)*

viii) Accountability

In the Qur'an it was mentioned that man is the vicegerent of God on Earth and thus the Earth should be viewed by mankind as a trust from God and thus man will account for his deeds, including his mode of exploitation of the resources of the Earth. This is illustrated by the following verses:

*We did indeed offer the trust to the heavens and the earth and the mountains; But they refused
to undertake it, being afraid thereof: but man undertook it: - He was indeed unjust and foolish;-
. (33: 72)*

Behold, thy Lord said to the angels; I will create a vicegerent on earth"(2: 30)

Then, shall ye be questioned that day about the joy (ye indulged in!). (102: 8)

.....and spend (in charity) out of the (substance) whereof he has made you heirs...(57: 7)

ix) Exhaustibility

A number of natural resources are limited in supply (e.g. oil, gas, species, etc.) and only a few of such resources are renewable. Thus the Qur'an states that life and all resources are exhaustible both in space and time.

On earth will be your dwelling place and your means of livelihood-For a time".. (2: 36)

What is with you must vanish (16: 96)

All that is on earth will perish:.. (55: 26)

x) Literature

The Qur'anic verses have some literary colourations that reflect the environment and its divisions:

*They are in parable like a hard, barren rock, on which is a little soil: on it falls heavy rain,
which leaves it (just) a bare stone.(2: 264)*

*What they spend in the life of this (material) world may be likened to a wind which brings a
nipping frost: it strikes and destroys the harvest..(3: 117)*

*...like the depths of darkness in a vast deep ocean, overwhelmed with billow topped by billow,
topped by (dark) clouds: depths of darkness, one above another:(24: 40)*

*Allah disdains not to use the similitude of things, even of a gnat as well as anything above it. (2:
26)*

xi) Beauty

The Qur'an recognises the aesthetic beauty of nature and appeals to people to appreciate it:

Do they not look at the sky above them- How we have made it and adorned it, and there are no flaws in it.

And the earth- We have spread it out, and set thereon mountains standing firm, and produced therein every kind of beautiful growth (in pairs)-. (50: 6-7)

On who has created the heavens and the earth, and who sends you down rain from the sky ye, with it we cause to grow well-Planted orchards full of beauty and delight: (27: 60)

Do they not observe the birds above them, spreading their wings and folding them in? (67: 19)

In many parts of the world religion remains a leading institution that shapes the thoughts and actions of many, and thus efforts at solving the problem of an unsustainable exploitation of our environment from a religious perspective is likely to win a lot of adherents. About one-fifth or twenty-five percent of the world population is Muslim, found across different continents of the world. Most Muslim countries are located in ecologically precarious zones: arid areas, earthquake prone areas, floodplains as well as rapidly expanding cities and towns (Barau, 2004). Though the overall impact of Muslim countries to the net global environmental degradation is low, there is a need for a concerted effort to keep it so, and to assist other parts of the planet solve their own environmental problems so that we can have a sustainable global ecosystem. It is felt that the admonitions of the Qur'an as discussed under the eleven broad divisions proposed by Barau (2004), if used in formal and non-formal environmental education for Muslims and adherents of other religions, will help in no small measure in realising a sustainable environment.

Conclusion

This paper has studied the question of the role that environmental education from an Islamic perspective can play in the quest for a sustainable environment; it can be concluded that as the Sustainer of the Earth, God has given humankind permission to use, or exploit the resources of nature without subjecting these resources to abuse, and as God's vicegerents on Earth, mankind will account for their stewardship. The relationship between Man and his environment is supposed to be that of harmonious coexistence: all creatures are not expected to demand more resources than the natural ecosystem can provide on a sustainable basis. They are also not expected to discharge their waste products into the environment in such a proportion that they cannot be recycled, as this may have a negative effect on the productivity of the environment.

This paper further illustrates how the holy book of Muslims, the Qur'an, is replete with verses illustrating environmental concepts and sustainability and denunciations of the overuse or misuse of natural resources. It suggests the possible incorporation of this knowledge into the systems of formal and non-formal environmental education, especially in the Muslim and developing worlds, for the sustainability of our environmental resources; as suggested by the Prince of Wales:

...Islamic civilisation at its best.. has an important message for the West in the way it has retained a more integrated and integral view of the world around us. I feel that we in the West could be helped to rediscover those roots of our understanding by an appreciation of the Islamic traditions' deep respect of timeless traditions of the natural order.

(Charles, Prince of Wales, 1996).

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Rehabilitation of slash and burn agricultural lands in the dry zone of Sri Lanka by low-cost silvicultural methods

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Introduction

The natural regeneration of degraded lands is usually poor in the dry zone of Sri Lanka (Weerawardane, 1999). Deforested lands result from shifting cultivation, and they usually do not allow sufficient natural regeneration of tree seedlings because of the infertile soil and impenetrable barriers of scrub. Therefore the restoration of degraded forest is a huge challenge. However, artificial regeneration by way of enrichment planting or replanting is practiced for a limited number of available species to convert degraded lands to woodlands in Sri Lanka. A simple and an effective method to accelerate natural regeneration of dry tropical forest was introduced by Sam Popham, which facilitates an increase in plant diversity compared to shifting cultivation land in Sri Lanka (Popham, 1993) is discussed in this paper.

The Popham method of low-cost silviculture

The principle of the Popham method is not to plant seedlings but to protect existing tree seedlings from competition and suppression by thorn scrub and creepers. It allows indigenous and endemic species to recolonise. Seedlings are spontaneously released from the scrubland and encouraged to survive through childhood to adulthood (Popham, 1993). The position of saplings is marked with stakes, to avoid damage from subsequent ground treatment, and their regeneration is monitored. The new seedlings established in each season are marked by different identification pegs. The seedlings are helped to gain height through trunk-stemming and crown-thinning of existing trees. To promote young tree seedlings, grasses, creepers and thorny shrubs are controlled. Removal of excessive tillering, dead branches and pruning of growing tree seedlings are carried out (Fig 1).



Fig 1: Demonstration of the Popham method through ground treatment i.e. grass cutting using heavy long-handled blades and then placement of a stake (yellow colour) to mark a seedling of a native tree species are depicted from left to right respectively.

Materials and methods

Study site

The Popham Arboretum is located in the Matale district proximity to 2.9 km away from the Kandalama Dambulla road ($7^{\circ} 51' 34''$ N and $80^{\circ} 40' 28''$ E) in Sri Lanka. The total extent of the IFS - Popham Arboretum is 14.4 ha comprising 3.6 ha in the arboretum and 10.8 ha of woodland (Fig. 2).

Vegetation sampling

Plots $20\text{ m} \times 20\text{ m}$ were established at the Arboretum and Woodland to enumerate the vegetation. A list of plants was compiled by ad-hoc methods.

Fauna sampling

A list of birds was prepared by walking through the nature trails regularly, while observing and recording their sounds from August 2005 to August 2006 using 8×35 binoculars. Similarly, butterflies were recorded along the trails and off-road using a sweep net in the same time.

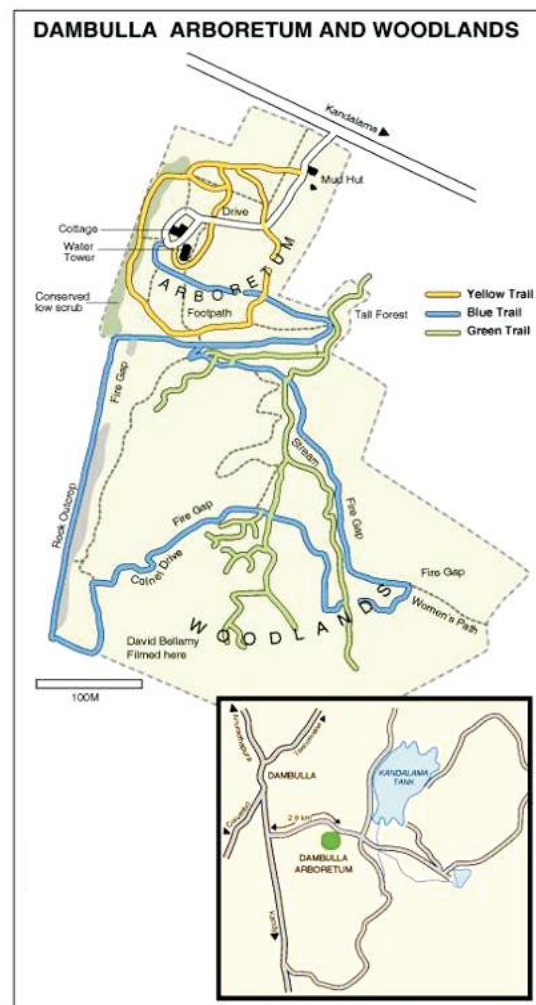


Fig. 2. Location of the IFS - Popham Arboretum. Three nature trails used for sampling fauna are shown.

Results

The total cost for rehabilitation by the Miyawaki method (rehabilitation project of Bintulu, Sarawak, Malaysia) was US\$ 15,329/ha, while it was US\$ 1,439/ha for the Popham method (rehabilitation project of Dambulla Arboretum, Sri Lanka). Therefore, the Popham method reduces the cost for rehabilitation compared to Miyawaki method as follows (Table 1).

Table 1. Comparison of two forest rehabilitation methods

	<i>Popham method</i>	<i>Miyawaki method</i>
Area (ha)	12	50
Period	1989–1996	1991–2000
Total cost	US \$ 17269	US \$ 80475
Cost per ha	US \$ 1439	US \$ 15329

(Rate of exchange 1 US \$ = 105 Sri Lankan rupees in 2007)

Biodiversity of the Popham Arboretum

Species-richness and life-form distribution of plants

A monograph prepared by Cramer (1993) recorded 192 plant species belonging to 169 genera and 53 families. However, available literature (Cramer, 1993; Dilhan *et al.*, 2006) depicted that a total of 225 plant species harboured at the Arboretum (Table 2). These species come under 190 genera and 58 families. Of the recorded species, eight were endemic. They were *Diplodiscus verrucosus* (dik-wenna), *Cassine balae* (neraloo), *Dialium ovoideum* (gal-siyambala), *Micromelum minutum* (wal-karapincha), *Rhinacanthus polonnaruwensis*, *Vernonia zeylanica* (pupula), *Ixora thwaitesii* and *Diospyros oppositifolia* (kalu-mediriya).

Table 2: *Species-richness and diversity of plants at the Popham Arboretum*

	Cramer, 1993	Samarasinghe, 1995	Dilhan et al., 2006	Cramer, 1993 & Dilhan et al., 2006
Species	192	45	101	225
Genera	169	42	91	190
Family	53	19	42	58
Trees	86	–	45	94
Shrubs	35	–	27	42
Herbs	55	–	18	66
Climbers	12	–	11	19
Parasitic	4	–	–	4

Faunal Diversity

The Arboretum is the home to a wide range of animals such as birds, butterflies and reptiles. During the one-year study period, a total of 85 birds were recorded at the Arboretum. Of these, 76 were residents and 9 were migrants. Seven endemic species *viz.*, black capped bulbul, grey hornbill, brown capped babbler, crimson fronted barbet, jungle fowl, hanging parrot and small white eye were recorded at the Arboretum. Furthermore, observations were made to identify the population distribution of birds, which revealed a higher number of species inhabiting the woodland compared to the grassland and rock outcrops. Of the migrant species, the blue tailed bee-eater, forest wagtail, brown shrike and Indian pitta were spotted commonly in the Arboretum. However, the common hoopoe has been rarely observed by Arboretum visitors. During the observation period, 40 butterfly species were recorded. Many butterflies were documented during April and May, when many of the indigenous plant species are in flower.

Discussion

The rehabilitation of degraded lands using the Miyawaki method is comparatively costly, because it also includes costs for nursery management practices (Miyawaki, 1993). In contrast, in the Popham method costs are incurred only for ground clearing and therefore cost declines steeply when continual ground clearing is done. For instance, ground clearing of untreated scrub vegetation through the Popham method costs 85 labour days per acre (0.405 ha) in July 1994 but reduced to 10 in January 1996 (Popham, 1996). The possible explanation for this would be the increased canopy shade of trees and shrubs, along with continual grass control and the decomposing mulch of litter, which inhibits the regrowth of grasses and weeds; this reduces the amount of manual work that would normally be required. Kularatne *et al.* (1996) reported that the thorn

scrub with few savannah species resulted, after six years burning, in converting vegetation into natural forest, when aggressive climbers were removed by silvicultural manipulation. The same principle was adopted by Sam Popham to rehabilitate degraded land into a climax forest in 1963.

The plant diversity of the Popham Arboretum is high when it compared with the floristic studies conducted in the dry zone of Sri Lanka. For instance, Kularatne *et al.* (1996) recorded 71 plant species comprised of 63 genera and 28 families including 7 endemics for the 60 sampling sites at the Victoria-Randenigala and Rantembe sanctuary areas. Although the endemic species confined to the dry zone are few viz. 34 species (Peeris, 1975), the fact that the Arboretum is home to 8 endemic species revealed that the accelerated natural regeneration enhanced the rich taxonomic diversity and high endemism. A total of 330,000 seedlings comprised of 92 species and 20 families for the 25 permanent plots were established (Miyawaki and Meguro, 2000) at the Bintulu Campus on Sarawak State. This evidence proved that assisted natural regeneration through the Popham method resulted in enhanced richness of floristic composition.

This rich floral composition provides valuable habitats for many animals. For instance, a large number of birds can be spotted from here – especially ground feeders such as the endemic jungle fowl, which take refuge at the Arboretum. The endemic grey hornbill is also resident here.

Gunatilleke *et al.* (1996) reported 72 species of birds comprising 5 endemics and 6 migrants. The present survey enabled a further update of the checklist of birds. The reason for poor distribution of birds at the grassland in the present and past (Gunatilleke *et al.*, 1996) would be scarcity of habitats for breeding, feeding and rearing. In contrast, larger populations were observed along the streams of the woodlands. Major threats to the biodiversity of the Arboretum are noisy explosions at the adjacent stone quarry, the spread of invasive alien species and fire hazards due to shifting cultivation.

Conclusions

Present results indicate that the silvicultural management of abandoned agricultural lands by the Popham method is useful in accelerating natural plant regeneration towards secondary climax vegetation, while facilitating rich biodiversity compared to the existing shifting cultivation land in Sri Lanka.

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Acknowledgements

The authors extend their thanks and appreciation to Mr. Sam Popham, creator of this Arboretum, to Ruk Rakaganno, current manager of the Arboretum, and to the Institute of Fundamental Studies for permission to carry out research. And last but not least we wish to thank the field assistants K.G. Sumane Banda, U.G. Rathnasiri, K.G. Palis and M.G. Jamis.

Engaging eco clubs in India's natural heritage: botanical garden as a place for environmental education: a case study from Tamil Nadu

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Introduction

In India botanical gardens are the places where people gather in a particular time for a function, relaxation, and to pass the time; in fact they learn little about plants. A classic example is the Ooty Botanical Garden in the Western Ghats, which is a hill station that holds an annual flower and fruit show in the month of May. Enormous crowds will come to enjoy the beauty of the Garden during that time. Due to climatic conditions, the number of visitors will be less in other months. It is same in other botanical gardens in India: people just go there for relaxation or as an excursion.

In 1992, the Coimbatore Zoological Park and Conservation Centre (CZPCC), situated 30 km west of Coimbatore city and about 90 km from Ooty, established a botanical garden in Anaikatty in the foothills of the Western Ghats for the purpose of conserving the local fauna and flora of the Nilgiri Biosphere Reserve (NBR) and to use this facility to teach about plant conservation to the public, students and others. The botanical garden will be a true replica of the NBR, focusing on the conservation of, and education about, its flora and fauna (Walker *et al.* 2004; Rathinasabapathy, 2006). Its mission fits well with the aims outlined in the *International Agenda for Botanic Gardens Conservation*.

Ecological restoration

The CZPCC had started ecological restoration work in the site, which was originally barren land (Fig.1), and the first planting was started during October 1992 with common species such as *Albizia amara*, *Dendrocalamus strictus*, *Carissa carandus*, *Ailanthus excelsa*, *Erythrina variegata* and it is still going on. Since then, the continual planting activity has been increased and extended to around 70 acres of land, in the middle of the hill slopes (Fig.2). Because of the continual planting activities in the last 17 years the soil pH, which used to be 8 in the beginning, has now come down to 7.

The level of the groundwater table also has risen, due to rainwater percolation and the accumulation of



Fig.1. Before site restoration in October 1992



Fig.2. After site restoration in 2008

humus layer in the soil. Since the site is adjacent to the NBR, the planting activity is restricted to plants typical of the Western Ghats and the NBR, which are acquired from various NGOs and the government sector. The restoration of deforested land will promote seed dispersal across the landscape by facilitating animal movement; the remnant vegetation provides a source plant resources that already exists and should be protected or enhanced first (Kanowski *et.al.*, 2003).

Impacts of Ecological Restoration

At late 2009 the plants species present at CZPCC number nearly 520 species, of which 140 species with 12,000 individuals are in the nursery and 430 species with 32,000 individuals are planted in the field. Because of the ecological restoration the park attracts wildlife species such as wild boar (*Sus scrofa*), porcupines (*Hystrix indica*) spotted deer (*Axis axis*), the small Indian civet (*Viverricula indica*), 10–12 species of snakes, 40–45 species of butterflies (Fig. 3) and 110 species of birds from the nearby mountain forests. The present biodiversity of CZPCC presages the opening of the Park to the public; it will also serve as a resource centre for the NBR.

The restoration has enhanced the populations involved in seed dispersal, especially birds and mammals. These provide a positive feedback through the dispersal of more seeds in the landscape and add to the species diversity by the immigration of species from neighbouring regions. The diversity of insect pollinators is increased. The role of seed and seedling predators is also increased. For example, the number of sandalwood trees (*Santalum album*) at CZPCC site at the beginning of ecorestoration was nil. The present survey indicates there are now 520 sandalwood trees present. This increase has been bought about through bird/mammals seed dispersal. Several butterfly host plants are planted in the Garden, of which species such as *Crotalaria longipes* attract regular migrant butterflies, such as the blue tiger (*Tirumala limniace*) and the striped tiger (*Danaus genutia genutia*). We have a record of the entire life history of both species. Regular data collection is in progress to assess butterfly diversity and abundance in different seasons.



Fig.3. *Crotalaria longipes* with blue tiger butterfly (*Tirumala limniace*)

Formation of eco clubs

After ecological restoration, the Society felt that that the facility could be used to teach environment subjects, especially plant conservation, to students in urban as well as rural areas by means of environment education programmes. So we started formal and informal education activities on the site. In November 2004 we received a grant from Botanic Gardens Conservation International (BGCI) through their Investing in Nature programme, under BGCI and NBRI's National Plants Conservation Programme. With this assistance, we initiated eco clubs for school and college students with the objective to "Educate students on the importance of Nilgiri Biosphere Reserve".

Regular annual activities for eco club members are:

- Green Classes for the members in the Schools and colleges, with audiovisual presentations.
- Members are taken to CZPCC Botanical Garden for an exposure visit.
- Members are encouraged to participate in events such as Wildlife Week Celebrations, World Environment Day World Forestry Day and World Wetlands Day.
- Members receive an annual certificate.
- Schools are given an affiliation certificate, which will help them in getting ISO Certification etc.,
- Consultancy may be given to other schools.

Fig. 4 shows the annual increase in the number of students enrolled in the eco clubs at various institutions. Their interest in plant conservation is shown by the establishment of kitchen gardens, flower gardens, school campus tree planting and roadside tree planting. Every year the eco club members celebrate World Environment Day and World Earth Day by planting tree saplings.

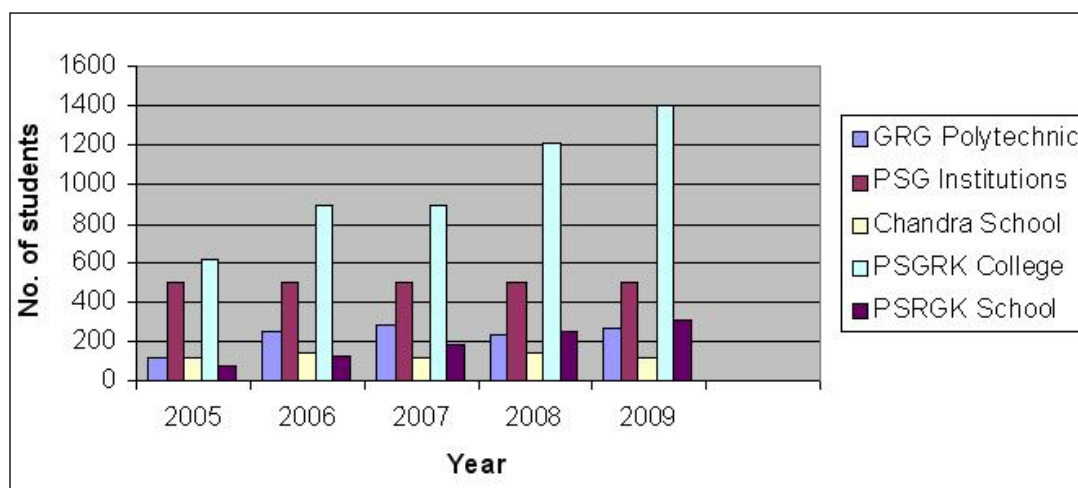


Fig 4 Eco club students at various institutions

Other eco club-related activities

Biodiversity Awareness

Using the resources on site we are carrying out several formal education programmes at school and college levels. Informal environmental educational was organized for visitors to the Garden on the importance of plants and animals. Between 2005 and 2009, 24 programmes were organized in association with local institutions involving various target audiences both in gardens as well as in institutions. In due course the fully-fledged facility will be operated through various sponsored and planned events.

The Amphibian Ark

CZPCC was part of the Amphibian Ark's Year of the Frog (Rathinasabapathy & Kalairasan, 2008)) and conducted many frog-awareness programmes, such as the Save Amphibian Signature Campaign and the Global Leapfrog Event. Students from PSGR Krishnammal School and local tribal students participated in the Global Leapfrog Event organized at Anaikatty during December 2007 (Fig 6). Zoo Outreach Organization (ZOO) amphibian education packets were used as resource materials and distributed to all the participants. Emphasis was given through this programme to different ecosystem and role of amphibians.



Fig.5. Eco club members during their visit to the CZPCC Garden



Fig. 6. A giant leap for amphibian-kind ... one more step to save the frog.

The winner of the event received an attractive tee-shirt offered by ZOO and also a participation certificate. About 70 students and five teachers benefited from this programme.

National Wildlife Week celebrations

In India, the celebration of National Wildlife Week takes place in the week of 1–7 October every year. It is one of the main events for promoting biodiversity conservation amongst Indian people. In this period, governmental and as well as non-governmental organizations conduct various programmes on various themes to promote wildlife conservation at the national level. CZPCC is part of these events and carries out plant conservation awareness programmes in the Coimbatore region. In the years 2007 and 2008 it was celebrated at Anaikatty by conducting drawing and essay writing competitions for school students; 200 students took part in the events each year and benefited through them.

Research Activities by students

We encourage students to undertake a short-term research project as part of their curriculum. During the year 2006, three undergraduate students from Krishnammal College did project work on biodiversity and the ethnobotany of tribal and medicinal plants of the Anaikatty region. The biodiversity of the Botanical Garden has been documented regularly to know its abundance and richness. Several projects identified for further study include seed dispersal by birds and mammals, pollinating insects, pests and diseases of plants.

Conclusion

Since 1992 the CZPCC has been doing its regular environmental education programme about biodiversity conservation in the Nilgiri Biosphere Reserve for school and college students and general visitors. The Founder and Committee Members of CZPCC – Jersey Wildlife Preservation Trust, Botanical Gardens Conservation International and the Zoo Outreach Organization – have generously supported all these activities. The formation of eco clubs has shown increased interest among the student community. In the long run we anticipate support from international agencies for effective outreach programmes, using the CZPCC Botanical Garden as a resource centre for the Nilgiri Biosphere Reserve.

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Acknowledgements

I wish to thank Mr. G. Rangaswamy, Secretary of CZPCC for constant encouragement and facilities provided. I thank Mr. R. Marimuthu of ZOO for his valuable inputs while preparing the manuscript and thanks to Dr. A. Kumaraguru for analysis and comments and Dr. V. Kalairasan for offering comments while preparing the script. Also thanks to the eco club coordinators of PSG institutions, GRG, PSGR Krishnammal College and School and Chandra Matriculation School for their valuable support.

The sustainable development village

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Introduction

Each year in France, the Ministry for Ecology and Sustainable Development organises ‘National Sustainable Development Week’. During this week numerous associations, companies or public institutions offer various activities.

A national label, ‘Sustainable Development Week’ was issued by the Ministry and in order to obtain it, the three main areas of sustainable development (social, economic and environmental) must be mentioned during the activities.

It is within this context that for the last 8 years, the education department of the CJBN has organised the Sustainable Development Village. The Sustainable Development Village takes place over a weekend. The aim is to put parties who are involved in sustainable development and visitors in touch with each other.

Explaining sustainable development is complex because it concerns many different fields. In order to simplify matters for the wider public we have divided the Sustainable Development Village into four smaller, themed villages. To attract visitors, we have chosen themes related to their everyday life (food, plants, habitat, etc) along with a new theme which changes every year. We have also made a commitment to propose ideas and solutions which exist locally. Each partner works on campaigns in our region. Visitors to the village will easily find daily leads or will be able to campaign in local associations.

In order to make it interesting for visitors we want to transmit information and knowledge in different ways. As such, we have implemented several methods:

- Direct interaction with visitors; we have appealed to numerous partners who are specialists in their field to help us in this task.
- Mini seminars
- Guided visits to the Garden
- Fun activities for younger visitors.

The themed villages

The themes for the four villages are: food, plant biodiversity, habitats and a further theme which changes each year.

Food – the fair trade and organic agriculture village

This village brings together the three main pillars of sustainable development: social development, environmental protection and economic development.

As regards fairtrade, our preferred partner is ‘Artisans of the world’ but we also welcome any other associations which offer fairtrade clothes, raffia bags, etc. For several years, we have been promoting fairtrade as a concept. We talk about it during guided visits around tropical food plants, during fair trade fortnight and in the Montet botanical garden shop where the majority of products we sell are fair trade (stationery, herbal teas, etc).

Organic growing is represented from two different perspectives: from the point of view of agriculture and that of gardening. The Lorraine organic farming group offers different locally-produced goods. To promote their products, an organic tasting session is offered to visitors. A few local producers also sell their products: jam, fruit juices, oils, etc. Promoting natural gardening practices is important because the French are the third biggest consumers of phytosanitary products. Alternative growing methods are proposed mainly through the presentation of natural products that are prepared using plants from the wild (nettles, horsetails, pyrethrum, etc)



Showing old varieties of apples

Biodiversity – The plant village

The presence of this village is very important. It is an opportunity to promote the richness of local biodiversity. We ask botanist associations and lovers of plants such as orchids and mycologists to attend. To illustrate the diversity and richness of flora in the Lorraine region, we offer short tours in the company of botanists around the Garden's collections and existing or recreated natural surroundings (forest border, peat bogs, streams, etc). The presence of institutional organisations such as the Regional Natural Park or the Lorraine Sites' Conservation Trust enables visitors to learn more about them and find out about their work. We can be a stepping-stone to help visitors increase their knowledge of these organisations. Exhibitions about natural surroundings have been organised on a regular basis in the plant village.

Habitats – the natural habitat village

Renovating and building houses is often carried out using pollutant materials. This is why in the natural habitat village, local companies offer materials and solutions which respect the environment. Initial offerings mainly consisted of insulation materials made from plants such as hemp, which is grown in Lorraine.

This village has become more and more significant with trade professionals attending and offering natural paints (lead free), energy-saving heating systems (wood and heat pumps) and even house builders who use wood from the Vosges region (the nearest forested area to Nancy).

The fourth village

The fourth village is a themed village which changes each year. The Ministry for Sustainable Development proposes a national theme every year and this is the theme extended by the village. Different themes until now have been: water, climate change, displacement and local consumption. The most relevant parties involved with the theme are invited to attend. The idea of renewal, which is at the heart of this type of annual event, enables us to change partners now and again and welcome new ones.

To help the public understand this new theme, mini-seminars are organised under the largest tree within the Garden. Its large branches serve as a roof under which visitors can assemble.. Each partner talks to the audience for 20 minutes in a basic manner (no PA system or video projector) with the idea being to provoke a rapid, direct question answer session.

Other interaction with the public

Alongside these villages, the education department offers visitors short tours of the tropical glasshouses. This is an ideal moment to set up a dialogue between the visitors and mediators from the botanical garden. These tours must be well prepared, as we have to transmit accurate ideas which are very clear.

Because these days are well attended, students who regularly work as mediators for the education department are present. However, a little training is essential as they are not always aware of the latest developments in gardening which concern conservation or of the work carried out as part of the mission to safeguard flora from the Lorraine region.

A trail is marked out and the mediators follow it with the groups. Specific signposting is put in place, with small signs marking out the path and explaining growing management activities or interests. For example, mulching around trees to help limit the use of weed killers and watering, the constant struggle in tropical glasshouses to limit the use of phytosanitary products, and the use of computers to manage heating in the glasshouses. This activity is important for example, in promoting the efforts of gardeners who have to put in place new working methods.

Report and views:

- Every year, we notice an increase in the knowledge of visitors. For the first few years, the term 'sustainable development' had to be explained but now visitors understand its meaning. Questions are more precise and more perceptive. The different parties involved are happy with this shift; dialogue is more interesting but the level of involved parties' knowledge must also progress.
- This is our eighth edition and I have noticed that it is not easy to renew the different parties involved i.e. to not invite the parties who were involved the previous year. So, from year to year the villages seem to resemble each other a lot.
- The botanical garden has been a pioneer in this kind of event. For several years and in many places nearby, numerous other events of a similar kind have taken place. Visitors are beginning to become weary and are bombarded with a great deal of information.
-

These various different issues have led the education department to develop a different way to put across the issues surrounding this theme for 2010.