BGCI's 6th International Congress on Education in Botanic Gardens

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Abstracts of papers and workshops

Contents

Monday 11 September

Paper session (A)

1 Theme: Achieving Sustainability: Ideas and Solutions

(Simultaneous translation into/from Spanish)

ENVIRONMENTAL EDUCATION IN ARGENTINA – PRINCIPLES AND PRACTICES

Dr Ana Julia Nebbia, Pillahuinco Botanic Garden, Argentina. (co-authors: María Andrea Long and Sergio Zalba)

Cutting trees to protect pastures: a challenge of communication

El Jardín Botánico Pillahuincó, ubicado en un área protegida de la Sierra de la Ventana, Argentina, es una iniciativa creada con el objetivo de promover la valoración pública de los ambientes de pastizales naturales de la región. Nuestra estrategia se basa en sensibilizar a la población local acerca del valor de los pastizales naturales, tanto desde el punto de vista utilitario como intrínseco, generando un ambiente favorable para las acciones de restauración y para cualquier iniciativa de conservación duradera. Las acciones de educación emprendidas se basan en la interpretación ambiental y en la educación por el arte. Hasta la fecha nos hemos concentrado en alumnos de nivel inicial, primario y secundario. Progresivamente estamos incorporando otras audiencias: docentes, grupos dedicados al cultivo y comercio de especies ornamentales y público general. Dentro del jardín se desarrollan actividades de investigación respecto de los requerimientos de cultivo de plantas nativas con potencial ornamental que son transmitidas a la comunidad local como una forma de promover la valoración de las plantas y reducir el riesgo de nuevas introducciones. El jardín botánico se constituye además como una alternativa para los recorridos turísticos del área, de ese modo intentamos promover el reconocimiento del valor de la biodiversidad nativa entre los empresarios turísticos que hasta el momento se oponen a las acciones de control de especies invasoras.

Gail Bromley, RBG Kew UK.

Interpreting Biodiversity ; with the community, for the community

Argentina is a country extremely rich in ecosystem diversity, but where biodiversity is constantly under threat from such problems as desertification, poor agricultural practices, overcollection of natural resources, inappropriate mining practices and poor watershed management. A number of conservation projects are in progress in the country, but in order to be sustainable they need some real commitment and support from local communities. A local NGO (Los Algarrobos) has been working with Kew and others to develop a number of 'biodiversity education and interpretation centres' . These will communicate key messages about the local, regional and national biodiversity management issues and offer activities, events, guided tours, web access and resources for a range of visiting audiences. Selecting sites, themes and content for the centres is a joint community venture between local educators, leaders of community groups, local authority representatives and university staff, all of whom have agreed to collaborate with Los Algarrobos to develop, manage , staff and sustain the selected centres . Local people will be appointed and trained to run the centres, offering employment for several persons. The development process, funding issues and current progress will be explored though this paper.

Eugenia Alverez, Cordoba Botanic Garden, Argentina.

El Proyecto Educativo Del Jardín Botanico De Córdoba

La "Agenda Internacional para la Conservación en Jardines Botánicos" reconoce a los jardines botánicos como centros de educación en el uso sostenible de los recursos florísticos, conservación e investigación para contribuir en la educación de los ciudadanos mediante el desarrollo de programas de educación ambiental. El Jardín Botánico municipal de Córdoba (JBC), comenzó a involucrarse con esta misión en el año 2000 y desde su Area Educativa organizó una propuesta cuyos objetivos son: Convertir al JBC en un "Centro de apoyo a la educación formal ".Concienciar a la comunidad sobre la importancia de la conservación de especies vegetales nativas. Implementar alternativas de capacitación abiertas dirigidas a todos los niveles. Utilizar como herramienta educativa la "Interpretación Ambiental", potenciando en el público el conocimiento de la naturaleza y el compromiso con su conservación. El proyecto surgió luego de un análisis DAFO que dio como resultado la creación de cinco programas diferentes. Hasta la actualidad se han tenido diferentes alcances para cada programa, siendo el más exitoso el de apoyo a la Educación Formal. Ha permitido referenciar al JBC como una importante alternativa para la Educación Ambiental en la ciudad. Los otros programas han fluctuado en los diferentes años por diferentes causas. Paulatinamente, nuestra institución va fortaleciéndose y se espera incrementar la eficiencia y optimizar los resultados de años anteriores en base al planteamiento de metas a corto, mediano y largo plazo.

Helene Vilbert, Miquel J. Culaciati Botanic Garden

Investing in Nature Programme: A new model for environmental educational programmes in Argentina.

The general goal of our project is to provide a high quality Environmental Education Programme at the local and regional scale that can also be implemented in other Argentinian botanic gardens. The handbook is aimed at staff working in botanic gardens and school teachers. It integrates scientifically strong curricula with outdoor investigations and stewardship, providing an in-depth understanding of biodiversity. It encourages collaboration among teachers, students, parents, community and civic groups. This programme is envisioned to complement schools' curricula at the elementary and high-school levels, facilitate college level education in environmental sciences, and provide adequate information to the general public and other stakeholders. Special courses will be delivered by trained professionals to teachers of elementary and high schools in order to provide teachers with the basic knowledge of environmental sciences. They will also provide innovative teaching tools and working examples that may be used in class to create awareness of the importance of preserving our natural environment and motivate students to take a responsible attitude towards environmental issues.

2 Theme: Education for All: Working with Challenging audiences

ADDRESSING INCLUSION IN BOTANIC GARDENS

Jane McCleave, SURFACE, University of Salford, UK.

Inclusive environments and the application of inclusive design principles to garden sites

Inclusive design is a way of designing environments so that they are useable and appealing to everyone, regardless of age, ability or circumstance. This paper begins with an overview of the characteristics that make an environment inclusive. In order to work towards equality of experience for all, it is important to understand the demographic profile and population capability data for the potential user group. General trends and patterns in this area are described which present a strong case for the need for and importance of inclusive design. The paper then provides examples of successful inclusive design at garden sites including the new sensory trail at the National Trust's Stourhead landscape garden in Wiltshire, UK. At Stourhead a booklet, including a wheelchair accessible route, has been developed highlighting elements to look out for, listen to and feel, with certain trees in the garden highlighted for their sensory properties. There is also an audio-guide and a tactile map. The trail aims to make a visit to the gardens more inclusive for all visitors including those with sight impairments or learning disabilities.

Jean Marie Larson, Centre for Therapeutic Horticulture, University of Minnesota, USA.

What's so Therapeutic about Horticulture?

Introduction: All people have one thing in common – we rely on plants to survive. From this underlying premise, Jean will explore how plants not only bring people together but provide physical, social, psychological and intellectual benefits as well. Jean Larson will share with the audience her 25+ years of experience working with people and plants. In that time, Jean has worked with a variety of populations (including but not limited to: persons with developmental disabilities; Parkinson's; Alzheimer's; eating disorders; youth with chemical health issues; elders and children together; young adults with mental illness; adults with brain injury).
Background and rationale: Jean will share with the audience information about the programme at the University of Minnesota: 1) Therapeutic Horticulture Program Certificate through the Medical School's Integrative Medicine courses 2) Therapeutic Horticulture programme services to a variety of people within metropolitan area 3) Therapeutic Horticulture outreach programs to rural regions in state, mid-west, and international programs. Jean will also share her insights to the therapeutic value of landscape design and its impact on future health care services.
Programme implementation and evaluation: Highlights will be given from programmes served over the past 15 years that are exemplar to the field of therapeutic horticulture. A simple activity will conclude the session to highlight all that was emphasized during the workshop.

Ratchuporn Spanuchat, Queen Sirikit Botanic Garden, Thailand.

QSBG Garden For The Blind

The Queen Sirikit Botanic Garden (QSBG), Chian Mai, was founded in 1994 with the aim of being a centre of botanical research and education to enhance plant conservation in Thailand. During the past 10 years of development, QSBG has well served the scientific community and the general public, while little attention was given to school children, especially the visual impaired. This is due to a lack of educators in the environmental field. Realizing the importance of youth education and the need for visually impaired students to experience the 'world of plants' in an

'outdoor classroom', the Technical and Research Department has formed a group of educators with diverse backgrounds to design a ***Garden for the Blind***. The aim is to develop the education programme with the visually impaired and sighted and for them to share the same experiences. The Garden for the Blind is designed with the theme of 'sharing the world of local wisdom and plant diversity'. The garden components are developed from interviews with visual impaired students and adults, Blind School teachers, psychologists, horiculturists and ethno-botanists. Details of garden design, its components, and the educational programme will be discussed in the presentation. It is hoped that Garden for the Blind, not only provides a learning place for the visual impaired students, but also reminds those of us with sight how much we take for granted the glorious gift of plants and nature.

3 Theme: Public Awareness of Plants

BRINGING PLANTS TO LIFE THROUGH INTERPRETATION

Jacqui Kennedy, Kings Park and Botanic Garden, Perth, Australia.

A Picture Paints A Thousand Words

The challenge for educators in botanic gardens is to move visitors from awareness, to a level that influences their attitudes and behaviour, in an effort to effect positive action for the environment.

Because people learn and absorb information in different ways it is not enough to only provide one avenue of learning. Layering information and experiences provided in botanic gardens gives the visitor opportunities to understand and develop empathy for conservation, further leading them towards behavioural change. Touching their senses through immersion experiences, hearing stories told about the plants, engaging in discussion, reading interpretive signage and interacting in guided sensory opportunities are just some of the informal strategies of conveying the messages we wish to impart. This paper will discuss the approach of the public education programme at Kings Park and Botanic Garden in Western Australia to interactive 'layering'. The main focus will be on interpretive signage, as one effective tool to grab the attention, engage and inspire some of the five million visitors who come to the Park each year. Examples will be shared, providing the groundwork for the workshop entitled, 'Streakers, Strollers and Studiers – a Sign of the Times Downunder.'

Michael Holland, Chelsea Physic Garden, London, UK.

'Shelf Life': a practical introduction

This session will introduce delegates to a simple and effective way of bringing the world of plants to life. The links between plants and our lives are visually illustrated by growing them in the product packaging (bottles, cartons, boxes) that correspond to the plant ingredient of that product (e.g. tomato in a tomato sauce bottle or an orange tree in a carton of orange juice, Pinus spp. in a bottle of pine cleaner). Practical considerations and growing hints will be covered to help you start your own display of these items. Chelsea Physic Garden has successfully been using 'Shelf Life' items in their education programme since 2003. On arrival at the garden many of the visiting students have little or no idea that their packed lunches or breakfasts have any plant ingredients in them at all. In 2004, we were awarded a Silver Gilt medal for our display of these items (in a facsimile shop) at the RHS Chelsea Flower Show. Apart from highlighting the relevance of plants in our lives, 'Shelf Life' also addresses the issues of recycling/reuse of packaging as well as an introduction to taxonomy (Fabaceae, Solanaceae, Poaceae families feature very highly in our every day products)

Wangmo Moitra, Royal Botanic Garden, Serbithang, Bhutan.

Recycling plastic bottles as mini greenhouses for plant propagation

Bhutan is a country with high biodiversity and a strong conservation ethic. However, it is short of people with horticultural skills and there is not much experience in cultivating non-agricultural plants. The new Royal Botanical Garden at Serbithang has been collaborating with the Royal Botanical Garden Edinburgh in a project funded by the Darwin Initiative, to increase the horticultural skills base and develop environmental education programme for teachers and students. There have been a number of successful workshops for teachers and students which have included a practical element on plant seeds, germinating from seeds, propagation from cutting and growing plants in 'mini-greenhouse'. Because materials are frequently limited there is an emphasis in these workshops for re-using resources.

4 Theme: Reflection on Practice

THE NATURE OF SCIENCE EDUCATION

Ana Claudia Nepote, UNAM Botanic Garden, Mexico.

Two ways of looking at a botanic garden: science and education as activating forces

México is a country considered as megadiverse representing around 10% of the world's species and occupying 4th place in plant diversity. The state of Michoacán, where our research centre is located, is among the five more diverse states in the country and it does not have an accredited botanical garden. In this context, our institution has initiated a project to create a botanic garden whose main aim is to contribute to the study and conservation of Mexican flora, and to promote the knowledge, conservation and sustainable use of plants and ecosystems. As a research institution, our interest is also for the botanic garden to share our scientific work with the public. Scientists and authorities at our institution are aware of the relevant role botanic gardens play in environmental education. However, from the beginning, the creation of a botanic garden that considers with equal relevance the technical botanical aspects and the needs of the visiting public has been challenging. In this presentation we reflect on how the different points of view of scientists, designers and educators involved in the project have affected its development. Scientists put too much emphasis on developing a plant collection for research and conservation purposes, and educators emphasize the role of the garden as a public place where people go to learn and enjoy nature.

Asli Sezen, Nezahat Gökyiğit Botanic Garden, Istanbul, Turkey

The effects of integrating field trips into science curriculum on students' achievement level of science and teachers' thoughts about science teaching – the case of botanic garden education

In 2003 results showed that Turkish students came bottom internationally in terms of science education (Organization for Economic Cooperation and Development and Programme for International Assessment). For this reason, our Ministry of Education prepared a new science curriculum in 2004. In response to this new curriculum, Nezahat Gökyiğit Botanic Garden prepared a field trip for students to apply the knowledge they has learnt about the plant kingdom. Moreover, its aim was for students to develop environmental consciousness through adventure games, creative drama, discovery hours and science activities during the field trip programme. As a pilot project, this programme was applied in four schools in Istanbul; two of them from low Socio Economic Status (SES) and two of them from high SES. The evaluation of the field trip programme was done by pre and post-tests given to students in the experimental and control groups. As a result, it was seen that the students' achievement level has increased. The details about the teacher's thoughts and student achievement are also presented in this paper.

Dr Sue Johnson, Institute of Education, London, UK.

Darwin Inspired Learning – reflecting on practice in botanic gardens

The aims of this presentation are to:

- recognise Darwin's fundamental ideas and consider how these arose
- consider how Darwin worked through investigations of distribution and diversity, and of adaptation and survival
- identify some of the key questions that arise from a close observation of natural habitats
- consider what Darwin himself said about his experimental method

Through examining the above, we will look at how Darwin's scientific investigation and reasoning can be applied to activities for school age children. We will also explore ways in which students can be encouraged to think about Darwin's methodology and incorporate his ways of working when setting up their own experiments. Examples will be given of how Darwin's experiments and ways of working and thinking can be adopted by botanic gardens when working with schools, encouraging students to think about questions such as 'Why is there a diversity of life?' and 'How does this diversity come about?' We will look at the plants available in botanic gardens that Darwin observed when he explored the countryside in various locations in Britain or on his travels. There will also be a discussion on the nature of questioning, looking at how Darwin collaborated with others to clarify his scientific reasoning.

5 Theme: Public Awareness of Plants

BOTANIC GARDENS SERVING THEIR COMMUNITIES – CASE STUDIES

Prof. Ghulam Hassan Dar, University of Kashmir, India.

The Kashmir University Botanical Garden: Role in education, public awareness and conservation
Established in 1961, the Kashmir University Botanical Garden (alt.1580m) has recently been added up with a high-altitude (2500m) extension at Gulmarg. Its houses a Centre of Plant Taxonomy (COPT) with a rich Herbarium (KASH), several Plant Houses, a Rockery, and a Lily Pond with Canal. A repository of the flora of Kashmir Himalaya, the garden is of great value to local people. The paper highlights the role of KUBG in education, public awareness and conservation of plants; the needs to widen its scope in line with the UN Decade of Education for Sustainable Development are also identified. KUBG has long been used for educational and research purposes to provide material and information about plants for postgraduate students and research scholars of botany. COPT is the major institute of taxonomic research and training in Kashmir. KASH, one of the largest herbaria in northwest India, acts as the main centre for plant identification in this area. The garden's information about plants is provided to the public through guided visits and organized lectures.

Robert Cereno, Makiling Botanic Gardens, Laguna, Philippines.

Raising Public awareness about forest plants and ecosystems at the Makiling Botanic Gardens (MBG)
Under the operational management of the University of the Philippines Los Baños (UPLB), MBG aims to promote appreciation and to increase the knowledge and understanding about plants, their diversity, importance and conservation. Its 300-ha area features a living collection of endemic and exotic flora and a repository and sanctuary of endangered plant species of the country. It serves as an important outdoor laborartory for the advancement of scientific knowledge on rainforest ecology and biodiversity conservation.

Located at the lower slopes of the Mount Makiling Forest Reserve and just 65 km South East of Manila, MBG receives an annual average of 150,000 foreign and Filipino visitors. Majority of its visitors are students and teachers of high schools and colleges from and around the capital. MBG has facilities and services for visitor enquires, reception, orientation-briefings and audio-visual presentations. Brochures, flyers and posters are made available to the general public. UPLB forestry students and volunteer faculty and staff members are serving as cogents who provide guided walks and nature interpretation services upon request. Current learning modules put emphasis on Philippine flora, rainforest ecology, Philippine raptors, and riverine habitats. Conservation education and information are also delivered through the annual biodiversity training courses for science teachers and community leaders, summer youth camps and nature encounters, nature art classes, annual Arbor Day and Festival of Trees event.

Dr Alex Asase, University of Ghana, Ghana Herbarium.

Engaging People in the Wechiau Community Sanctuary, Ghana
The Wechiau Community Hippopotamus Sanctuary Initiative, a unique community-based approach to in situ conservation in Ghana is presented and discussed. The sanctuary covers an area of 40 km? along the banks of the Black Volta River and contains one of the two remaining populations of hippopotamus (*Hippopotamus amphibious*) in Ghana. There are over 210 species of plants in the sanctuary, many of which are rare elsewhere in Ghana. The initiative to develop the area into a sanctuary was led by chiefs and local people, resulting in the establishment of the first truly community-based and owned conservation site in Ghana. The management of the sanctuary is the responsibility of a Sanctuary Management Board which is made up of the local people. The board consider recommendations made by Earthwatch scientists who conducted botanical and resource use research in the area between 2000 and 2004. The scientists used community participatory ethnobotanical techniques and the results of biodiversity research to create greater awareness of biodiversity and resource use issues and to facilitate the establishment of the sanctuary. The sanctuary is already bringing benefits to the communities through the conservation and sustainable use of natural resources and the promotion of community-based ecotourism. The challenges of raising awareness within the local community and of local management of the sanctuary, and recommendations for future management are discussed. This case study provides guidelines for engaging communities in conservation and awareness-raising projects in Ghana.

Paper Session (B)

1 Theme: Public Awareness of Plants

(simultaneous translation into/from Spanish)

EDUCATION IDEAS FOR BOTANIC GARDENS

Edelmira Linares, Jardín Botánico del Instituto de Biología de la Universidad Nacional Autónoma de México (UNAM)

Importancia de promover el consumo de hongos silvestres, como una estrategia de conservación de los bosques templados de México. Taller: Los Hongos Comestibles de la Sierra Nevada

En la parte central de México se localiza la Sierra Nevada con elevaciones de 2000 a 5000 m.s.n.m., que incluyen una flora micológica muy diversa. En ésta área geográfica están ubicados una gran cantidad de pueblos que aún viven de la recolección de productos forestales no maderables, entre los que se encuentran los hongos. Debido a nuestro interés por promover la sustentabilidad de estos recursos E. Linares llevó a cabo un proyecto de documentación sobre su comercialización en uno de los mercados locales más importantes de la región, el Mercado de Ozumba, Estado de México. Tomando como base esta investigación organizamos el taller : "Conoce y degusta los hongos comestibles de la Sierra Nevada", con los objetivos de promover el consumo de los hongos silvestres entre diferentes públicos de la Ciudad de México, por ser esta el área a donde se destina principalmente la comercialización de estos productos. Este taller estuvo dirigido a chefs de diversos restaurantes, amas de casa e interesados en el consumo seguro de este tipo de organismos. El programa incluyó: Aspectos taxonómicos, biológicos, de sensibilización sobre la importancia biológica en las cadenas alimenticias, aspectos culinarios, de preservación de los hongos para consumo futuro y una variada degustación. Como parte complementaria se visitó la Colección Micológica del Herbario Nacional. Los participantes adquirieron la habilidad de reconocer los hongos comestibles de esta área geográfica, sus grandes posibilidades culinarias, y la importancia de seguir consumiendo estos recursos no maderables, ya que indirectamente su comercialización está prolongando la vida del bosque y su conservación beneficiando a un gran número de familias rurales. Este taller evidenció el gran desconocimiento que existe sobre los hongos y la gran necesidad de difundir su utilización para no perder el conocimiento tradicional sobre su consumo.

Silvina Elena Mercado, Agronomy Botanic Garden, National University of San Luis, Argentina.

Constructing an educational space in the botanic garden through art

El Jardín Botánico de Ingeniería Agronómica (FICES - UNSL) eligió como eje del Día de los Jardines Botánicos de la Argentina en nuestro caso, la frase: "Descubriendo el Jardín … a través del arte". Convocamos a sectores de los destinatarios directos de este evento a participar activamente en la organización del mismo. El desafío para este grupo que era a la vez audiencia crítica y parte organizativa fue hacer de nuestro Jardín un espacio más apto para la educación ambiental. Nos basamos en resaltar los caracteres adaptativos de las plantas nativas y exóticas que componen el jardín a las condiciones restrictivas del semiárido. Se elaboró en conjunto una experiencia sensorial que permitiò a los futuros visitantes descubrir las cualidades estéticas de las plantas a través de la participación en talleres de arte y juego. También se utilizaron los afiches de la campaña "Plants for life" como disparador en aspectos relacionados con el diseño. Del intercambio de ideas surgió la relevancia del JB en el aprendizaje significativo de contenidos transversales (educación formal) y la importancia de vincular la educación ambiental en el Jardín con la *alfabetización ambiental* no solo de niños y jóvenes sino de adultos

Kay Mendieta de Alonso, Acapulco Botanic Garden, Mexico.

A different project in the Acapulco Botanic Garden

Mediante imágenes mostraré como era el sitio originalmente, la deforestación y abuso que había en la zona y esta destrucción se iba extendiendo aceleradamente y como la acción de un grupo de mujeres sin experiencia académica, pero sí con muchas ganas de aportar a su comunidad y preservar la biodiversidad de la zona permitió en poco tiempo llevar a la realidad un proyecto que parecía imposible, la construcción del Jardín Botánico de Acapulco. La importancia de la planeación, el proceso para la obtención de recursos, la vinculación con la comunidad tanto académica como con la población de escasos recursos, el inicio del programa de Guardián Ambiental para que los niños entiendan de la importancia de conservar nuestras plantas y los retos que se nos han ido presentando.

2 Theme: Education for All: Working with Challenging Audiences

ECOLOGICAL EXPERIENCES WITHIN BOTANIC GARDENS

André Graziano, University of São Paulo

Botanic Garden Santa Elisa - Agriculture Environmental Education

The Botanic Garden Santa Elisa situated in the Instituto Agronômico de Campinas (IAC), has undergone improvements concerning educational activities. IAC develops scientific research in different agri-botanic fields and also has important collections of germplasm, but its activity in education is still initiating. The newly proposed education project will encompass both agriculture practice and landscaping. It will focus on enlarging the debate and generating knowledge in relation to the local and global environment. The aim of this paper is to publicize the characteristics of the Botanic Garden Santa Elisa situated in IAC as well as the educational project which we propose establishing.

Kozi Hayasi, Natural History Museum and Institute, Chiba, Japan.

Community education activities in the Ecology Park

The Ecology Park is an open-air facility, where visitors can observe the life of plants and animals those are native to the Boso Peninsula, central Japan. We provide several programmes for people of all ages.

Forest Explorer is a worksheet-based programme mainly for children. A child can search some shapes or colours from the field, observe the nature, make a poem etc. following the worksheets. Debriefing is an important process in the programme. Children strengthen the memory of doing something in the field through talking about his or her experience to the staff. As a reward, children are presented with paper models of animals and plants found in the Park and many have become familiar with nature through this programme. About 50 citizens act as volunteers in the Park. As a Forest Explorer Partner, they listen to children talk, sympathize and facilitate them, but not educate. Partners are now indispensable to our educational activities in the Park. In the Ecology Park Gallery we run a photography-contest. People are invited to submit digital photographs taken in the Park and they are then displayed in a simple frame. Small panels of photographs with a short message (like HAIKU) are prepared by visitors not the museum staff. Such an activity demonstrates visitor's and citizen's interest in the educational, research and collection activities in the Park and the museum.

Godwin Ade Tanda, Limbe Botanic Gardens, Cameroon.

Multidisciplinary approaches to environmental education

The Mount Cameroon Region is considered a biodiversity "hotspot". It is home to about 42 endemic plant species and inhabited by over three hundred thousand people. The Limbe Botanic Garden acts as a shop window to the Mount Cameroon Region. This garden is a haven for many ex-situ and in-situ collections and runs a vibrant environment education unit. This unit carries out educational programmes that have demonstrated success in connecting and engaging different people to plants. This paper will highlight ways in which the environmental education programmes (nature interpretation, holiday environmental education workshops, open fun days, school link programs, radio broadcasting, etc) are implemented at the Limbe Botanic Garden, demonstrating their success in connecting people to plants. It will also present the outcomes and feedbacks from different audiences before and after the programme's initiation.

3 Theme: Achieving Sustainability: Ideas and Solutions

EDUCATION FOR THE CONSERVATION OF BIODIVERSITY

Susie Kelpie and *Cath Evans*, Royal Botanic Garden, Edinburgh, UK.

Focus on plant biodiversity

The Royal Botanic Garden Edinburgh (RBGE) Schools Education team caters for over 10,000 pupils a year in the primary and secondary age-range through our curriculum-linked schools programme.

Our reputation for providing high quality Continuing Professional Development courses for teachers in plant science, horticulture and expressive arts is well established and our programme continues to expand.

We have recently completed a schools poster pack project entitled 'Focus on Plant Biodiversity', funded by the Royal Bank of Scotland 'Branching Out' scheme and RBGE

membership. The project will enable us to broaden our outreach to schools that are unable to visit the Garden and promote interest in plants.

This paper will present the pack which comprises 20 A2 full-colour posters. Images are included on the posters, of plants held in the RBGE Living Collection complemented by microscopic images and pictures taken in the field by botanists. They illustrate aspects of plant science in the 5-18 Scottish curriculum but are useful to anyone involved in plant-based education at any level.

The 20 posters divide into four sets of five: Plant Groups; Plant Parts; Plant Reproduction; A Closer Look at Biodiversity. Additional information is provided in a background booklet which is intended to increase teachers' knowledge and confidence in teaching these subjects.

Magali Stitelmann, Conservatory and Botanic Gardens of the City of Geneva, Switzerland.

Plants and sustainability – welcome classes at the botanic gardens

The role botanical gardens play strengthening links between plants, people and cultures contributes to pursuing sustainability in our society. For us at the Geneva Botanical Gardens, this is an important education target. Together with teachers, we use plants and live collections in the context of Education for Sustainable Development (ESD). Our teacher training programme aims to enable teachers to conduct visits and activities in the garden with pupils. We prepare teaching material, bringing our knowledge of plants together with their programmes, techniques and practice. In this way, a large number of pupils learn about the importance of biodiversity for life on earth. Furthermore, we found that social integration and cohesion is a challenge in an international and multicultural city like Geneva. With the idea of promoting such a process while studying environment, the teachers conduct *welcome classes* – for migrant children who do not understand French – have contributed to the development of specific educational material based on plants growing at CJBG. The educational material provides pupils with a good opportunity to practice French while appreciating their own identity and cultural values. For example, pupils choose a plant they know from their country of origin within the live collections. They collect information about it using existing interpretation material and the library. This approach allows children to become conscious that plants are a common factor of human development at the basis of cultural diversity

Dr Elena Pushai, Tver State University Botanical Garden

On the way to the sustainable development: what we can do

Social roles and functions of botanic gardens have drastically expanded over last few decades, with many gardens becoming large educational centers, which demonstrate modern achievements and know-how in science and education. Gardens also have a significant role to play in sustainable development and can contribute to the UN Decades on Education for Sustainable Development 2005-2014".

Tver State University Botanic Garden, founded 125 years ago, is situated in downtown area of the city. The main objectives of the garden's activity are: the studying and preserving of regional biodiversity, introduction as the way of conserving the biodiversity, ecological education. A number of visitors to the Garden has recently increased to 10 000 per year. This paper will present the various education projects the garden is involved in, including 'Development of Agenda 21 in Russia', 'Promoting Eco-education to the Citizens of Tver' and 'Open the Heart to the Nature'. The education programme at Tver State University Botanic Garden demonstates the principles of sustainable development in an urban environment, promoting itself as a model for other gardens.

4 Theme: Reflection on Practice

FROM IDEAS TO ACTION

Dr Svetlana Sizykh, Botanic Garden of Irkutsk State University, Russia.

Conserving Russian plant biodiversity through education

The Botanic Garden of Irkusk State Unviersity is the only botanic garden in the Baikal region which has been designated as a World Heritage Site. In 1994 BG ISU started a transfer and introduction of market oriented educational and horticultural technologies acquired from a few advanced BGs of Europe, North America and Asia to meet regional needs and expectations. This paper will discuss the changing role of the BG ISU following the disintegration of the USSR and its transition towards a market economy. It will highlight its significant resources including 1) Largest regional living collections (more than 3000 taxa); 2) Outdoor displays and indoor collections and in conservatories and outdoor; 4) Highly educated staff; 5) Herbarium, artifacts; 6)

Library; 7) Networks and information system; 8) Land, infrastructure. This paper will also examine the regional role of the garden in education, which focuses on A) formal education for students and teachers at universities, colleges and high schools; B) continuous education for different ages and social groups; C) extended education practices for people with special needs, including 'horticultural therapy' for young offenders, orphans, disabled people, dacha-owners, etc; D) excursions for visitors and tourists; E) city greening, use of ornamental, medicinal, edible plants.

Shaun Olsen and ***David Anderson***, Utah Botanical Center and Utah State University, USA.

The value of an education masterplan for the Utah Botanical Center

In 2002, the Utah Botanical Center (UBC) initiated an intensive programme planning process that was led by an interdisciplinary team of 11 educators and administrators from Utah State University (USU) Extension, the Utah Botanical Center, the Utah State Office of Education, and the Davis School District. The team's goal was to plan, evaluate, and implement new programmes that integrated with plans for physical development of different theme gardens and facilities. Over a period of 12 months, the team conducted two surveys, six group process meetings, 33 interviews with stakeholders, and observed programs at 17 interpretive sites to develop a list of priority programs. This input was prioritized by considering the UBC and USU mission, potential funding opportunities, audience needs, cooperation or competition from existing programmes, and the expertise and limitations of UBC staff. The team summarized their priorities into immediate-term and long-term programmes for different audiences such as kindergarten through 12th grade students, university students, horticulture industry professionals, and the general public. Components of the plan have been implemented by hiring a coordinator for the Utah House—a sustainable building demonstration house and learning center, hiring an education coordinator for the botanical center, expanding field trip opportunities for school students, and expanding general gardening classes for the public. The education master plan has been of great value in bringing together many diverse educational programmes and helping sequence the construction of demonstration gardens and UBC facilities.

Dr Reni Lestari, Bogor Botanic Gardens, Indonesia.

Environmental Education at the Bogor Botanical Garden with case studies from Indonesia

Environmental education is now incorporated in all major international strategies for biodiversity conservation and sustainable development (World Conservation Strategy 1980; The Botanic Gardens Conservation Strategy 1989; Convention on Biological Diversity 1992; International Agenda for Botanic Gardens in Conservation 2000; Global Strategy for Plant Conservation 2002). One of the core competence of the Center for Plant Conservation-Bogor Botanical Gardens (CPC-BBG) of Indonesia, as an *ex situ* Institution is conducting environmental education (Strategic Plan 2005-2009). Environmental education is an effort to change the behaviour and attitudes of the society. (CPC-BBG) aims to increase the knowledge, skill and awareness of the environment, highlighting the environment problems that society faces.

5 Theme: Reflection on Practice

THE ROLE OF PROFESSIONAL DEVELOPMENT

Prof. Michael Bentley, University of Tennessee and Associate Prof. Susan Hamilton, University of Tennessee Gardens, USA.

The inquiry, integration and differentiation project, professional development for middle-level Appalachian teachers at the University of Tennessee Gardens

The Inquiry, Integration and Differentiation (IID) project was conducted in 2005 at the University of Tennessee (UT) as a professional development opportunity focusing on plant-related science for middle-level teachers in the Appalachian region of Tennessee. The median household income in this area is almost half the U.S. average with over 20% living below the poverty level (U.S. Census Bureau, 2004). The unemployment rate is nearly twice the state average (Tennessee Department of Labor and Workforce Development, 2004). Nadel & Sagawa (2002) argue that child poverty in the U.S. is greater in rural than in urban areas, as poor rural children often receive substandard educations, inadequate health care, and have limited opportunities for further intellectual development. As for their teachers, researchers have noted that in the area of science many U.S. middle level teachers lack confidence in both their understanding of the content and their ability to "do" science (Lederman, 1992). The IID program was

conducted at the UT Gardens, greenhouses, and laboratories as well as at field sites in the Great Smoky Mountain National Park. A multidisciplinary team provided instruction through a 60-hour (two week) summer institute with two 3-hour follow-up symposia during the autumn term. The project aims were to advance teachers' knowledge of plants and environmental science as well as their pedagogical skills, especially in inquiry teaching, using active learning strategies, differentiating instruction and in developing outdoor sites on school grounds for environmental studies. Participating teachers experienced an inquiry approach themselves as instructors modelled the high-impact active learning strategies promoted by the project. A communication network and Web site (http://web.utk.edu/~appalsci) were created to provide resources to both participants and other Appalachian educators. The presenters will share the Project's results, as indicated in an external evaluator's report.

Abel Barasa Atiti, National Museums of Kenya, Nairobi, Kenya.

Exploring organizational learning and change for sustainability in a Kenyan context

Since the 1992 Rio Earth Summit, there has been a growing global commitment to the role of education and learning as a tool for organisational change towards sustainability. Action research has been widely used within Environmental Education (EE) as a methodology for professional development, creating change, improving practice and organisational learning. This paper highlights how through action research, organisational learning and change as an EE process can contribute to sustainability in a Kenyan context.

The paper is based on an ongoing action research study on organisational learning and change for sustainability at the National Museums of Kenya (NMK). The study examines aspects of organisational culture, team learning and power relations towards an improved understanding of organisational learning and change for sustainability at NMK. A number of contextual issues that both constrain and enable cultural change and innovation for sustainability at the organisation are shared. Some of these are being addressed to generate new practices, norms, values, ideas and strategies as cultural change and innovation for sustainability at NMK. The paper discusses challenges, opportunities and emerging strategies of improving communication to enable widespread adoption of sustainability practices at NMK.

Dr Dawn Sanders, Kings College, London, UK.

Reflection on practice, professional renewal or additional pressure?

The lack of a considered and reflective commentary on botanic garden education has had a significant impact upon the visibility of botanic gardens in both policy and research arenas. In response to this low profile Willison (1997) has argued that '*by encouraging educators to question their own programmes - and even to embark on their own research - we believe that botanic gardens would be well placed to help shape the nature of the debate rather than trailing behind*' (Willison, 1997, pp. 2-3). In addition to Willison's argument, a major stimulus for reflecting on practice is the perceived challenge of curatorial voices which allude to education as a key role of botanic gardens, but appear not to have a clear vision of how that role might interweave coherently across the broader scientific and horticultural remits of their gardens (Touchell and Dixon 1997, Sanders, 2004). Subsequently, a further challenge presents itself to the reflective practitioner, the challenge of conducting research and sharing data within the wider botanic garden community. Botanic garden educators are often isolated from their peers (Foster, 1997) and in many institutions have a laden portfolio of tasks. In cases like these embarking on a reflective journey may appear to be too onerous a proposition, one that might be considered an added pressure rather than a source of professional renewal. The proposed paper will consider these challenges by anchoring them in the research journey of one botanic garden practitioner who conducted a doctoral study. The proposed paper will consider how this experience might support the: reflective journeys of others, building a sense of professional renewal among botanic garden educators, developing pedagogical dialogues across the botanic garden community and, establishment of research partnerships between practitioners and researchers.

Tuesday 12 September

Workshop session (A)

1 Theme: Education for All: Working with Challenging Audiences

(simultaneous translation into/from Spanish)

Brian Johnson, BGCI, USA, *Dr Maite Lascurain*, BGCI, Mexico, *Dr Marcela Sanchez*, BGCI, Argentina.

Setting up a national botanic garden day

One proven strategy for raising public awareness is organized events and celebrations that promote a specific conservation message. Arbor Day has successfully promoted the importance of trees and tree planting for more than 130 years. Since 1970, Earth Day has increased the general public's environmental awareness and literacy. On May 18, 2006, Plant Conservation Day was launched with a coordinated celebration at hundreds of botanic gardens and zoos throughout the United States in a unified effort to promote public awareness of plants, current threats to plants, and how individuals can play an active role in saving plants. This presentation will discuss the launch of Plant Conservation Day, and analyze the successes and challenges of managing a large-scale public awareness campaign. Plant Conservation Day is a joint project of Botanic Gardens Conservation International (U.S.) and the Association of Zoological Horticulture. Participating Plant Conservation Day institutions are free to design their celebrations in a manner that best suits their individual sites and local audiences. However, an online celebration planning kit developed by BGCI (U.S.) was available for guidance. The kit provided activities to engage visitors on Plant Conservation Day, including art and science activities for children, a guided plant conservation tour, and suggestions for highlighting local plant conservation projects. The kit also included promotional materials and a press kit. BGCI (U.S.) also distributed 100,000 copies of "A Plant Conservation Checklist for Gardeners" to participating sites. Congress participants attending this session will receive a Plant Conservation Day materials kit, with full information on organizing a Plant Conservation Day celebration at their sites in 2007.

Theme: Achieving Sustainability: Ideas and Solutions

Mike Kerkman and *Mikki Heydorff*, Huntington Library, Art Collections, and Botanical Gardens, USA.

Train to sustain: lasting, quality programming through innovative methods in volunteer training

Public programmes in botanic gardens must be led by confident representatives of the institution with a thorough understanding of teaching technique and subject content. Often these programme leaders are volunteers. How do we develop appropriate training for sustainable, volunteer-led programs? This workshop details a case study of creative, effective volunteer training and provides participants with techniques and models for building volunteer training at their home institution. At the Huntington Botanical Gardens, the newest school programme, "Seeds and Sprouts," was developed through an innovative partnership between volunteers and staff. Together, the two groups worked to build the content and teaching methods for the program. As a result, "Seeds and Sprouts" has been popular and successful for the public and for volunteer leaders alike. This workshop explores the components of the model and its positive results in areas of volunteer ownership, teacher and student response, programme consistency balanced with the ability to remain dynamic, and programme sustainability.

3 Theme: Working with Challenging Audiences

Kim Pierpoint, Thrive, UK and *Pat Ealey*, The Holly Lodge Centre, UK.

Working with groups with special educational needs

Horticulture and gardening have been increasingly recognised as ways to promote social inclusion, and physical activities, for health, well-being and skills development and fulfilling activities.

This workshop will be of interest to those who have little or no previous experience of working with disabled or disadvantaged people in the garden environment. It will investigate how horticulture can be adapted to meet the needs of individuals and show how adjustments can be made to gardening activities to meet individual abilities. Activities will include: seed sowing, and potting on, with an opportunity to try out tools for easier gardening. The workshop's aims are for participants to feel fully informed,

and empowered to implement the knowledge and skills gained from the workshop in their own context. Participants should come willing to take part in group work and practical hands on testing.

4 Theme: Reflection on Practice

Lisa Orgler, Reiman Gardens, Iowa State University, USA.

Dimensional design: a holistic approach to garden planning

Dimensional Design is a holistic approach to garden education based on team effort (the team is key!). The team works together to develop programmes, horticulture and entomology displays, interpretation, communications, and amenities to support an annual theme, which also supports the Gardens mission. All staff develops ideas as a team creating one cohesive unit. This innovative process was developed to keep our Gardens fresh and explore unique angles of horticulture, and as a result, has encouraged return visits from diverse audiences. This paper will explore how the Dimensional Design process works, taking delegates through a step-by-step procedure. The unique aspect of this approach is that it is done an annual basis, rather than display-to-display. By working annually, all displays have interconnected sub-themes that also support the annual theme. Brainstorming is an integral step within the Dimensional Design process. The goal of team meetings is to develop unique ideas that support the theme year. This process is important in creating new concepts in gardening. It challenges the team to think outside the box, so we can in turn enchant and educate the public by offering outstanding displays and programmes.

5 Theme: Public Awareness of Plants

Keith Tomlinson, Meadowlark Botanical Gardens, USA.

Strategies for interpreting the Global Strategy for Plant Conservation

To support Target 14 of the GSPC botanic garden educators must have a working knowledge of plants and their central role in human agency. Ideally, we should be able to apply this knowledge in any botanic garden anywhere in the world with the same result: visitors leave our programmes empowered with the knowledge that conservation of plant diversity is the foundation of human well-being. This workshop will focus on interpretive strategies to achieve that goal through:1) Audience definition: planning for diversity in age and cultural expectations.2) Emphasis on the "Global" in the GSPC: our societies are globalizing, culturally and economically. Ideally, this should provide an improved forum to address conservation globally. 3) Interpreting a temporal understanding of plant diversity in our own gardens: when people begin to understand nature's timeline they understand more about the human-nature relationship.4) Interpreting the "Sixth Extinction" in relation to the GSPC: what are effective methods of explaining the extraordinary impact of human agency on global biodiversity without painting a bleak picture.5) Practicing "Emotionally Intelligent" interpretation: avoid overly didactic lecturing but get the point across through storytelling, personal experience and topics the general public relates to.

6 Theme: Public Awareness of Plants

Antoinette Eyssell and *Avhatakali Mamatsharaga*, South African National Biodiversity Institute (SANBI), South Africa

School indigenous greening programme

Environmental protection, sustainable utilisation of natural resources and restoration of degraded environment are the key pillars to an environment conducive to sustainable development. Public awareness is very important if this is to be achieved. Who to target and with what programmes, where to start and how to ensure sustainable and continuous use of the information provided remains a challenge. Educating the youth by incorporating sustainability issues and Environmental Education in general into the school curriculum seems inevitable in order to create an environmentally sensitive and aware generation. Heavy reliance on natural resources, poverty, living below subsistence levels, unemployment, lack of skills, and illiteracy are key issues and reality on the ground. The result is that, although the bulk of the population has indigenous and/Or scientific knowledge on how to conserve our natural heritage and ensure an environment conducive to sustainable development, they are constrained by the fact that they have no option but to exploit the natural resources, engage in activities destructive to the environment. The challenge is providing alternative means that will assist in ensuring that target audience buys into the process of conservation and protection of the natural heritage.

A workshop presentation by trained SANBI's Environmental Education staff will deal with all the issues raised in this abstract with live examples of programmes that the EE Unit is currently implementing on the ground.

7 Theme: Achieving Sustainability: Ideas and Solutions

Bill Graham, Farming and Countryside Education (FACE), UK.

Personalising the food chain

This workshop sets out to explore how the food chain can be personalised through a range of hands-on activities and a presentation of ways in which schools are being encouraged to help young people reconnect the food they eat, with where it comes from. At present the UK Government has a clear agenda that schools should play a more active part in shaping attitudes to healthy eating. A report in October 2005 sets standards that consider children's needs across a broad spectrum and address not only nutritional requirements but also the wider issues of what children learn about food: where it comes from, how it is produced and how to cook food for themselves and their own families in the future. A multi-faceted approach to healthy eating which touches on many different aspects of school life is likely to be the most effective way forward. At the heart of this agenda is a disconnection between food and farming and the reality is that many young people have little concern about where or how their food is produced. How can food miles, freshness and animal welfare become real live issues of meaning? The answer may be to personalise the food chain so that the people who grow and prepare our food are more like our neighbours and their concerns become ours. FACE is working with schools and local food initiatives to develop curriculum resources and activities that encourage informed discussions about food choices. Many of these are making the connections with actual farmers who grow their food, those who process and deliver it and the people cooking it – chefs, parents or the young people themselves. Offering visits to farms, market gardens, farmers' markets, farm shops all help to add character to what otherwise is an impersonal sequence of events.

Paper Session (C)

1 Theme: Achieving sustainability: Ideas and Solutions

(simultaneous translation into/from Spanish)

BEST PRACTICE FOR ESD AT A NATIONAL LEVEL

Dr Alla Andreeva, Moscow University Botanic Garden, Russia.

Building awareness of education for Sustainable Development in Russia's botanic gardens

The concept of Education for Sustainable Development arrived in Russia relatively recently, and there is still no officially approved ESD strategy. Debate on the principles, aims and objectives of ESD is leading theoreticians and practitioners towards an understanding of the enormous role that botanic gardens can play in this process. The gardens themselves, however, have so far been slow to get involved. In most cases, the ESD concept is being introduced in the gardens by outsiders, sometimes generating opposition and conflict over the need to adopt new ways of thinking. This is primarily the legacy of Russian botanic gardens' history of providing traditional education for university students and school pupils. A second reason is the lack of trained and competent specialists willing to introduce the new educational concept. And thirdly, the gardens need to change their funding and administrative policies to create a platform for implementation of the new strategy.

Garden-based education began to attract attention following the adoption of the International Agenda for Botanic Gardens in Conservation in 2000, which defined ESD as a priority activity. With the assistance of international grant programmes and the financial support of major companies promoting ESD in Russia, some gardens have successfully launched projects based on the new principles. These successes have generated interest amongst the garden community and set precedents. The growing body of experience has highlighted problems, while at the same time demonstrating clearly the benefits ESD brings, such as enhancing the role of botanic gardens in society and increased funding.

Laurel McIvor, Canadian Botanic Garden Education Network, Canada.

Conserving plant diversity: the 2010 challenge for Canadian botanic gardens

Canada's botanical gardens are working to increase public understanding about the urgency and importance of maintaining the diversity of biological life on earth. Canada is a large country with a relatively small, geographically dispersed population. Our botanical gardens and arboreta are a mixture of university-affiliated and private institutions. They are generally small, urban-based, seasonal operations with few full-time employees. A handful are involved in botanical research, many manage natural properties and almost all offer educational programmes. Collectively we host over 5 million visitors a year and deliver hands-on educational programs to about 500,000 people. The *Investing in Nature: A Partnership for Plants in Canada* project co-ordinates a network of Canadian botanical gardens and arboreta for plant conservation and sustainable living. Through this network we are promoting greater public awareness of the importance of plants, the threats they face, and the actions needed to protect them.

In response to the many relevant national and international programs and policies, the Canadian botanical community has developed "*Conserving Plant Diversity: the 2010 Challenge for Canadian Botanical Gardens*". This plan of action is the framework for expanding and improving plant conservation efforts and education for sustainable development at our institutions over the next five years. This paper will provide an overview of best practices of conservation and biodiversity education at botanical gardens, arboreta and other institutions across Canada and present our plans for engaging Canadians in "Conserving Plant Diversity".

Paola Sierra Manrique, Colombian Botanic Gardens Network, Colombia.

Routes of discovery: environments that encourage learning in Colombian botanic gardens

Las rutas de descubrimiento surgen a partir de varios años de reflexión sobre el impacto que tienen los recorridos guiados de los jardines botánicos de Colombia en los aprendizajes de los niños y las niñas que los vistan. A partir de esta reflexión surgió la necesidad de diseñar recorridos innovadores que permitieran la construcción de conocimiento y el desarrollo de habilidades y actitudes relacionadas con las ciencias en los jardines botánicos. Esta búsqueda me llevó a explorar la situación actual de la educación en los jardines botánicos de Colombia y, luego de un diagnóstico nacional, encontré que en la gran mayoría de los casos los jardines carecían de programas educativos construidos o consistentes con teorías de aprendizaje que sustentarán el diseño y la puesta en marcha de las actividades de educación ambiental que realizaban. A partir de esto desarrollé un año de práctica pedagógica con algunos educadores de los jardines botánicos del Quindío y José Celestino Mutis de Bogotá, que me permitiera, en equipo, encontrar estrategias de enseñanza-aprendizaje consistentes con una teoría de aprendizaje que orientara nuestra acción pedagógica. De esta manera se diseñaron, realizaron y evaluaron rutas de descubrimiento consistentes con algunos principios de la Teoría de Aprendizaje Constructivista. A través de estas rutas no sólo hemos despertado el interés de los niños hacia las plantas, sino que además hemos logrado promover el desarrollo de habilidades como la discusión entre pares, la observación, la indagación, el registro de datos y la generación de inquietudes y preguntas relacionadas con la flora colombiana. En estos casos el educador del Jardín se ha convertido en un facilitador o guía pedagógico del aprendizaje de los niños, que tiene en cuenta las experiencias previas de los estudiantes. Actualmente estamos desarrollando dos investigaciones educativas que permitirán evaluar el impacto que tienen las rutas de descubrimiento sobre el aprendizaje de los niños; para, finalmente, implementarlo en todos los jardines de Colombia.

2 Theme: Working with challenging audiences

THINKING CREATIVELY FOR PLANT DIVERSITY EDUCATION

Prof. Maria Dalila Espírito Santo, Jardim Botânico da Ajuda, Portugal.

Alice in Wonderland: a project for education

Alice in Wonderland is a theatre play performed on stage at the Ajuda Botanic Garden, in Lisbon, in the mid-Summer of 2004 and 2005, although it had some presentations in theatres at Oeiras and Porto.

This theatre performance was held in the open air space. It was played by a group of children aged from 7 to 14 years old and was presented for more than 5,000 people of all ages – most of them, children on school trips. The play is based on Lewis Carroll's tales *Alice's Adventures in Wonderland* and *Through the Looking- Glass*. The only things similar to these tales are the characters and the tale structure. For instance, in *Alice in Wondergarden*, Alice finds a rabbit, but not a white one, this one is brown and knows everything about plants. In fact, he's going to give her a

lesson about the functions of all of the plant parts. The Queen of Hearts is going to make her a test, asking her which part of the plants can we eat, with examples, and the guards are going to help her. There is even the Mad Hatter but he shows Alice that he is not as mad as everyone says… he separates the garbage whilst Alice's neighbours don't! The results so far achieved, demonstrate the important potential of this project to introduce to children new concepts that would not otherwise be perceived.

Sarah Lloyd, University of Oxford Botanic Garden, UK.

Using drama with teenagers

As an education officer, it is sometimes quite unnerving when the educational experience of people visiting the Garden is in the hands of others. Especially when the 'others' are teenagers. This is the position we have been placing ourselves in through a Wellcome Trust funded project entitled the 'Healing Power of Plants'. Two years ago the heads of drama from local secondary schools were approached and asked if they would like to work with the University of Oxford Botanic Garden on an innovative project. There were a number of positive responses and schools that don't routinely incorporate a visit to the Botanic Garden in their plan for the year, were selected. 'The Healing Power of Plants' is a broad theme that includes many weighty issues, including those of the use and exploitation of nature's resources. It was felt that young people needed more than a few hours to understand and develop their opinions on these, so the aim was to work with students over a sustained period rather than during a single visit

Dr Karen van Oostrum, University of Cambridge Botanic Garden, UK.

Securing funding for arts activities via 'Percent for art' schemes

Cambridge University Botanic Garden (CUBG) secured Arts Levy money to fund a two-year programme of arts activities at the Garden, for public and community audiences. The Arts Council of England endorsed 'Percent for Art' in 1988, as a means to integrate the work of artists into the planned developments of public space. Since then, numerous council authorities across the country have adopted their own 'Percent for Art' schemes. These schemes encourage developers to allocate a proportion (usually 1%) of the budget in any capital project for spending on public art. It is an internationally used funding mechanism, often employed for commissioning contemporary artworks. Each council that adopts a 'Percent for Art' scheme sets its own conditions of eligibility, which must be met for the money to be allocated. Our Arts Programme represents an unusual and inventive use of Percent for Art money, while satisfying the criteria set by Cambridgeshire City Council. In 2004 the University of Cambridge built a Plant Growth Facility on the Botanic Garden site. The Arts Levy associated with this new build came to almost £16 000. Cambridgeshire City Council accepted our proposal for using this money to fund a 2-year programme of arts activities at the Garden. The programme, now coming to its end, has been a great success, with this funding enabling us to develop our outreach activities considerably. We have worked with groups that we were never able to reach before, and the activities, workshops and festivals delivered a vast array of creative opportunities to all participants.

3 Theme: Public Awareness of Plants

CONNECTING PEOPLE TO PLANTS THROUGH INTERPRETATION

Donna Osland, Botanic Gardens Trust, Sydney, Australia.

More than a plant label: creatively engaging the public
A plant label, while a fundamental, essential and very much observed feature of every botanic garden, generally does no more than give the name and origin of the plant. Often the extent of a visitor's engagement with a plant is to read the label, the content of which may mean little to the visitor, and view the plant for a short time before moving on to the next plant. However, it is possible to significantly increase the extent of a visitor's engagement with a botanic garden's living collection through quality interpretation. Such interpretation engages not only the senses. Plants often have wonderful stories, with such chapters as their biological makeup, provenance, role in local ecology, ethnobotanic use, and conservation issues, to stir the viewer's imagination and emotions as well. This extended engagement and deeper appreciation leads to increased public awareness of plant diversity and relevant issues, including conservation and sustainability. This presentation will explore a range of static and dynamic interpretation techniques designed to add much to a visitor's engagement with the living collection and create a more memorable experience. Partnerships of botanic gardens with other cultural institutions, and the engagement and increased awareness of new visitors to the gardens via these institutions, will also be explored

Dr Lisa Wagner, South Carolina Botanical Garden, USA.

Connecting people to plants: botanical messages that make a difference

Have you thanked a plant today? As an educator, I've learned to appreciate the power of simple messages, both verbal and written. My interpretive programmes for adults and children connect people of all ages with plants and the natural world through inquiry-based learning and experiences in the garden. Consider pollinator visits to flowers, for example. Encouraging teachers, college students, parents, and children to observe flowers and their visitors more closely (before "telling" them about pollinator syndromes or floral morphology) has elicited responses from "wow, I had no idea that flowers were so interesting" to "I always hated science before, but this is great." Even in a presentation for adults, engaging participants through posing questions, creatively using visuals, and keeping the messages direct and clear has far more impact than a traditional "lecture" program. Written interpretation offers another area where key points are best served by simple messages and an engaging approach. Short captions, "hooks," and visuals that tell a clear story make the difference between an interpretive panel or book that people read and one that is ignored. Botanical messages and images that capture interest and "work" to connect people to plants are an essential part of an effective communication strategy to advocate for plants and their conservation.

Steve Meredith, Botanic Gardens of Adelaide, Australia.

Connecting people, plants and culture

Plants have diverse and intriguing stories that provide insights into people, cultures and the environment. However, in botanic gardens we have a relatively short time grab to get our stories across to the many school students who visit our sites annually. We also deal with increasingly sophisticated young people who live in a fast paced world saturated with imagery and promotional sound bites that compete for their attention and interest. Harnessing and presenting our stories and messages in ways that make for engaging and intriguing learning across the school curriculum is a challenge for all garden educators. We need to creatively design and deliver learning programs that have educational integrity yet resonate with young people above the background chatter of their increasingly media-rich world. The Botanic Gardens of Adelaide has tackled this challenge through three approaches that use a variety of media and methodologies designed to capture the interest and attention of students beyond the more traditional guided tour or self-guiding notes. The approaches include an entertaining set of interpretive performances and scenarios delivered through MP3 players, an activity based 'Plants and People of China' website and a successful 'quiz on legs' format for event based learning. All have endpoints that creatively connect plants, people and culture to different types of learners within botanic gardens and beyond their walls.

4 Theme: Reflection on Practice

COMMUNITY REFLECTION

Dr Joe Sempick, Thrive, Reading, UK.

Lessons Learned – evidence from practice

Written evidence exists of the benefits of gardening exist dating back to the ancient Egyptians. During the 20th century this interaction became more formalised with the advent of horticultural therapy practices and an increasing amount of validated evidence has emerged in the past few years.

This paper draws together the most up-to-date evidence and looks at how gardening and horticulture is used in the UK – and wider afield - to benefit of a wide range of people. It is illustrated with specific case studies that show how it has changed people's lives allowing them to live lives of choice.

From allotments to secure units in hospitals and prisons, in window boxes and walled gardens, on private estates and botanic gardens, gardening is used in active and passive ways with a wide range of disabled people. The evidence shows how gardening has moved away from being a purely leisure pursuit to providing opportunities for people to gain a range of skills.

Dr Jennifer Schwarz Ballard, Chicago Botanic Garden, USA.

Connecting with the community: three models of community-museum interaction

Because of the variety of contexts and circumstances in the schools and communities of our constituencies, informal education institutions cannot take a narrow approach to educational programming. Rather, we must provide programming that is accessible to different audiences and practical on an institutional level. This paper describes three approaches the Chicago Botanic Garden has taken to promoting environmental awareness through education programming for secondary students (ages 12-18) in the

Chicago metropolitan area. The discussion centres around each programme's underlying rationales and strategies, including an assessment of results in knowledge acquisition and student motivation.

Case one, College First, is an on-site full-year mentorship programme. 20 students (ages 15-18) visit the garden for eight weeks to engage in group activities and one-on-one internships with Garden staff. School-year components include visits to higher education institutions and local sustainable businesses, and assistance with the college application process. The second case is Primero la Ciencia, a community-based summer program located in a densely Hispanic neighborhood of Chicago. Forty neighborhood children (ages 11-14) come to a partner community center for eight weeks to investigate the science behind locally relevant environmental issues. Finally, I discuss a school-based secondary school programme developed by the Fairchild Tropical Botanic Garden in Miami, Florida, U.S.A. The "Fairchild Challenge" takes an interdisciplinary approach to environmental science by sponsoring competitions around projects in architecture, economics, education, literature, the fine arts, and sciences that promote students' awareness of environmental issues.

Susan Conlon Morgan, Home and garden television and University of Tennessee, USA.

Project Green Reach at Brooklyn Botanic Garden – a case study of the summer programme

This research study examined Project Green Reach (PGR), one programme of the Children's Education Program at Brooklyn Botanic Garden (BBG). Located in Brooklyn, New York, USA, BBG is a public garden that has served as a model program for garden-based youth education since 1914. PGR utilizes both the indoor classroom and outdoor laboratory to engage K-8 students and teachers at Brooklyn's Title I schools in informal learning about science. Every year, PGR instructors select a small group of students into the summer programme where they work in teams on garden and science projects at BBG. A case study was conducted to document PGR's summer program as a potential model for informal science youth education and to investigate the effects of PGR on inner city youth. Field observations of PGR's summer program participants and collection of programme documents were conducted during the 2004 Summer Program. In 2005, phone interviews were conducted with four adult PGR Summer Program alumni and one former staff member who discussed their experiences while participating in the programme and described the meaning of PGR in their lives. From the data collected and triangulated through document review, observations, and interviews, seven themes emerged: (1) PGR participants come from challenging home and school environments, (2) PGR developed academic and interdisciplinary skills, (3) Participation increased understanding of science concepts and developed gardening skills, (4) PGR fostered environmental awareness, (5) PGR supported social development and personal growth, (6) PGR was a positive life experience, and (7) BBG is culturally significant to the participants' community. From the results, it is concluded that PGR has had an impact on participants' lives, showing that PGR had positive influence on their views towards BBG, gardening, and science

5 Theme: Public Awareness of Plants

CONNECTIONS TO CULTURE

Charlene Forrest, Milner Gardens and Woodland, Canada

Shoots with Roots – helping community Shoots make and meet Roots

Milner Gardens and Woodland (MGW) is an estate garden and woodland property in Qualicum Beach, British Columbia, Canada. It was donated to Malaspina University-College in 1996 to maintain it in perpetuity for education and the community's benefit, in Ray Milner's memory. Located centrally on Vancouver Island, Qualicum Beach has a population of approximately 8,500. The gentle pace and climate of the immediate area and Vancouver Island itself are attractive to residents and visitors. Qualicum Beach is particularly appealing to retired residents, and has an impressive gardening community upon whom numerous awards have been bestowed. The MGW children's education program, *Roots and Shoots*, began in 2003 after renovation of the Milner vegetable and berry patch. The MGW program was modelled after the *Roots and Shoots Intergenerational Gardening Program* at Elizabeth Gamble Garden in Palo Alto, California. In its first year, the MGW program paired staff and volunteer mentors with students from local Grade 3 classes (7-9 yr olds) in an 8-week onsite food gardening program

Karina White and ***Kitty Connolly***, Huntington Library, Art Collections and Botanical Gardens, USA.

Real plants, real tools, real science: building a conservation ethic through botanical exhibits

Botanical gardens are uniquely positioned to offer visitors direct, meaningful experiences with plants and the natural environment. However, many public gardens don't fully take advantage of the educational potential of their collections.

In an era when science education is in steep decline, and real experiences are often eclipsed by the virtual, offering visitors direct contact with the green world is increasingly important.

The Huntington Botanical Gardens, in San Marino, California, has opened a new botanical education centre designed to offer visitors direct experiences with plants and science. Visitors are encouraged to touch, smell, measure, observe, and compare — using real tools, and examining an extraordinarily diverse plant collection. Hands-on investigations ranging from viewing stomata under a microscope to measuring the acid levels in pitcher plant juice pull visitors into direct, visceral, and exciting experiences with plants. We believe that these experiences are a prerequisite to a greater public understanding and valuing of the plant world, and ultimately, a stronger conservation ethic. As members of the education and exhibit development staff on the botanical centre project, we will present strategies for engaging visitors through botanical exhibits. We will share the findings of our evaluation research on the public's attitudes towards plants, successful and less successful interpretive elements, and how gardens may begin to shape people's feelings about plants and the conservation of biodiversity.

Diane Turcotte, Montréal Botanical Garden, Canada

A unique garden for a unique experience

The Courtyard of the Senses, created in 1999, is a small 500 m2 garden at the Montréal Botanical Garden. It is designed to be explored with the non-visual senses, for its plants were selected for their scent, texture or taste and sometimes even for the sounds they make. The visitors to the Courtyard of the Senses are like all others who come to the botanical garden, except that it is naturally most interesting to those with disabilities. Does the greater emphasis on the sensory dimension in this garden meet the specific needs of its different clienteles? What approaches have been developed for visually impaired visitors, for those with reduced mobility or intellectual impairments? This presentation is a reflection on our practices designed for the specific clienteles of the courtyard of senses.

Theme: Achieving Sustainability: Ideas and Solutions

ENGAGING PEOPLE IN CONSERVATION EDUCATION

Paul Blanchflower, Auroville Botanical Garden, India

Developing relationships with highly degraded ecosystems The Tropical Dry Evergreen Forest (TDEF) of South India is now extremely threatened in its natural range due to high levels of human interference. Less than 1% of the natural forest remains and most of this is highly degraded. Consequently the local population in general, and the younger generations in particular have no real idea about the forest in its pristine state. The educational programmes at the gardens aim to help the children to develop a relationship with this forest system through using children's stories based on the forest, showing them the plants, and involving them in activities at the gardens such as planting and raising of seedlings. The underlying philosophy behind this approach is that when a relationship is formed through experience between an individual and another entity then there is concern from the individual towards the well being of the entity. Without the relationship there is no concern, and without concern there is no conservation effort. It is particularly hard to develop this relationship when the entity, in this case the Forest, is highly degraded, and thus uninviting, inhospitable and generally devoid of immediate interest. This is why it is important to give the children's imagination a helping hand through stories and fantasy. Environmental responsiblilty is high in the awareness of many young people in India, and yet it is still an abstract concept brought in from the media and abroad. Thus as well as developing relationships it is important to show clearly to the children how in their daily lives they are being environmental responsible, and from this positive experience to indicate ways in which they develop this contribution to sustainability.

Malta Qwathecana, SANBI, South Africa

Engaging people in Biodiversity Education and Sustainability within a botanic garden context

Development on a fragile environment is a vain attempt to improve people's lives. Poverty and unemployment that are dominating in most underdeveloped sections of the world have resulted in people putting emphasis on maximising short-term gains through the use of exploitative practices, (Fuggle and Rabie, 1992). These exploitative practices not only place the present generation at risk but generally undermine the human existence considering the fact that

the earth and its natural resources are finite. Biodiversity is threatened and endangered to a point of extinction and the key causes are human activities. Environmental threats and challenges such as the global climate change as initiated by human activities, the spread of alien and invasive alien vegetation as orchestrated by human activities; soil degradation as made possible by human activities; pollution of rivers, air and soil all made possible by human activities and many others can only be minimized to a point of eradicated through environmental awareness and education.

Sustainable development needs a stable environment and hence communities need to be educated and made aware of key and basic environmental management principles through environmental education. With all the challenges we face, holistic approaches that are designed to address all the issues and concerns surrounding the conservation of biological diversity need to be developed and implemented.

Esther Ball, Earthwatch Institute Europe, UK

Training and Learning *in situ*: Early-career scientists on Earthwatch research projects

Earthwatch Institute is an international conservation organisation that engages people worldwide in scientific field research and education to promote the understanding and action necessary for a sustainable environment. We currently support more than 140 research projects in 50 countries. Earthwatch's African Capacity Building Programme has recently entered its eleventh year of operation. The programme began in 1994 to provide practical training placements on our field research projects. Since then, we have enabled over 800 African conservationists, NGO staff and scientists from 25 countries to join 34 projects across the continent. The Programme aims to address some of the key training needs in sub-Saharan Africa – as identified by the *Convention on Biological Diversity, Agenda 21* and various other regional studies. Being actively involved in a scientific project in another country will demonstrate the international nature of conservation problems, and Fellows see how lessons learnt by one conservation project can be applied to their own work. A network of past Fellows is now exchanging information between projects all over Africa. It presents a rare opportunity to get involved in practical hands-on scientific research while making contacts and exchanging ideas with conservationists and scientists from other African countries.

Workshop session (B)

Theme: Achieving Sustainability: Ideas and Solutions

Laura Hobley, BGCI.

Sustainable funding for education programmes

So, you have spent time and effort developing an innovative education programme, the only problem now is how to fund it? How do you identify potential supporters and most importantly, once you've found them and want to develop a funding application, just how do you avoid your hard work being 'filed' in the waste paper bin? Using an interactive approach this workshop will explore the key principles of sustainable funding. The aim is to provide participants with an overview of how to submit successful applications for education programmes and build relationships to turn one-off donors into on-going supporters. Covering essential activities from identifying potential funders to submitting an application and developing a donor base, participants will gain a comprehensive understanding of the fundraising process.

Theme: Achieving Sustainability: Ideas and Solutions

Art Sussman, Wested, USA.

Dr Art's Planet Earth Show

Dr. Art's Planet Earth Show helps people understand how our planet works from a systems point of view. Through the show, the audience learns that Earth is a closed system for matter ("matter cycles"), an open system with respect to energy ("energy flows"), and a tightly networked system with respect to life ("life webs"). In addition to its simplicity, this framework provides an easy way to think about sustainability, and apply sustainability considerations to specific issues. In addition to standing alone as a very enjoyable education outreach tool, the show works with a book (*Dr. Art's Guide to Science*), a DVD (Dr. Art Does Science), and a website (www.guidetoscience.net) to provide a deep scientific understanding of sustainability and environmental issues. This workshop will provide participants with hands-on, interactive experiences based on materials and ideas in the show, book, DVD, and website. Dr. Sussman will also facilitate a discussion on how to best connect his resources and this systems science approach with education in and around botanic gardens. This discussion will include ideas on how to use this approach in combination with resources from botanic

gardens to work with the formal education system. The workshop will model a variety of pedagogical approaches, combining exciting scientific demonstrations, audience participation, and innovative uses of props. The activities presented during this workshop work well at educator conferences, science centres, and schools (especially middle schools and high schools).

Dr. Art's work has received very favourable reviews. Come to the workshop and find out why Dr. Jane Goodall said, "Art Sussman joyfully explains science we all need to know. His presentation captures the imagination of people of all ages and invokes a sense of wonder."

Theme: Education for All: Working with Challenging Audiences

Caroline Lewis, Fairchild Tropical Botanic Garden, USA.

The secrets behind engaging diverse audiences – the Fairchild Challenge

The growing role of public gardens in education challenges us to become more ambitious in our outreach initiatives. The wording of our institutional missions may vary, but our common agendas include developing lifelong learners who appreciate the beauty and value of nature. Carefully crafted programmes like the Fairchild Challenge can help public gardens cultivate large, diverse, untapped audiences and promote botanical awareness, scholarship and stewardship. Workshop participants will learn why we must and how we can design and implement programs like the Fairchild Challenge in order to: (1) reach broad audiences of learners at the middle and/or high school level (2) promote civic-minded thinking on local and global issues (3) involve local organizations/institutions (4) impact the broader community (5) promote interdisciplinary learning, and (6) raise botanical and environmental awareness, scholarship and stewardship. The Fairchild Challenge encourages teenagers, and by extension their families and communities, to appreciate the beauty and value of nature, develop critical thinking skills, understand the need for conservation and biodiversity, tap community resources, become actively-engaged citizens, and recognize that individuals do indeed make a difference. Participants will be given opportunities to explore Challenge options currently used to engage students and teachers, suggest additional Challenges and topics, evaluate sample student entries, and participate in a workshop Challenge option. Only in its fourth year, this program already engages over 16,000 teenagers of diverse backgrounds, interests and abilities in the multicultural urban environment of Miami, Florida.

Theme: Reflection on Practice

Dr Suzanne Kapelari, Dr Costantino Bonomi, Gail Bromley, Vera Grancharova, Dr Sue Johnson, Dr Krasimir Kossev.

Teaching across the borders – a collaborative project developing a 'good practice' manual and resource for teachers and botanic garden educators in four European Union countries

The resources botanic gardens and arboreta are able to put into education differs largely from garden to garden and from country to country. Some larger gardens may have their own staff dedicated to the work whereas in others education is just one of many responsibilities of the curator. An education network helps spread information to those who are interested. In the case of the EU Project: Plant Science Gardens a model will be developed to give examples of how botanic gardens and primary schools can work together to pool resources for improving science education at primary school level. This model may be helpful for other botanic gardens to set up or enhance their educational programmes and to integrate botanic garden education activities into the national primary school curriculum. A European botanic garden education network could help develop the educational potential of botanic gardens and arboreta in Central and Eastern Europe and facilitate the exchange of information between people involved in education, interpretation and public relations. This workshop will offer the opportunity for people interested in forming a European Botanic Garden Education Network to get in contact with each other. Delegates will be able to share information about activities they carry out and start talking about the goals of a future network.

5 Theme: Reflection on Practice

Jacqui Kennedy, Kings Park and Botanic Garden, Perth, Australia.

Streakers, strollers and studiers – A sign of the times down under.

No, this Workshop won't discuss cricket, toddlers or academics, but rather explore the creation of effective interpretation through pictures and the written word. Interpretive signage is an art form that can be created using a tried and true formula developed in Kings Park and Botanic Garden in Western Australia.
Done well, an interpretive sign will target the casual visitor *streaking* past and attempt them to slow down and look around and maybe discover something new. The *Stroller*

who enjoys the superficial layer of the sign, by finding out the name of the plant and maybe where its found and perhaps a snippet of information, may just find themselves 'hooked' and wanting to read more and observe their surrounding more closely.

That rare breed, the *Studier*, is the sponge - keen to absorb as much information as possible. This person will probably seek out the Visitor Information Centre and to talk to a Guide and gather a handful of brochures for some scintillating bedtime reading!

The workshop will demonstrate how to develop eye-catching, effective signs that cross language barriers; are flexible in their design; able to be adapted for a range of target audiences and locations; and are simple, sturdy and relatively cost effective to produce. The design should also translate well to plant labels and brochure design to enhance your corporate identity. Kings Park and Botanic Garden has developed its directional way finding and interpretive signs, plant labels, temporary and events signage as part of a total suite that conforms to a comprehensive 'Style Guide' that includes design perameters for all publications, printing and website design. Many examples will be on display and you will be given the tools to develop effective signs for your garden.

6 Theme: Public Awareness of Plants

Associate Prof. Khaled Sawalha, Al Quds University, Palestine. ***Keith Tomlinson***, Meadowlark Botanical Gardens, USA. ***Dr David Michener***, University of Michigan Matthaei Botanical Gardens and Nicols Arboretum.

The place of religion and spirituality in botanic gardens in relation to plant conservation

The human-nature relationship is truly ancient, preceding the rise of virtually all organized religions by hundreds of thousands of years. Does this suppose a "predisposed divinity" of the natural world in human conciseness? The first part of this workshop will review concepts in the Nature-Faith continuum from a historical perspective. The second part will feature a question and answer format focusing on scriptural interpretations of nature. Participants will have the opportunity ask questions and share insights from their home gardens. Ultimately, this workshop is intended help garden educators understand the spiritual diversity of the visiting public and how nature is addressed in various liturgies

7 Theme Public Awareness of Plants

Fiona Danks and ***Jo Schofield***, UK

Natures Playground

Playing in wild places should be at the very heart of childhood - yet too many of today's children don't have enough opportunity for free, unstructured play outdoors. Our book *Nature's Playground* aims to inspire and encourage families to explore the natural world wherever they might be, introducing fun activities and encouraging children to pursue their inborn affinity with nature. This workshop aims to encourage debate about the importance of environmental play and identify ways in which Botanic gardens might provide opportunities for many informal activities to encourage children to enjoy the natural world. Young children engage with nature through informal environmental play, hands-on activities and immersion in the natural environment – this workshop in Oxford Botanic Garden will include the chance to try out some of the sensory and creative activities described in *Nature's Playground*.

8 Theme: Achieving Sustainability: Ideas and Solutions

Alla Andreeva, Moscow University Botanic Garden, Russia and ***Elena Pushai***, Botanic Garden of Tver State University, Russia.

Education for sustainable development: successful activities

On the basis of experience gained in Moscow University's "Apothecary Garden" and the Botanic Garden of Tver University, this workshop will introduce participants to interactive game models and techniques for organizing theme trail games and lessons for schoolchildren in the garden or in the natural urban environment. Participants will be encouraged to assess the effectiveness and relevance of the games and explore how they can be used in their own garden context. The games are designed to introduce players in an entertaining way to the diversity of plants in the botanic garden's collection and to help them discover the relationship between plants and humans.

Paper Session (D)

1 Theme: Public Awareness of Plants

(simultaneous translation into/from Spanish)

RECONNECTING WITH NATURE FOR SUSTAINABILITY

Cristina Maria Nogueira Baptista, Botanic Garden of the National Museum of Natural History, Portugal.

Living botany at school

The present paper describes the "Living Botany at School" project, which has been running for three years at the Botanical Garden of the National Museum of Natural History, Lisbon. Designed for teachers' training (pre-school to 9th grade), this project aims to reconnect urban children to nature and to promote pleasure and interest in plant studies, through the creation of organic gardens at schools. Teachers learn how to develop education for sustainability projects, based on the creation of organic kitchen gardens. Projects are developed taking into account an initial diagnostic of the children's educational needs in order to develop a sustainable life approach. Therefore, each project is designed to achieve a specific transformation.

Gardening is carried out using organic agriculture techniques, scheduled in harmony with the seasons, and it is the main framework of the projects. Through it we hope that the children will develop an emotional bond, sensibility and a sense of wonder towards nature, and also acquire the basis of ecoliteracy. The basic skills of scientific literacy are acquired from the observation of what happens in the garden and from the need to understand it.

Adriana Burgos, Carlos Thays Botanic Garden, Argentina.

Education for development: eat your greens!
Desarrollamos un programa de actividades abordando la problemática de la falta de vegetales en la alimentación, debido a la relevancia que presenta la carencia de ciertos nutrientes para los niños de la provincia de Buenos Aires (Argentina) y su entorno social, por el impacto que tiene en la salud y por ende en la calidad de vida. Partimos de la premisa que conocer los alimentos ayuda a alimentarse mejor y nos planteamos como objetivo que los niños conozcan como funciona el sistema huerta, que tomen conciencia de la gran diversidad de vegetales que existen y de la falta de los mismos en su dieta. Nos propusimos también, promover el consumo de vegetales frescos, la participación, la expresión de ideas propias, la reflexión, la creatividad y principalmente una actitud critica y activa hacia la propia alimentación.

Se diseñaron actividades para realizar antes, durante y después de la visita a la huerta, flexibles y adaptables tanto a los intereses y capacidades de los alumnos como a las características socio culturales de su entorno. Durante las actividades los alumnos confeccionaron un listado de alimentos que consumen habitualmente, los clasificaron en función de sus propiedades alimenticias, diseñaron grupalmente planos de huertas en papel, compitieron en equipos para buscar vegetales en función de sus partes comestibles, hicieron macetas, plantaron semillas sorpresa, registraron su crecimiento en un diario de germinación, compartieron recetas con vegetales traídas de sus hogares y por ultimo crearon las propias.

Consideramos al maestro como un facilitador, que guía al alumno en el proceso de aprendizaje, partiendo de sus conocimientos previos. La motivación, la experimentación, la discusión y el uso de los conocimientos recién adquiridos fueron elementos claves para consolidar el aprendizaje. Tratamos de esta manera de brindar conocimientos y a la vez generar una actitud responsable hacia la propia salud

Teolinda Balcazar Sol, UNAM Botanic Garden, Mexico.

An alternative space for education and raising awareness about Mexican biodiversity: the Tigridia shop

En el año de 1998 se fundó la tienda "Tigridia" concesionada a la Asociación de Amigos del Jardín Botánico del Instituto de Biología, de la UNAM. El objetivo principal fue de generar recursos económicos para el Jardín botánico y así apoyar diferentes proyectos de mismo jardín y ofrecer plantas y productos derivados o inspirados en éstas a nuestros visitantes, además de que la tienda fuera una ventana del jardín que apoyara su programa de Difusión y Educación. Por lo cual también se ha incluido en "Tigridia" información educativa sobre los productos y diversos materiales impresos. Desde su fundación se inició en el Jardín Botánico por un lado, un programa intensive de propagación de plantas en peligro de extinción para su venta, dirigido a aquellas personas interesadas, para que las pudieran adquirir fácilmente a precios accesibles y así disminuir el saqueo en sus áreas naturales. Posteriormente se han sumado a la comercialización plantas regeneradas por cultivo de tejidos, y una serie de artículos de origen vegetal o con motivos botánicos como: juegos, materiales didácticos, publicaciones especializadas y artículos

promocionales, entre otros. Gradualmente se ha logrado una diversidad de productos relacionados principalmente con la conservación de la naturaleza, y se han apoyado a pequeños grupos de artesanos de diferentes partes del país, que promueven programas de desarrollo sustentable en sus comunidades. Hasta ahora la tienda ha sido un excelente ejemplo de un espacio con fines múltiples, en el cual la educación ha jugado un papel importante, además de la generación de ingresos que apoyan los programas del mismo jardín botánico.

2 Theme: Education for All: Working with challenging audiences

LIFELONG LEARNING IN BOTANIC GARDENS

Md Mustafizur Rahman, Bangladesh Agricultural University, Bangladesh.

Education in botanic gardens in Bangladesh: prospects and problems

Bangladesh has been striving hard to achieve economic progress since independence in 1971, but its high population pressure and poor resource-base have made it impossible to achieve such progress. Now it ranks as the world's eighth and Asia's fifth most populous country with a land area of 147 570 sq km resulting in a population density of about 948 per km2 which is the highest in the world. According to recent report, the human population of Bangladesh stands at about 140 million and is expected to reach approximately 225 million by 2050. Almost all the people, particularly the rural people are directly dependent on the continued productivity of natural resources, like water, soils, forests and fisheries. But the overuse by the extremely high population pressures has degraded the natural resources in to severe soil erosion, soil nutrient depletion and widespread deforestation. The degradation of natural resources, particularly the plant resources has been a great concern for socio-economic and sustainable development of the country (UNCED 1991).

B. Rathinasabapathy, Coimbatore Zoological Park and Conservation Centre, India.

Conservation education programmes about plants at Coimbatore Zoological Park and Conservation Centre

The Coimbatore Zoological Park and Conservation Centre (CZPCC) occupies an area of 100 hectares in the foothills of the Nilgiri Biosphere Reserve (NBR), a unique and threatened ecosystem in Western Ghats of India. The NBR, is one of 14 biosphere reserves of India. It provides habitat for about 110 strict endemics of plants. The CZPCC focuses on the flora and fauna of the NBR. Ever since inception, it has been involved in various conservation related activities and has attracted many nature lovers and students. An initiative towards this was the conduct of a botanic education workshop in collaboration with Zoo Outreach Organization and BGCI in 1995. The aim of this workshop was to bring together zoos, botanic gardens, forest department, research institutions and NGOs, to work towards plant diversity. In recognition of our plant conservation work, the BGCI/NBRI awarded a grant in 2004 under Investing in Nature-India to establish an Arboretum for endemic and endangered plants of the NBR and to promote conservation education.

Emma Williams, University of Oxford Botanic Garden, UK

Botanical recollections: creativity with the over 50s

Botanical Recollections was an art and creativity project run especially for participants over the age of 50. The group met once a fortnight throughout the summer of 2005 working with a visual artist and a reminiscence worker. The project used a mixture of visual art, reminiscence work and writing to make pieces of creative work. It allowed participants to gain new skills and gain creative confidence as well as providing a valuable social network for the group. Running the programme from May to August 2005 gave participants the best chance to see the Garden change from spring to summer. Evaluation carried out by the *Campaign for Drawing* showed that projects that engaged with learners over a period of time made the most demands on staff, but had the most impact on the learners involved.

3 Theme: Achieving sustainability: ideas and solutions

USING ECOCLUBS TO GET THE MESSAGE ACROSS

Ana Raquel Barata, Alexandra Escudeiro, Maria Amélia Martins-Loução, Botanic Garden of the National Museum of Natural History, Portugal.

Playing with plants, learning for life

Education for sustainability is now a key topic throughout the world as an essential tool for nature conservation. Botanic gardens demonstrate how plants can be used to promote ecosystem conservation and achieve sustainability. This was the basis for development of school holiday courses for children. These are aimed elementary school

students and involve application of concepts for sustainability through games, art work and plays in a weekly programme. Activities are designed within a theme, teaching children how to learn about plants and become familiar with the botanic garden, study reusing and recycling materials and creating a play to be presented to parents, family and friends at the end of each week. Children may repeat courses, as each theme is different – but complimentary, always targeting at raising awareness of plant ecology, current environmental threats and sustainability. Numbers of participants have increased every year, with 200 participants in 2005, including children, their family and friends.

Katia Astafieff and *Pierre-François Valck*. Le Montet Botanical Gardens, Nancy, France.

Sustainable Development in the school holidays – a course at Le Montet Botanical Gardens

The Nancy Conservatory and Botanical Gardens education service carries out a number of activities: guided tours, activities, exhibitions, talks, gardening and drawing courses, publications, designing educational resources and taking part in events. During the school holidays, it organises "green workshops", courses for children lasting a week, during which they work in the mornings on a theme based on the plant world. The main aim is to learn about nature and to make children more aware of environmental protection and biodiversity. The approach is always scientific, recreational, artistic and sensory. Children can learn while having fun! Numbers are limited to 15 to give better supervision.

In February 2006, the theme proposed was sustainable development. The course, for children aged 8 to 12, was entitled "On ne va pas se Terre !", a play on the word "Terre", meaning "Earth", but sounding like "taire", meaning "keep quiet" – i.e. "We're not going to keep quiet!". As the subject is a particularly complex one, we decided to work on certain themes such as biodiversity, water and recycling.

Alexander Amirtham, GREENS Biodiversity Sanctuary, Tamil Nadu, India.

Ecoclubs as tools for environmentally effective community development

Ecoclubs were formed in 12 disadvantaged schools. Teachers, students and parents were sensitised to the benefits of organic farming, recycling and composting through a variety of activities. Students were further motivated through competitions and quizzes, and the opportunity to explain their work to other adults and students at exhibitions and fairs. A few students were selected for LEWS (Learning Earning While Studying) where home farming provides income to go towards higher education costs. Participating schools are now recycling waste and growing organic vegetables and mushrooms to supplement school meals and provide income. The confidence and self-esteem of Ecoclub students has markedly improved, and interest in environmental issues has percolated through into local communities and government. "Children as students" have become "students as resources".

4 Theme: Reflection on Practice

EVALUATION AND REFLECTION – LEARNING FROM EDUCATION PROGRAMMES

Dr Alan Peacock

What do families get out of a visit to a botanic garden? Evaluation of interpretation

This study aimed to explore children's experiences during family visits by observing dialogue and interaction in the family context. We recorded family discourse using minidisk recorders and lapel microphones with 13 families, the mean length of recordings being 2.5 hours. No directions were given to families about what to do or where to go during their time at Eden. The evidence indicates that families spent a limited amount of their time talking about Eden-related issues; that questions played a very limited role in the discourse of most families; and that extended interchanges or conversations which develop ideas were relatively rare amongst most families. Much of the Eden-related talk focused on what children were observing, and had a strongly affective component, indicating that the emotional impact- frequently referred to as the 'Wow!' factor- was powerful, for children and parents alike. Family interaction differed widely, though most talk in all families was positive and encouraged children to take an interest in what they observe. However, parents rarely encouraged the reflective talk that might empower their children to take responsibility for exploring or extending their ideas further. The evidence also indicates that the families' own perspectives on the purpose of such visits can influence how they interact, and thus potentially how much the children learn.

Emily Smith, Lauritzen Gardens and University of Tennessee, USA.

Brooklyn Botanic Gardens Children's Gardening Programme: A survey of alumni

Among public gardens, Brooklyn Botanic Garden (BBG) hosts the oldest children's gardening program in the United States. Founded in 1914, the Brooklyn Botanic Garden Children's Gardening Program (BBG CGP) has succeeded in involving a steady flow of children year after year, creating an environment where children have the opportunity to interact with nature. Approximately 35,000 children have participated since its inception. A mail survey was conducted of 700 alumni of the BBG CGP in the spring of 2005 to identify how the program has affected their adult lives. The survey consisted of five major sections: 1) Current gardening interest, 2) Involvement with public gardens, 3) Current involvement with children's gardening programs, 4) Childhood experiences in the BBG CGP, and 5) Demographic variables. Adult alumni reported they enjoyed their experiences as a child participant in BBG's CGP, the program helped in the development of various personal skills as well as increasing their self-esteem. Over 30% of alumni stated that the program helped them choose a career path, which in most cases was within the natural sciences field. Results suggest that the participant's childhood development and learning skills gained from this program have played an important role in their adult lives and they regard the BBG CGP as being of great value in their lives.

Veronica Franco, CICY Botanic Garden, Mexico.

Perception and environmental knowledge in primary school children in Merida, Yucatan

El programa educativo del Jardín Botánico Regional-CICY (JBR) se centra en: promover la toma de conciencia sobre la importancia vital de las plantas; difundir el conocimiento y valor de la flora native y la neccesidad de conservarla; promover una nueva relación con el ambiente. A 16 años de inciado el programa de educacíon, no contamos con una evaluacíon que nos indique el cumplimiento de nuestra metas. De esta forma, en agosto de 2005, se inicío una primera valoracíon cualitativa sobre la percepción ambiental de un grupo importante de nuestros visitants: niñas y niños de escuelas primarias de la ciuadad de Mérida. Nuestra primera pregunta fue conocer cómo percibe el cualitativas tales como análisis del dibujo, observación participante y entrevistas posteriors a la visita una noción muy precaria de lo que es el medio ambiente, dificultando su conceptualización y probablemente la generación de actitudes de mejoramiento ambiental. En cuanto a la percepción de la vegetación de su ambiente, los primeros resultados indicant que el grupo en cuestión presenta una percepción muy ligera sobre la flora de su entorno. El presente studio analiza y discute la importancia de conocer la percepción del medio ambiente en nuestros visitants con el fin de asegurar que nuestros mensajes sean

5 Theme: Reflection on Practice

RESEARCHING AND LEARNING FROM VISITOR EXPERIENCE

Prof. James Wandersee, and *Dr. Renee M. Clary*
Louisiana State University, USA.

Advances in research towards a theory of plant blindness

Since 1989, our visual cognition laboratory has been studying public understanding and public awareness of plants. In 1998, we coined the term 'plant blindness' and introduced it to the fields of biology education and botany education (Wandersee & Schussler, 1999; 2001). We defined plant blindness as failing to see, take notice of, or focus attention upon the plants in one's everyday life—and we added eight other supporting characteristics. Simultaneously, we proposed a default human visual processing explanation for the public's lack of attention to and interest in plants, as exhibited in industrialized nations such as the US. We also considered such a visual-perception explanation to be more plausible than plant neglect born of 'zoochauvinism' for explaining plants' under-representation in biology textbooks and courses. At the 6th ICEBG meeting, we wish to share some advances in understanding plant blindness drawn from our series of local, national, and international studies that appear to lend increasing support to our nascent theory of plant blindness. One of our most robust and hopeful findings has been that the presence of a plant mentor early in a person's life is a key predictor of that person's awareness, appreciation, understanding of plants throughout the lifespan. Another is that as the total practical value a person self-ascribes to the Plant Kingdom and its members increases, plant blindness decreases. Finally, we have found that a providing garden visitors with paleobotanic perspective of the plants they are viewing (Wandersee & Clary, 2006) and offering simple classification experiences in public gardens can increase the attention to, time spent, and appreciation of plant diversity in living garden collections.

Dr Sue Dale Tunnicliffe, Institute of Education, University of London, UK.

Education starts here – children's spontaneous comments about plants; reflecting public understanding

What do children know and notice about plants? Pupils from primary and lower secondary school were interviewed separately about six everyday plant specimens. All pupils use anatomical features when naming the plants and explaining why they have identified them. Older pupils, in addition to relying on shared anatomical and habitat features begin to show evidence of knowledge of taxonomy and use this knowledge to group plants and use habitat features. Home and direct observation is more important as sources of knowledge than school, with TV, videos, CD-ROMs and books as sources of information. So what sense do children make when they comment whilst looking at plants in a botanic garden? A project carried out in a botanic garden with school groups (aged 5-11) sought to establish the content of the conversations of the groups as they looked at the plants, whether there were differences in content of conversations when adults were present and between single sexed and mixed groups. Children spontaneously talk about easily observed features of plants, such as colour, shape and smell. When cued by other children in the group or adults children attended to less obvious features. Pupil- only groups made significantly more statements than the other groups but asked fewer questions and commented more about the human use of plants. There were few differences between the conversational content of boys-only and girls-only groups and mixed groups. Boys made more comments about plant function.

Prof. Roy Ballantyne, ***Dr Jan Packer*** and ***Karen Hughes***, Brisbane Botanic Gardens, Australia.

Exploring the motives, expectations and conservation learning experiences of visitors to Brisbane Botanic Gardens

Botanic gardens are ideally placed to provide informal learning experiences that promote the importance of plants, habitats and conservation, and to influence the visitors' values, attitudes and behaviour. To do this effectively, we need to know *why* people visit gardens; what aspects and features they find enjoyable, memorable or interesting; what they learn about plants, gardening and/or conservation from their visit; and how to design garden experiences that maximise visitor learning and enjoyment. Research exploring these issues was conducted at Brisbane Botanical Gardens in Queensland, Australia. Pre and post visit questionnaires were distributed to 150 visitors over a six week period that incorporated school holidays, weekdays and weekends. The main motives for visiting were enjoyment, admiring the garden's scenery, spending quality time with family /friends, enjoying being outdoors, and viewing beautiful plants. Visitors were not particularly interested in learning about plants, garden design or the environment. However, they were attracted to features specific to botanic gardens such as special interest plants, plants from different areas, peaceful surroundings and easy access to plants. Most visitors were already environmentally aware, though the majority were not keen gardeners. There were substantial positive changes in respondents' conservation knowledge and attitudes following their visit. The two most important features contributing to the high levels of visitor satisfaction were the opportunity to stroll around the gardens, and cleanliness and tidiness. Visitors also felt visiting the gardens provided opportunities for relaxing, stress recovery and renewing the human spirit. The implications of these findings for the future design and delivery of learning experiences will be discussed and some examples of how to market these to the public presented.

Theme: Public Awareness of Plants

NATURE OF SUCCESS IN EDUCATION

Dr Christina Paulette Colon, The New York Botanical Garden, USA

Success Stories in Plant Based Classroom Curriculum Development

Garden Adventure SEEDS (Science Exploration and Exploration Education Discovery Series) are classroom resources that help elementary teachers improve science literacy through fun, hands-on lessons that create a seamless feedback loop between classroom science and explorations at botanic gardens or parks. Unit 1, for Kindergarten and first grade, introduces students to '*Plant Parts*'. Unit 2, for second and third grade teachers about '*Plant Adaptations*', and Unit 3 for fourth and fifth grades addresses '*Plant-Animal Interactions*'. Each unit comes with classroom resources such as books, hand lenses and activity materials. Originally created for local distribution, SEEDS are now disseminated nationally through a partnership with America's leading publisher of K–12 science curricula, who will help ensure that students across the nation benefit from these resources. Ethnobotany Explorers is a two part series of inquiry based classroom lessons that engage secondary students in innovative explorations in plant science through the research of botanists at the Garden's Institute of Economic Botany.

Unit 1, for middle school, focuses on '*Economic Botany*' and shows the immense value plants play in our everyday lives and the global economy. Unit 2, for high school students, illustrates the tremendous value of ethnobotany in the search for cures to diseases such as AIDS and cancer. Both curricula include a video that links to the lessons, as well as interactive web resources, including the *Virtual Herbarium's* high resolution digital images of herbarium specimens from the Garden's world class herbarium. All curricula were created with input from curriculum experts, pilot teachers, and independent evaluators, are aligned with standards and address multiple learning modalities, which explains their success among educators and appeal to a diverse array of students.

Felicity Gaffney, National Botanic Garden, Glasnevin, Ireland

Developing education at the National Botanic Gardens, Glasnevin

An exciting new collaboration project between the National Botanic Gardens, Glasnevin and the National Centre for Sensory Research at Dublin City University was launched in May 2006. This innovative project is a web based initiative for Primary Science education. Based in the Great Palm House, the project uses a specially developed wireless sensor network which act like mini weather stations to measure, light, heat, humidity and temperature and transmits live to the website, where the data is represented in an accessible user-friendly manner. The site contains dynamic graphing and information on environmental conditions within the glasshouses and exciting botanical information. Children can learn fascinating and fun facts about the plants growing in the houses and take a themed tour through the glasshouses to learn how people use plants, how different plants have adapted to where they live and what's being done to protect and conserve threatened plant populations. I will also discuss our approach to public education at the gardens, covering items such as sustainability week, and children's education programmes.

Mark Paterson, Eden Project, UK.

Overview of the Eden Project

The Eden Project is a living theatre of plants, built in a disused 14 hectare clay pit and showcasing plants for human use. Using 3 different world climate zones, Eden offers a dynamic and exciting display. The architecture of the covered Biomes and the Core education centre is iconic, and embeds sustainable development within design and construction as a coherent message. Both a company and a charity, Eden is an internationally recognised constantly growing project that promotes sustainable practice and local economic regeneration –facilitating additional income of £600 million in the local economy since it opened in 2001. Eden passionately believes in the power of change through discussion and the sharing of ideas with partners locally, nationally and internationally, providing a site where arts and sciences meet. It acts as a resource for learning, communication and dialogue that takes a positive approach to reconnect people with the world they live in and empower them to work towards a sustainable future. Over 7 million people have visited Eden so far – we use progressive and ongoing monitoring and evaluation to strive towards interpretation that is engaging to all visitors at all levels. Sculpture, storytellers, guides, interactive play areas, seasonal concerts and events, interpretative signs and guidebooks and the retail areas are all part of the visitor experience. Education is at the heart of Eden Project. The formal education team offers programmes for groups from primary through to university level. These programmes are now expanding beyond the Eden site - Gardens for Life is the first combined national and international project for schools

Wednesday 13 September

Paper session (E)

1 Theme: Public Awareness of Plants

WORKING WITH SCHOOLS TO SUPPORT BIODIVERSITY AND SUSTAINABILITY

Sue Hunt, RBG, Kew, Wakehurst Place, UK and *Dr Fiona Hay*, Millennium Seed Bank.

Using cutting edge research from botanic gardens to raise schools' awareness of the threats to plant diversity

The MSBP at Wakehurst Place is a global conservation initiative responding to the increasing threats facing the world's plant species. The collected and stored seeds in its vaults are intended to remain viable for hundreds of years, retaining a bank of plant genetic diversity for use of future generations. However, some species may deteriorate after a relatively short length of storage, it is vital to identify these species so a programme of more frequent monitoring and replacement can be instigated. To determine seed longevity, accelerated ageing tests can be carried out - a trial is underway to train schools to carry out a seed longevity study of the native British flora. School students will be involved in making a genuine contribution to maintaining plant biodiversity.

The project will give students:

- An understanding of why it is vital to conserve plants for the future of the planet and its people.
- Experience of investigative procedures and techniques
- An opportunity for schools to be acknowledged as contributors in a real life research investigation
- An awareness of the challenges faced when we set out to conserve the genetic diversity of the world's flora.

This is a novel approach to tackling bio diversification and conservation research and increasing public awareness and concern.

Tony Potterton, Eden Project, UK.

Gardens for Life

Gardens for Life has been exploring strategies for education for sustainable development and global citizenship which combine garden-based learning with both local and international school partnerships. 74 schools in UK, India and Kenya have been involved since early 2004. The participation of these schools has been supported by partner organisations in the regions. Schools have established gardens and provided their children with the experience of growing food crops, often for the first time. Materials to link this activity with classroom curriculum teaching are being developed and made available in collaboration with the UK Association for Science Education. Schools have been encouraged to seek means of promoting community participation in their gardening - and to find ways in which their school work can lead to action in the community. Groups, which bring together schools from the three countries, have been established and materials produced by children have been exchanged. The project has demonstrated a variety of approaches to school gardening, in the different socio-cultural and environmental contexts. Although regional generalisations can only be limited, many of the UK GfL schools have undertaken garden development as part of overall planning for outdoor learning and school grounds development. Indian GfL schools have concentrated on the potential for using gardens as a teaching resource, while Kenyan GfL schools have focussed on food security issues. The task is now to capture the range and diversity of project experience and make it available to schools worldwide, while seeking a sustainable mechanism for more schools to participate and continue to generate new materials and ideas.

Dr Kathy Stewart, University of Sydney, Australia.

Using technology to support sustained student inquiry in learning environments beyond the classroom

Botanic gardens educators have cited the challenges they face in creating learning situations that support ecologically sustainable development (ESD) for teachers and their students (eg Willison 2004, Stewart 2003). Such programmes require the facility to engage students in longer-term and more meaningful interactions with a botanic garden. These programmes also need to arise from school curriculum documents and the unit planning processes that form the professional work of classroom teachers. This paper reports on the work of an Australian federally funded project that aims to engage students in sustained inquiry of their local environment. Student inquiry is supported by the use of mobile technologies including tablet PCs. Classroom teachers develop units of work based on student investigation of aspects of the local environment. The project is supported by scientists and naturalists from universities, museums, local council and local amateur naturalist clubs and societies. Students have the opportunity to interact with this scientific community directly and via the internet. This community of learners produces a database of local plants and animals that is made available to the public as an engaging record of local biodiversity.

2 Theme: Education for All: Working with Challenging Audiences

REACHING OUT TO A WIDER SCHOOLS AUDIENCE

Sharon Myrie and ***Elyssa Arnone***, Brooklyn Botanic Garden, New York, USA.

Partnerships for reaching inner city youth – garden apprentice programme and the Brooklyn Academy of Science and the Environment

How do you reach high school/secondary school audiences through botanic garden programming? Teenagers are a group traditionally underserved in botanic garden programming. Brooklyn Botanic Garden (BBG) recently launched two major initiatives to reach out to this often overlooked audience. BBG's Garden Apprentice Program (GAP) and the partnership with the Brooklyn Academy of Science and the Environment (BASE) are raising student interest in botanical sciences and creating meaningful connections with inner city youth. This presentation will not only examine these programs, but will also explore ways in which Congress participants might be able to adapt the programs, particularly GAP, to their own garden. In 2002, BBG was instrumental in the creation of a new public high school, BASE. BBG works with the school to create students who are active learners and scientifically literate, engaged citizens who value and respect the environment. For example, first-year students attend weekly biology labs in the BBG plant collection and greenhouses. These labs, which will be shared with the participants, are designed to utilize the resources of a botanic garden with high school audiences.

Dr Jacky Chave, Royal Horticultural Society, Wisley, UK.

Engaging a diversity of schools through the Royal Horticultural Society

The Royal Horticultural Society believes that 'horticulture and gardening enrich people's lives. As a charity and as a learned society, we are committed to bringing the personal and social benefits of growing plants to a diverse audience of all ages'. When reviewing the types of school that visit RHS Garden Wisley, it is clear that a large proportion are schools with a low percentage of children receiving free school meals. (In Britain the percentage of children receiving free schools meals is a crude way of assessing the level of disadvantage amongst children that attend the school). Wisley is visited by schools with a high percentage of children from relatively affluent families, reflecting to some extent the social balance of the immediate area, but a matter of concern when schools reflecting other community profiles are known to lie within visiting distance. In it's '*Plan for Learning*' (2005) the RHS outlined the need to redress this imbalance and recommended 'The school visits programme should be developed across all sites to establish common measures of impact, in attracting a diversity of schools within the catchment area of each Garden'. The plan also stated that 'In all key areas of learning activity, wider participation should be sought actively'. This paper outlines how the RHS intends to correct this imbalance of schools and what has been achieved to date.

Steve Clancy, Royal Botanic Garden, Melbourne

Connecting people with plants

The Royal Botanic Gardens manage two very diverse sites that offer unique experiences for visitors. The Royal Botanic Gardens Cranbourne (RBGC) is situated on 363 hectares of remnant bushland and reclaimed farmland, enticing visitors with heathlands, wetlands and woodlands. The opening of Australia's newest botanic garden '*The Australian Garden*' in May this year has thrust RBGC into the spotlight and dramatically increased visitation and interest in the site. Early in 2005, the Royal Botanic Gardens released a new charter and three-year corporate plan. The plan provides direction for activities across both the Melbourne and Cranbourne sites through the identification of strategic goals. The goal relevant to this paper is: 'Enhancing on-site experiences and providing programs for a broader spectrum of the community' (RBG Corporate Plan 2005 – 2008). The corporate plan outlines the Gardens intention to increase the relevance and diversity of programs and to make these available to a wider audience than has previously been reached.

3 Theme: Achieving sustainability: ideas and solutions

A SENSE OF PLACE

Martin Clement, Durban Botanic Gardens, South Africa.

Botanic gardens and cultural landscape: the potential of place identity in informing a more relevant educational practice

Botanic gardens have become significant holders of place meanings, through their history and time-honoured practices, and are often at the centre of cultural landscape issues across the globe. Similar to the manner in which protected areas were established, botanic gardens

especially in the colonial world face the challenge of implementing a more relevant course of action that focuses attention on livelihood and environmental justice. The Durban Botanic Gardens is a case in point where these processes are being actively explored through the '*Garden Window Project*'. However, the new concept requires a new approach for actively and meaningfully engaging with plant-people relationships; one that relies on place associations, narratives and the manner in which plants and place identity provide meaningful learning opportunities for botanic gardens. This paper argues for greater attention to be paid to issues of place identity and cultural landscape in order that botanic gardens are able to achieve environmental justice and make a meaningful contribution to the question of sustainability through a more relevant environmental educational practice.

Jill Raggett, Writtle College, Essex, UK.

Education for Reconnection

The education of landscape managers and horticulturists is vital to the creation, management and enjoyment of the vibrant parks and botanical gardens, the gems of many cities, which provide such a valuable resource for increasingly urban populations. It is important that individuals entering these careers have a sensitivity for the environments look after, and have the ability to find imaginative ways by which gardens can communicate, allowing people to reconnect to the natural world. In addition they need to be aware that such places have a special meaning to visitors. At Writtle College, Essex (U.K.), students join the academic community to learn how we interact with our environment and how it can be managed for aesthetic, leisure and productive purposes. Teaching curricula are complimented by an Artist in Residence. Artists engage with the students and other members of the College community to encourage them to see the world in new ways, develop a greater sensitivity to the environment.

Dr Li Shin Chang, Chao Yang University of Technology, Taiwan, R.O.C.

Enhancement of education function in botanic gardens through landscape narrative

In the past, interpretation has placed more emphasis on communicating 'facts' to tourists rather than trying to engage them in an entertaining way. Initiating the incentive for visitors to learn is difficult and may result in poor learning efficiency. The objective of this project is to investigate the modes of 'pattern recognition', 'attention' and 'memory' of visitors to the Heng-Tsueng Tropical Botanic Garden based on 'Cognitive Psychology' theory and to find out what factors influence the above processes. We are applying the theory in conjunction with using landscape narrative as an interpretation tool, and are testing the effects of interpretation using a landscape computer simulation model.

The following results are expected:

1. The landscape design of a botanic garden can increase the entertaining and story telling effects in interpretation. In addition to the education and research functions of a botanic garden, it also provides incentive for people to visit the garden for recreational purpose.
2. Interpretation by means of landscape narratives can increase the opportunity of motivated learning of visitors spontaneously, raising their attention and increasing the persistence of memory.
3. A model of landscape narratives should be established and referred to by botanic gardens to improve their interpretation plans.

4 Theme: Reflection on Practice

FURTHER EDUCATION OPPORTUNITIES

Leigh Morris, Royal Botanic Gardens, Edinburgh, UK.

Back to the Future

For over a hundred years the Royal Botanic Garden Edinburgh (RBGE) offered their 3-year 'Diploma in Horticulture, Edinburgh' course, very similar to that still offered by Kew today. In 1995 it was replaced by a 2-year, mainly theory based, Higher National Diploma (HND) programme in 'Horticulture with Plantsmanship', with one year at the Scottish Agricultural College in Ayr and the other year in Edinburgh, predominantly at RBGE. The HND at RBGE, however, has gone through a huge period of change in the last 2-years, with both years of the course moving to Edinburgh and the re-introduction of garden based work experience and practical based projects for the students. A full BSc in Horticulture with Plantsmanship will be offered from September 2006 at the Garden. This talk will outline these developments and RBGE's vision for delivering an internationally recognised, professional, practically based, higher education horticultural qualification, within a botanic garden setting…and the challenges this brings!

Timothy Walker, University of Oxford Botanic Garden, UK.

Undergraduate education at the University of Oxford Botanic Garden

Our present understanding of plant diversity is based on a colossal amount of field work by professional and amateur botanists. As our cataloguing of the world's plants nears completion we need plant biologists with new, practical skills integrated with traditional systematics and evolution. The current syllabus used in most schools in UK allows teachers to avoid plant biology in many important areas. This produces university biology students who have never been exposed to plants in an exciting way. The challenge for university lecturers is to open the eyes, hearts and minds of the first year students to the fundamental importance of plant biology and thus need to conserve it.This will then guide their choice of options as they progress through the course. Contrary to popular opinion, many UK universities no longer teach field botany and the associated conservation techniques. The structure of the Biological Sciences degree at Oxford facilitates the production of the trained graduate students that are referred to in Target 15 of the Global Strategy for Plant Conservation.

Dr Andrew Vovides, Clavijero Botanic Garden, Mexico.

Horticultural training for farmers: part of an alternative conservation strategy aimed at sustainable management

Since 1990, a group of farmers in possession of some well-preserved cycad (*Dioon edule*) habitat have been propagating the species. This work, carried out with the help of Botanic Garden staff, has enable farmers to harvest seeds, cultivate young plants and either sell the plants or reintroduce them to the wild. Botanic garden expertise have assisted farmers in marketing and cultivation skills, as well as using scientific data about cycad demographics and germination. So far, the farmers have conserved 80 has of the cycad habitat. This model has since been repeated for four endemic cycad species in nurseries situated in two biosphere reserves (buffer zones) in the state of Chiapas. The a cycad propagation manual has been published and various workshops and seminars have been delivered to groups other biosphere reserves interested in propagating native cycads. This is an example of botanic garden extension to rural communities that covers several articles of the CBD.

5 Theme: Achieving sustainability: Ideas and Solutions

COMMUNICATING THE IMPORTANCE OF PLANT DIVERSITY – THE BIGGER PICTURE REPORTING ON THE OUTCOMES OF THE TARGET 14 MEETINGS WORLD WIDE

Brian Johnson, Botanic Gardens Conservation International, USA, ***Christine Newton***, Wakehurst Place, Royal Botanic Gardens, Kew, UK, ***Ling Xu***, Xishuangbanna Tropical Botanical Garden, China, ***Reni Lestari***, Bogor Botanic Garden, Indonesia

Communicating the importance of plant diversity – the bigger picture

The Global Strategy for Plant Conservation mandates that "the importance of plant diversity and the need for its conservation [be] incorporated" in all education programmes by 2010. BGCI is leading the consultation on this target and this year coordinated a series of national meetings in Brazil, China, Indonesia, Russia, UK and the USA. Each meeting brought together stakeholders representing a range of organizations (schools, colleges, botanic gardens, zoos, museums, etc.) to examine the status of plant-based education. During the meetings, stakeholders identified gaps, shared best practice and recommended a series of actions for taking forward the education and public awareness target of the GSPC. BGCI will later communicate the results of these meetings to governments to demonstrate the value and importance of plant-based education. Join the presenters to hear more about the meetings and find out how you can contribute to the consultation. Your views are important!

Tours and Workshops

Tours

Depart from Main Gate. Tours will be led by Kew Guides and will accommodate a maximum of 15 people. The following tours are offered:

1. General tour exploring Kew and its history - in Spanish

2. Royal Kew and the development of the Gardens
This tour will take you through Kew's historic landscape – with its glasshouses, follies and other distinctive buildings which evolved through 3 centuries.

3. Kew, a World Heritage Site
Discover what makes Kew Gardens such a special place.

4. Plants that changed the world
Several plants have made a major impact across the world, join this tour to find out more about plants that changed the world.

5. Plants in Kew used in traditional herbal medicine
This tour will introduce visitors to plants that are either used medicinally themselves or as the source of chemical templates for synthesised medicines.

6. Kew's global conservation work
Meet the plants that tell the story of survival against the odds.

7. A tapestry of trees
This tour introduces you to Kew's rich variety of trees, their natural habitats, the life they support, their economic uses, little and (very) large, old and new.

8. Princess of Wales Conservatory
Modern technology has enabled ten different tropical and subtropical habitats to be created under a single roof, from the Mohave desert of California to the lowland tropics of Malaysia.

Workshops

Workshops will accommodate a maximum of 20 people. The following workshops are offered:

1. Exploring wild–life – ponds, puddles and pooters
In some of the wilder parts of Kew we will discover some of the plants and animals that live there. *Primary focus*

2. Sustainability in the Classroom
We will consider the important role that botanic gardens have to play in plant conservation and sustainable use of natural resources and how this can be incorporated into programmes. *All ages*

3. Helping teachers and students with field studies
This session explores field study skills, considering different methods for measuring biodiversity including clinometers, quadrats, transects and keys. *Secondary/ high school focus*

4. Biodiversity Games
Games and role play are an exciting way to engage children (and adults!) alike in the concepts of plant science and biodiversity. *All ages*

5. The art of experimentation (SAPs / Kew activities)
A hands on, practical workshop covering immobilised algae, thin layer chromatography and the '2 minute DNA extraction challenge.' *Secondary / high school focus*

6. Art in the service of science – using paintings and photographs
Using artworks as 'a snapsot in time' – we will see how art and photography can be useful tools in explaining change and conservation issues and will also explore plant maths, symmetry, form and function and how this is replicated in art *All ages*

7. Weaving and dyeing with plants – Sarah Chesters, RHS Rosemoor, UK
Humans have used plants as coverings for thousands of years. Look at the care labels in your clothes and you are probably wearing at least one plant – cotton, viscose, maybe linen. Other plant fibres, some used centuries ago, are making a comeback or being developed using modern technology. Hemp, nettle, soya bean and bamboo make a variety of fabrics for durability, absorbency and pure luxury. All the clothes we are wearing today are likely to be chemically dyed, and yet a rainbow of natural colours can be extracted from plants. This workshop will show you how, using a microwave, you can dye small amounts in minutes. Learn how to colour skeins of wool with unusual and everyday plant dyes, with suggestions for experiments you can try yourselves. Once dyed, the fibres are spun and woven into fabrics. Using rushes, you can turn them into part of a loom to weave a rush mat for their classroom. A list of UK suppliers of plant fibres, dyes and wools will be supplied, together with useful websites around the world.

Thursday 14 September

Paper session (F)

1 Theme: Reflection on Practice

(Simultaneous translation into/from Spanish)

NETWORKING FOR EDUCATION

Suzanne Kapelari, Grün Schule Botanic Garden, University of Innsbruck, Austria.

Networking in Central and Eastern Europe

The resources available for education differ hugely from garden to garden and from country to country. Some gardens may have a dedicated education team, in others, education may be just one of many responsibilities of the curator. An education network could be a focal point for disseminating such resources. spreading information to those who are interested. Within the EU Project, 'Plant Science Gardens' a model will be developed to demonstrate how botanic gardens and primary schools can work together to pool resources for improving science education at primary school level and to integrate botanic garden education activities into the national primary school curriculum. A network could help develop the educational potential of botanic gardens and arboreta in Central and Eastern Europe and facilitate information exchange between people involved in education, interpretation and public relations.

Professor Claudio Longo, Lombardy Botanical Gardens Network.

Functionality of the Lombardy's Botanical Gardens Network – three years after its establishment

The Gardens of Bergamo, Bormio, Milano – Brera, Milano – Cascina Rosa, Pavia, Romagnese and Toscolano Maderno have been networking for three years, in the Lombardy Botanical Gardens Network (northern Italy). This paper focuses on history, actions, objectives, strength and weakness.

Fátima Macho, *Carmen Rodríguez Hiraldo*, *Jesús Vilches Arenas*, Andalucia Botanic Gardens Network, Spain.

The Andalucia botanic gardens network and natural spaces La Red Andaluza de Jardines Botánicos en Espacios Naturales constituye un magnífico recurso para acercar, sensibilizar y formar sobre nuestro patrimonio vegetal; que si bien es el más diverso de Europa, también soporta graves amenazas y es desconocido por la sociedad tanto en sus grandes valores y singularidad como en su estado de conservación. Desde este punto de vista, la educación ambiental es entendida como una herramienta más para la conservación. Los destinatarios del programa son: el alumnado de educación formal, agentes y trabajadores forestales y grupos de especial incidencia sobre la conservación de la flora (ganaderos, recolectores y empresas transformadoras...). Especial interés tienen dentro del programa los habitantes de los espacios naturales como depositarios de la mayor parte del patrimonio florístico andaluz.

2 Theme: Education for All: Working with Challenging Audiences

ENGAGING THE PUBLIC

Alenka Marinček and *Jože Bavcon*, University Botanic Gardens, Ljubljana, Slovenia.

How to remain in the public eye

For many years, the Botanic Garden of the University in Ljubljana had no public profile. This is now changing, through a strategic programme for public relations. The programme has several key areas – building relationships with journalists, organised events, guided tours for schools and groups of plant lovers, monthly lectures, workshops and producing articles for popular magazines. We are investing effort in attracting the attention of different media (television, radio, newspapers) to reach the public in the broadest possible sense and we have had considerable success in the recent years. We appear almost weekly in the media. We have also benefitted from indirect promotion of the garden, with a number of television stations and newspapers using it as background, by shooting parts of their broadcasts in the loveliest parts of the Garden premises. Our aim is not only to promote our garden, but also the activities and importance of botanical gardens in general, to stimluate the interest of the public in plant life and make it more aware of the need to protect plants and their habitats

Ling Xu, Xishuangbanna Tropical Botanical Garden, China.

Reflection on public education provision

Public education is a core activity of modern botanical gardens. Its implementation is still subject to discussion and change. Many educational programmes lack a full integration of education objectives and application of scientific knowledge of educational psychology. Furthermore, in many cases there exists no qualified

evaluation of the educational activities. This paper presents both the educational activities and the study cases to evaluate public education within the Xishuangbanna Tropical Botanical Garden (XTBG), China. We hope the practices and findings from the study may contribute to the discussion on methodological aspects in the public education of botanical gardens in general.

Juan de Dios Muñoz, Oro Verde Botanic Garden, Argentina.

Is education enough to protect natural resources

To protect natural resources it is necessary to develop partnerships, with ecological groups, and branches of production, as well as offering economic incentives to encourage sustainable development. Without a stable government, regulations banning the destruction of natural resources prove to be useless. Argentina has lost 70 % of its native forests in the last 88 years. Deforestation not only destroys biodiversity, but also important rural communities, cultures and ancient crops. The province of Entre Ríos, where the Oro Verde Botanic Garden is located, is one of the areas most severely affected by deforestation and water erosion. A recent report showed that in the last seven years, 600, 000 ha of forest in the province was destroyed. As a result of this, the government of Entre Ríos sanctioned an emergency decree banning deforestation in all its territory. Although severe penalties were established for its infringement, deforestation continued, as they were not put in practice. The present government abolished this decree, but a legal appeal was presented by many ecological groups and won. After a long struggle an agreement was established between the provincial government, non-governmental organizations and agricultural entities. It was decided that properties with well cared-for native forests in the province would be free of tax up to a maximum of 300 ha. Although recently applied, it seems to be a better policy than banning deforestation or simply trusting in education.

3 Theme: Achieving Sustainability: Ideas and Solutions

LINKING HEARTS AND MINDS

David Fox, Gurukula Botanical Sanctuary, India.

Alienation from the Wild

Gurukula Botanical Sanctuary is situated on the western edge of the Western Ghats in southern India. While the degradation of habitats throughout the region has increased to intolerable levels, GBS has worked steadily since 1981 to create a unique plant conservation project. The programme focuses on around 2000 species from about 100 families of plants. There are 500 species of orchid: 300 from south India, 40% of which are found only in this region. Most come from destroyed or degraded habitats in the region: roadsides, plantations, dam sites. It is a Noah's Ark of the plant world, propagating rare and endangered species that have never been cultivated before. In addition to this conservation work we strive to create an effective programme of nature education, largely aiming for a sense-based approach

Christine Joy, Royal Botanic Gardens Melbourne

The Delight Factor – Exploring transformational learning through plant landscapes at the Ian Potter Foundation Children's Garden

For many years educators have spoke of the importance of the emotions in the learning process.

Those who have written about the role of the environment in learning are perhaps most passionate in their eloquence. '*Nothing without joy*' (Malaguzzi), '*a sense of wonder*' (Rachel Carson) '*a symphony of the senses*' (Sally Jenkins) '*extinction of experience*' (Robert Michael Pyle) among many others. All seek to communicate the intensity of the experience where the emotions are integral to the learning process and all seek to communicate the intensity that environmental learning can bring to the child's feelings, and the ease and pleasure to which the environment brings to the learning process. For me their beautiful words come together in what I call '*The Delight Factor*', which encompasses other emotions I associate with *deep experience and deep learning*; such as awe, fear, joy, surprise, discovery and transformation. Educational theorists and writers have guided us in the development process for both the design of the Ian Potter Foundation Children's Garden and its programs. The garden itself, situated at the Royal Botanic Gardens Melbourne, opened in 2005 and *'is a place where children can delight in nature and discover a passion for plants. It is a garden that celebrates the imagination and fosters the creative nature of play* (IPFCG Vision statement).

Donavan Fullard, South African National Botanical Institute, Kirstenbosch, South Africa.

Biodiversity education at a natural world heritage site – Kirstenbosch Botanical Garden

Education for Sustainable Development provides the means by which we engage people in a more sustainable future. It aims to empower citizens to act for positive change,

implying a process-oriented, participatory and action oriented learning approach. (Tilbury D and Calvo S, 2005). The important role of education to attain sustainable development is recognized globally and it is strongly argued that botanic gardens should engage in 'stronger' forms of Education for Sustainability. Willison (1997) described EfS as a 'holistic approach to education which emphasises the interrelationship of disciplines.' The challenge for environmental educators in botanic gardens, according to Tilbury and Calvo is that they no longer can afford to be confined to educating people about ecology, but that social realities and consumer choices need to be imbedded within such programs. This paper will endeavour to share experiences made on our journey in our attempt to implement the Decade of Education for Sustainable Development within our Environmental Education programme at the Gold Fields Environmental Education Centre, situated within the Kirstenbosch National Botanical Garden in Cape Town, South Africa. The programme is located within the education directorate of the South African National Biodiversity Institute (SANBI), previously the National Botanical Institute (NBI).

4 Theme: Public Awareness of Plants

BRINGING PLANTS TO LIFE

Junko Oikawa, BGCI

Japan's botanic gardens – waking up to education

The Japanese Association of Botanical Gardens (JABG), was established in 1947 by the representative of botanic gardens in Japan and became an authorised national corporation recognised by the Japanese government in 1966 (Japanese Association of Botanical Gardens 2005). The objectives of JABG are "to facilitate communication between botanic gardens in Japan, to increase understanding and address issues by sharing relevant information from inside and outside the country, and to undertake development of botanic garden activities"(Suzuki 2006). Currently, JABG has around 130 institution members and 70 individual members. Education has been traditionally considered as a role of botanic gardens in Japan and many botanic gardens have run some kinds of education programmes. Today, the variety of the programmes has diversified, in parallel with increasing interests in education in general within the Japanese botanic gardens' community

Merilyn Haigh, Gladstone Tondoon Botanic Gardens, Gladstone, Australia.

Bringing the bush to the city

Tondoon Botanic Gardens, an integral part of the Regional Port City of Gladstone, Queensland, Australia, maintains a unique scientific collection of native regional plant species. Established in 1984, the 83 hectare Garden includes 21 hectares of developed display, and 4 hectares of lake, the remainder being natural bushland. The Gladstone Region is being developed as an area of significant visitor interest. Highlighted by its hinterland, subtropical coastline and continental islands, Gladstone is one of the southern gateways to the Great Barrier Reef, one of the seven natural wonders of the world. The challenge Tondoon is to empower an industrially-orientated, highly urbanised population to develop an awareness and knowledge of the natural environment surrounding them – '*Bringing the bush to the city*'. A key focus is on hosting local school groups - with over 5,000children participating so far. One of the most popular classes presented at Tondoon is the "Australian Plants and their uses" for primary children, and as a guided walk to the visitor. The interpretation of local plant species and their uses progresses into a hands on tasting of commercial products made from native food plants, colloquially termed '*Bush Tucker*'.

Simon Mériaux, National Natural History Museum, Paris, France.

Towards sustainable production and consumption

Within the framework of Environmental Education and Sustainable Development, the National Natural History Museum of Paris has developed a new workshop with secondary school and college students. From the vegetable garden of the Botanical Garden (Jardin des Plantes, Paris), one leads the children to wonder about the concepts of sustainable development and ecocitizenship. From the production of fruits and vegetables to consumption from our plates, we explore the sources of pollution at all stages (culture, packaging, transport, sale and consumption). For each one of these stages, the children think of the concrete means to limit the attacks on the environment in a sustainable development prospect. This general workshop can then be declined in several more specific workshops around food, energy, alter-consumption and so on.

5 Theme: Public Awareness of Plants

LOCAL CONCERNS – NATIVE SPECIES AND EDUCATION

Kristina Bjureke, Natural History Museum, Oslo, Norway.

From standard educational programmes to different interdisciplinary methods: endangered vegetation in the Oslo region

In 2000, a new area was developed in the Oslo Botanical Garden. At the 'Oslo Ridge', we present plant species typical of the calcareous islands and hillsides of the inner Oslo fjord. Some of these plants have their northernmost distribution here. As a result of urbanization, several of them are now endangered in nature, and the Oslo Ridge functions like an *ex situ* conservation area. The other important aspect is its educational value in the ongoing teaching of both school classes and the general public.

After some years of conducting standard educational programs at the Oslo Ridge, we felt a need to expand these teaching programmes. The nearest island in the Oslo fjord is a typical example of the characteristic habitat of our local flora, and bringing classes to the island greatly enhances the quality of teaching. The contents of all the courses developed around the Oslo Ridge and the nearby island, concern the themes of biodiversity and conservation. Coincidentally, the island is now in the process of being declared a conservation area, and in cooperation with various cultural agencies, we have been engaged in creating the necessary management plans. As a serendipitous result, an interdisciplinary teaching program has evolved, in which the biology, ecology and cultural heritage of the Oslo region is taught in one exciting and comprehensive program.

Dr Sooriamuthu Seeni, Tropical Botanic Garden and Research Institute, Thiruvananthapuram, India.

Raising Awareness of local plants and their sustainable use by linking the Darwin project with the public education system in southern Tamil Nadu – lessons learnt

Bureaucracy is displayed at its best in the elementary education system of India. No school headteacher listens to a novel idea or different method of teaching unless there is written permission from the Head of the hierarchical system, the Director of Elementary Education routed through the District Elementary Education Officer (DEEO) and the Assistant Elementary Education Officer (AEEO). The implementation of the Darwin project aimed at raising awareness about local plants and the need to conserve them by training Darwin mentors in the public schools of biodiversity-rich remote areas of southern Tamilnadu with the blessings of the local bureaucracy was challenging. Yet it resulted in outcomes and impacts which were not anticipated at all. The salient achievements were: 1. The project addressed biodiversity education to the poorest of students, generating awareness and actions at grassroot levels. 2. Support from the education authorities resulted in activation of the entire hierarchical machinery and participation of even the DEEOs and AEEOs in various programmes. 3. Establishment of at least 44 school gardens and planting of the saplings in fallow lands by school children in partnership with local NGOs, State Forest Department Officials and Municipal authorities. 4. Related activities in the school campuses: erection of water harvesting structures, separation of biodegradable and non-degradable wastes, biocomposting, outreach visits to undisturbed and degraded forests, displays of the newspaper cuttings on environmental issues, oratorical, essay, cultural and drawing competitions and distribution of plant saplings as prizes. 5. Publication of a book on medicinal plants with contributions from teachers and students, publication of a Newsletter (Voice of Darwin Mentors) and networking of the teachers through organization of Darwin Environmental Education Development society (DEEDS) to continue the activities of the project beyond its expiry.

Constantino Bonomi, Viotte Alpine Garden, Trento, Italy.

Raising awareness of alpine plants

Since 1998 Trento Natural History Museum, based in north east Italy, has planned and designed education activities in its two botanic gardens especially focused on alpine and mountain plants. In the past eight years these activities have been constantly updated in their content and formats and also in part renewed. The main aim has always been to raise awareness on the importance of plants for our daily life, the various threats that endanger them in the wild and what ordinary people can do to help and save them. As a general rule these activities tried to engage the visitors making use of popular games and quests re-designed and re-formatted with a botanic content (treasure hunts, mastermind, domino etc.). Participants are subsequently engaged in creative experiences that required direct interaction with plants or plant derived products (preparing plant-made gifts, paintings, bags, dishes, pots etc..). Finally the event concluded with a message on plant sustainable use and its importance for the future of humankind. This workshop will present a selection of the most successful activities developed over the past years and will simulate the creation of possible new activities using the same successful format.

Workshop session (C)

1 Theme: Education for All: Working with Challenging Audiences

Elyssa Arnone, Brooklyn Botanic Garden USA.

Strengthening your garden programnes for teenagers: a hands-on workshop

How can botanic gardens compete with television, music, friends, and sports for the attention and time of teenagers? Gardens must find creative ways to make learning about plants and science interesting and worthwhile for young people. This workshop will explore activities, lessons, and projects used at Brooklyn Botanic Garden to engage teenagers both on a social and academic level. Youth development is one of the key components to a successful programme for teenagers. The Garden Apprentice Program at Brooklyn Botanic Garden spends months building a cohesive and dynamic group of youth and adults. The relationships that are formed in the garden programs help to ensure engaging and meaningful experiences for everyone. Participants will have a chance to experience many of the team building activities used with teens at Brooklyn Botanic Garden. In the second part of the workshop, teachers will become the students while experiencing a series of short exercises developed for high school biology lab classes. These lessons are designed to make examining the scientific method fun, meaningful and memorable. Participants will perform hands-on activities such as, 'using your senses to make observations' and 'the importance of detail and accuracy'. The workshop is aimed at helping participants build upon their own comfort level for working with teenagers. By doing the same interactive activities and lessons that are used with youth, participants will gather ideas and tools to use in their own programmes. We will focus on lessons and activities practical for educators with limited resources and staff. These lessons and activities can be utilized with teens from diverse backgrounds and those with limited knowledge of plants. Most importantly, in the final portion of the workshop, participants will have an opportunity to share with each other their own best practices and ideas for connecting botanic gardens and teens. The expectation is that each participant will leave with a 'toolbox' full of new ideas and activities to engage teens in botanic gardens.

2 Theme: Achieving Sustainability: Ideas and Solutions

Prof. Dmitry N. Kavtaradze, Lomonosov Moscow State University, Moscow, Russia.

Simulations and games in education for sustainable development

Traditional methods in educating students to become environmentally literate have failed. New ways of working are needed and educational institutions and teaching staff need to be provided with resources that will enable them to develop young people who can be actively involved in finding solutions to some of the major environmental problems of our time. During this workshop participants will be encouraged to try out some of the innovative resources we have produced at Moscow State University in Russia. Our main emphasis is on promoting interactive decision-making.

3 Theme: Reflection on Practice

Sam Kendall and *Pam Horton*, Eden Project UK and Rob Bowker, School of Education and Life Long Learning, Exeter University

Creative strategies for evaluating teaching and learning on out of school visits

The Eden Project, Cornwall uses a range of creative strategies to convey their messages about the interesting lives of plants and an understanding of the essential links between plants, people and resources for a sustainable future for all. Since it opened in 2001 over 100 000 children have visited Eden on school trips. Throughout this time the Education Team at Eden and the University of Exeter have been working in partnership continually to improve the quality of children's learning experiences when visiting Eden. We are currently engaged in a research project evaluating the effectiveness of an Eden Education Officer-led workshop – Don't Forget your Leech Socks. This research has involved children completing a simple classroom activity in the form of a Personal Meaning Map (PMM) before and after their visit to Eden Project. Children's written work and drawings have been analysed and a report written on the findings.

The workshop will share these findings and explore and demonstrate evaluation techniques and strategies suitable for use in free-learning environments, such as botanic gardens. We will also discuss effective strategies for teachers making out-of-school visits.

4 Theme: Public Awareness of Plants

Laurel McIvor, Canadian Botanical Garden Education Network, Canada.

Planting the seeds of biodiversity

Up to 100,000 plants, more than one-third of all the world's plant species, are threatened or face extinction in the wild. A 2002 Biodiversity Project study found, however, that nearly 70 percent of adults do not understand the importance of biodiversity to the continued health of life on Earth. The living and non-living collections at botanical gardens, arboreta, zoos and museums highlight this diversity and offer opportunities for research, education and public participation. Many of these institutions are contributing to international efforts and agreements to protect and promote biodiversity. For example, 24 Canadian institutions have registered to support the International Agenda for Botanic Gardens in Conservation. Their programmes in plant conservation and sustainability help meet targets that Canada has committed to as a country endorsing the the International Convention on Biological Diversity. In 2005, the Canadian Botanical Conservation Network and BGCI helped draft the North American Botanic Garden Strategy for Plant Conservation. Target D of this strategy specifically states that botanic gardens should "promote the importance of plant diversity to all visitors and include conservation messages in their interpretation and education programs for all ages and audiences." How will public gardens meet this challenge to promote the importance of plant diversity to ALL audiences? During this participatory workshop, presenters and participants will share insights and activities to assist in teaching about the importance of biological and plant diversity to audiences of all ages, backgrounds and abilities. The discussion will also focus on how to engage the public in taking action to protect our important biological heritage.

5 Theme: Achieving Sustainability: Ideas and Solutions

Brian Johnson, BGCI US

Contributions to the UN Decade of Education for Sustainable Development

The United Nations has declared 2005-2014 the Decade of Education for Sustainable Development. The overall goal of the Decade is to integrate the principles, values, and practices of sustainable development into all aspects of education and learning. The aim of ESD is to encourage changes in behaviour that will create a more sustainable future for present and future generations. Botanic gardens have a vital role to play in this aspect and can take advantage of the Decade to promote their excellent work. Over the past few days you have had an opportunity to make a pledge for the Decade. During the workshop, we will examine these pledges and develop a global statement from botanic gardens and a strategy to communicate how your vital work is promoting the Decade. Please join us and make your voice heard

6 Theme: Public Awareness of Plants

Katia Astafieff and *Pierre-François Valck*, Le Montet Botanical Gardens, Nancy, France.

Making exhibitions come alive!

Many botanical gardens stage exhibitions, but these sometimes lack an interactive aspect.
How can we involve the visitor in taking an active approach? How can we encourage an exchange between visitors and guide? How can we involve visitors in activities and games? So that the exhibition can be a living, user-friendly activity, and so that the visitor can feel involved, have fun and learn. During this workshop, participants will discuss ideas about running an exhibition and making exhibitions more lively.

7 Theme: Public Awareness of Plants

Ian Edwards, Royal Botanic Garden, Edinburgh, Scotland and Sandy Tanck, Minnesota Landscape Arboretum

Sense of wonder: creating engaging exhibitions

Next year is the 100th anniversary of the birth of environmentalist Rachel Carson and 50 years since the publication of her seminal essay Sense of Wonder. Although written half a century ago it is more relevant now than ever before. As we loose green spaces to development and cIn this workshop we will investigate how childhood experiences with nature have often proved to be important in shaping our lives and those of others we know and admire. We will begin to collect recollections of times when participants were touched by the sense of wonder. This will be the start of a collection that we hope to develop into a worldwide exhibition celebrating and exploring the relationship between childhood nature experiences and environmental awareness in later life. The workshop will also highlight ways in which parents, teachers and youth leaders can provide safe opportunities for children to have contact with nature and play outdoors.