

roots



BOTANIC GARDENS

Education for Sustainability

- Evaluation in Botanic Gardens – Luxury or Necessity?
- Killer Plants and The Big Smelly Tree!
- Environmental Ambassadors for Conservation
- Global Change Exhibition Makes an Impression in China
- Eco-Clubs in the Foothill of the Forest, India
- Further Training in EE for North Africa

Botanic

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Conservation

International

Education

Review

December 2000

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Evaluation

BGCI 5th International Congress on Education in Botanic Gardens

'Connecting with Plants – Lessons for Life'

29 September – 4 October 2002

Come and visit the southern hemisphere and experience the visitor educational and interpretation programs that take place 'down under'. The Royal Botanic Gardens Sydney, Australia invites you to participate and attend the BGCI 5th International Congress on Education in Botanic Gardens.

RBGS consists of three sites: the well known gardens in the heart of the city next to the Opera House on Sydney Harbour; a cool temperate display garden 105kms away at Mount Tomah; and an extensive collection of Australian native plants at Mount Annan Botanic Garden, 90kms south west of Sydney.

Call for Presentations

Botanic Gardens Conservation International and the Royal Botanic Gardens Sydney invite you to submit abstracts for presentations at the Congress. Workshop, paper, poster and educational fair presentations are being sought from botanic garden educators and educators working in zoos, museums, plant science institutions, national parks etc concerned with plant-based education. Abstracts will be evaluated by the Congress Planning Committee on how well they address the congress themes, their overall quality, well-defined focus and practical applicability.

All abstracts must address one or more of the following congress themes:

- Evaluation and research
- Multiculturalism and indigenous issues in interpretation
- Linking science and sustainability
- Novel methods in interpretation/communication
- Forming partnerships (with museums, national parks, forests etc)

Please send us your abstracts using the following format:

Font: 12 point Times New Roman

Line spacing and margins: single line spacing; 3cm margins all round

Title: Bold, all upper case, centred

Author: Leave one line space below title; list first name first for each author; bold, upper and lower case, centred

Author address: Leave one space below author; list affiliation/institution address (3 lines maximum); upper and lower case, centred

Text: Leave three line spaces below address; left justified, right unjustified; One line space between paragraphs, no indentations

Please send abstract either on diskette, or via email, as a MS Word Document or Rich Text Format file to Julia Willison or Lucy Sutherland at BGCI at the address below by 29 June 2001.

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The congress will promote environmentally friendly practices, for example we will endeavour to minimise the use of paper leading up to the congress. Please visit the web site regularly for further information: www.rbgsyd.nsw.gov.au



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Subscriptions

Roots is published twice a year as a service to the BGCI education network. It is sent to member gardens as part of their annual subscription. For information on how to become a member please contact BGCI or refer to the back cover of this edition of Roots.

Forthcoming Issues

Roots 22 - Environmental Ethics Last submission dates: Articles - February 16, 2001, News - March 16, 2001
Roots 23 - Environmental Interpretation Last Submission dates: Articles - July 13, 2001 News - 10 August, 2001

Evaluation achieving our objectives

■ Editorial

This issue of Roots focuses on the important topic of evaluation. Evaluation is often an area that is overlooked, it may be considered too expensive, staff may not feel they have the skills to undertake it or perhaps it is considered to be of little value. However, as educators, is there any point in carrying on developing and presenting educational programmes, designing interpretive signs and communicating with the general public unless we know that we are being effective in achieving our objectives?

There are many types and levels of evaluation as described by Elizabeth Beckmann in her article. Elizabeth calls on botanic garden staff to look at their educational programmes and methods of communication with their visitors and decide which are the most appropriate techniques for evaluating their effectiveness.

Evaluation can be used before a project has even started. María José Carrau explains how the University Botanic Garden of Valencia, Spain, uses front-end evaluation as a planning tool for the development of exhibitions. Evaluation can also be integrated into the development and implementation stages of projects as highlighted by Carolann Baldyga who describes a collaborative project between Fairchild Tropical Garden, USA, and the Girl Scouts to develop and implement new Girl Scout badges in plant identification and conservation.

Evaluation can be undertaken to assess whether training has met its objectives. A combination of formative and summative techniques was used by Larry de Buhr and Barbara Addelson at Missouri Botanical Garden, USA, to assess their teacher

▲ Editorial

Ce numéro de Roots met l'accent sur l'importance de l'évaluation. Ce domaine est souvent négligé pour plusieurs raisons: il peut sembler onéreux, le personnel estime qu'il détient les compétences nécessaires pour mener à bien ses propres évaluations ou parfois encore on leur accorde peu de crédit. Cependant, les éducateurs peuvent-ils continuer à développer et présenter des programmes éducatifs, concevoir des panneaux et communiquer avec le public sans savoir si les objectifs définis sont atteints?

Il existe de nombreux types et niveaux d'évaluation comme le décrit Elizabeth Beckmann dans son article. Elizabeth demande au personnel des jardins botaniques d'évaluer leurs programmes éducatifs et leur méthodes de communication avec le public et de décider des techniques les plus appropriées pour juger de leur efficacité.

L'évaluation peut être utilisée avant même le démarrage d'un projet. Maria José Carrau explique comment le jardin botanique de l'Université de Valence, Espagne, utilise l'évaluation comme outil de planification et de développement de ses expositions. Les évaluations peuvent également être intégrées au développement et à phase de réalisation du projet comme l'explique Carolann Baldyga qui décrit le projet de collaboration entre le Fairchild Tropical Gardens, États-Unis, et les scouts afin de développer et de mettre en place de nouveaux labels scouts dans les domaines de l'identification et de la conservation.

Les évaluations peuvent être menées pour évaluer si la formation a atteint ses objectifs. Une combinaison de

● Editorial

Este número de Roots se dedica al importante tema de la evaluación. Suele descuidarse ya que a menudo es considerada de poca utilidad, se estima que es onerosa y el personal puede creerse sin las técnicas necesarias para realizarla. Sin embargo, como educadores, si no cumplimos nuestros objetivos ¿tienen sentido los programas educativos, el diseño de paneles interpretativos o la comunicación con el público?

Como describe Elizabeth Beckmann en su artículo, hay muchos niveles y tipos de evaluación. Elizabeth pide al personal de los jardines botánicos que revisen sus programas educativos y las formas de comunicación con los visitantes, para decidir cuáles son las técnicas más apropiadas y evaluar su efectividad.

La evaluación puede usarse incluso antes de comenzar un proyecto. María José Carrau nos explica cómo el Jardín Botánico de la Universidad de Valencia, España, utiliza la pre-evaluación como instrumento de planificación de las exposiciones. La evaluación, como destaca Carolann Baldyga, puede integrarse en las distintas fases de desarrollo y cumplimiento de los proyectos. Describe un proyecto de colaboración entre el Fairchild Tropical Garden, EAU, y las Chicas Scouts para la conservación y crear nuevas placas identificativas de plantas.

La evaluación puede llevarse a cabo para juzgar si un aprendizaje ha cumplido sus objetivos. Larry de Buhr y Barbara Addelson, del Jardín Botánico de Missouri, ha utilizado una combinación de técnicas aditivas y formativas para evaluar la formación del profesorado. El artículo de Larry y

■ Editorial

training. Larry and Barbara's article highlights the positive consequences that can result from comprehensive evaluation such as the continued funding of programmes and a change in the philosophy of teacher training to ensure a more effective approach.

Bill Graham reflects on the need for botanic garden staff to evaluate their own environmental policies and practices through a process of self-review and by setting challenges with realistic targets. Evaluation can be threatening to people as it can produce results that reveal that our objectives are not being met, and that our programmes or communication techniques are not as effective as we initially thought. However, as educators we need to consider evaluation as a positive planning and learning tool that assists us in modifying and improving our communication techniques to achieve our objectives.

Lucy A. Sutherland

▲ Editorial

techniques a été utilisé par Larry de Buhr et Barbara Addelson au Jardin Botanique de Missouri pour évaluer la formation réservée aux enseignants. L'article de Larry et Barbara met en évidence les conséquences positives qui peuvent découler d'une évaluation large telle que la poursuite d'un financement et un changement dans la philosophie de la formation afin d'assurer une meilleure approche.

Bill Graham réfléchit aux besoins des personnels des jardins botaniques d'évaluer leurs politiques et pratiques en matière d'environnement par un processus d'examen critique tout en se fixant des objectifs réalistes. L'évaluation peut paraître une remise en cause car elle peut révéler que les objectifs ne sont pas atteints, que les programmes de communication ne sont pas aussi efficaces que l'on pensait. Cependant, en tant qu'éducateurs, nous devons considérer l'évaluation comme un outil de planification et d'apprentissage efficace qui nous aide à planifier et améliorer nos techniques de communication pour atteindre nos objectifs.

● Editorial

Barbara destaca las positivas consecuencias que se pueden derivar de una evaluación integral, teniendo en cuenta aspectos como la financiación continuada de los programas y los cambios de mentalidad en la formación de profesores para asegurar un enfoque más efectivo.

Bill Graham reflexiona acerca de la necesidad de que el personal de los jardines botánicos evalúe sus propias prácticas y políticas medioambientales, a través de un proceso de autorrevisión y proponiéndose retos con metas realistas. La evaluación puede percibirse como amenazante, ya que es capaz de revelar que nuestros objetivos no se han alcanzado, y que nuestros programas o la comunicación con el visitante no son tan efectivos como creíamos. Sin embargo, como educadores debemos entender la evaluación como un instrumento válido de planificación y aprendizaje que nos ayuda en la mejora de las técnicas de comunicación para el logro de nuestros objetivos.



Look for the following symbols... ■ English ▲ Français ● Español

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News up date

■ News

Further Training in EE for North Africa

A second training workshop on environmental education has been conducted in Morocco and Tunisia as part of the collaborative project between Fauna and Flora International, Botanic Gardens Conservation International, Institut Agronomique et Vétérinaire Hassan II Morocco and the Institut National de la Recherche Agronomique de Tunisie. The training, conducted by BGCI's Education Officer Lucy Sutherland, included a combination of practical examples of environmental education games and activities and also focused on programme development and strategic planning for environmental education. Participants particularly enjoyed the practical examples of games and activities and the opportunity to network with other institutions.

Right: Professor Moh Rejdali, Director of Scientific Research and Development at the Institut Agronomique et Vétérinaire Hassan II surveying the development of the new environmental education centre (top right)



▲ Nouvelles



Une Formation Avancée en Afrique du Nord

Un second atelier de formation à l'environnement a été mené au Maroc et en Tunisie dans le cadre d'un projet de collaboration entre Fauna and Flora International, le BGCI, l'Institut Agronomique et Vétérinaire Hassan II du Maroc et l'Institut National de la Recherche Agronomique de Tunisie. La formation, dirigée par Lucy Sutherland, responsable éducatif au BGCI, comprenait un ensemble d'exemples pratiques sur l'éducation à l'environnement, des jeux et activités et portait également sur un programme de développement et de stratégie sur l'éducation à l'environnement. Les participants ont particulièrement apprécié les exemples pratiques, les jeux et activités et cela a été l'occasion de travailler en réseau avec d'autres institutions.

Outre ce projet de collaboration, un centre d'éducation à l'environnement est en voie d'achèvement au jardin Botanique de l'Institut Agronomique et Vétérinaire Hassan II à Rabat au

● Noticias

Más capacitación en educación ambiental en el norte de África

El segundo taller de capacitación en educación ambiental se llevó a cabo en Marruecos y Túnez como parte del proyecto de colaboración entre Fauna y Flora Internacional, Botanic Garden Conservation International (BGCI), Instituto Agronómico y Veterinario Hassan II de Marruecos y el Instituto Nacional de Investigación Agronómica de Túnez. El taller dirigido por la responsable de educación de BGCI Lucy Sutherland, se enfocó tanto a actividades prácticas y juegos de educación ambiental, como a la planeación estratégica y desarrollo de programas de educación ambiental.

Los participantes disfrutaron particularmente los ejercicios prácticos de juegos y actividades, así como la oportunidad de enlazarse con otras instituciones. Como parte de este programa de colaboración, el Centro de Educación Ambiental del Jardín Botánico del Instituto Agronómico y Veterinario Hassan II de Rabat,

■ News

As part of this collaborative project an environmental education centre is nearing completion in the Jardin Botanique de Institut Agronomique et Vétérinaire Hassan II in Rabat, Morocco. The centre's construction has been sponsored by the British Council and includes a classroom, meeting room, herbarium, seed bank and interpretive display space. For further information contact: Professor Moh Rejdali, Département de Botanique, Institut Agronomique et Vétérinaire Hassan II, B.P. 6202 Rabat – Instituts Rabat, Morocco Tel: (212) 7 774093 Fax: (212) 7 78110.

European Educators Meet in Birmingham

The first gathering of European botanic garden educators took place in October at a congress hosted by the Birmingham Botanical Gardens and Glasshouses in conjunction with Botanic Gardens Conservation International, Botanic Gardens Education Network and PlantNet. The congress focussed on the implementation of the educational chapters of the European Action Plan for Botanic Gardens, launched in Spain earlier this year. Key points from the congress will be included in the next edition of *Roots*.

Papers and workshops were heard from presenters from all over Europe including France, Italy, Slovenia, Latvia, Wales and Spain to name a few. During the congress delegates took part in field trips to the University of Oxford Botanic Garden, Birmingham's Environmental and Outdoor Education Centres and Kappa Paper Mill. Evaluation of the congress revealed that participants particularly enjoyed the opportunity to network and meet people with similar jobs, ideas and problems and share material and experiences.

The World Botanic Gardens Congress

In June this year nearly 1000 delegates from around the world attended the World Botanic Garden Congress hosted by the North Carolina Arboretum, USA. Staff from the

▲ Nouvelles

Maroc. La construction de ce centre a été financée par le British Council et comporte une salle de cours, une salle de réunion, une salle d'herbier, une banque de semences et une salle d'exposition. Pour de plus amples informations contacter le Professeur Moh Rejdali, Département de Botanique, Institut Agronomique et Vétérinaire Hassan II, B.P. 6202 Rabat -Maroc Tél.: (212) 7 774093 Fax: (212) 7 78110.

Rencontre Des Animateurs Européens à Birmingham

Le premier rassemblement des animateurs des jardins botaniques d'Europe a eu lieu en octobre lors d'un congrès accueilli par les Jardins Botaniques et Serres de Birmingham sous l'égide du Réseau Education, du BGCI et de PlantNet. Le congrès portait sur l'application des aspects éducatifs du Plan d'Action Européen

● Noticias

Marruecos, está por concluirse. La construcción de dicho Centro ha sido financiada por el Consejo Británico e incluye un salón de clases, sala de seminarios, herbario, banco de semillas y área de exposiciones. Para mayor información contactar a: Profesor Moh Rejdali, Departamento de Botánica, Instituto Agronómico y Veterinario Hassan II, B. P. 6202 Rabat – Institutos Rabat, Marruecos Tel: (212) 7 774093 Fax: (212) 7 78110.

Educadores Europeos Se Reúnen en Birmingham

El primer encuentro de educadores de jardines botánicos europeos se llevó a cabo en octubre en los Jardines Botánicos e Invernaderos de Birmingham. El congreso fue organizado conjuntamente con BGCI, la red de educación de Jardines Botánicos y PlantNet. Dicho congreso se centró en la implementación de los

Below:
Delegates from Italy take part in one of the many workshops conducted at the Birmingham congress



■ News

American Association of Botanic Gardens and Arboreta, Botanic Gardens Conservation International, Center for Plant Conservation and the North Carolina Arboretum worked to host an extremely successful congress that provided a diverse programme of papers and workshops.

Education was one of the key areas that the programme addressed. A paper session on 'green housekeeping' practices in botanic gardens was very successful. If gardens are to be effective in influencing public attitudes and values they need to be seen as models for practising sustainability as well as preaching it. Papers from the USA, Mexico and the U.K. illustrated how botanic gardens are tackling this challenge. Sustainability has been a working philosophy at the Cheyenne Botanic Gardens, USA for over 23 years and Shane Smith presented some of the botanic gardens everyday work practices to illustrate this. Edelmira Linares from the Jardín Botánico del Instituto de Biología in Mexico discussed how their programmes raise awareness by using techniques such as the formation of a Friends group and a store which sells botanical products sustainably produced by small industries and community groups. Sue Minter and Dawn Sanders from Chelsea Physic Garden, U.K., presented papers illustrating the challenges they faced implementing sustainable work practices in a historic garden.

International Agenda

During the World Botanic Gardens Congress BGCI launched the International Agenda for Botanic Gardens in Conservation. The International Agenda, developed through a worldwide consultative process with botanical institutions, provides a global framework for the development of botanic gardens policies and programmes for biodiversity conservation. The International Agenda is relevant to educators as it identifies initial priorities for botanic gardens, one of which is to consider how to use

▲ Nouvelles

pour les Jardins Botaniques, lancé en Espagne au début de cette année. Points clés du congrès sera présenté dans la prochaine parution de Roots.

Des communications et des ateliers ont été animés par des orateurs venus de toute l'Europe notamment de France, d'Italie, de Slovénie, de Lettonie, du Pays de Galles et d'Espagne, pour ne citer que quelques exemples. Lors du congrès, les délégués ont participé aux excursions organisées par les jardins botaniques universitaires d'Oxford et de Birmingham. Ils ont visité également le Centre Educatif de Plein Air et le Moulin à Papier de Kappa. Un bilan du congrès a montré que les participants ont particulièrement apprécié le en réseau et la rencontre de collègues aux profils, idées et problèmes similaires et de partager matériaux et expériences.

Le Congrès Mondial des Jardins Botaniques

En juin 2000, environ mille délégués du monde entier ont participé au Congrès Mondial des Jardins Botaniques accueilli par l'Arboretum de Caroline du Nord aux Etats-Unis. Les équipes de l'Association Américaine des Jardins Botaniques et Arboretums (ABGA), le BGCI, le Conservatoire Botanique (Center for Plant Conservation) et l'Arboretum de la Caroline du Nord ont collaboré pour accueillir ce congrès très réussi congrès aux nombreux thèmes et ateliers.

L'éducation a été l'un des thèmes phares du programme. Une session de communications sur les pratiques de 'maintenance verte' dans les jardins botaniques a remporté un vif succès. L'objectif des jardins botaniques est non seulement d'influencer l'attitude et l'éthique du public mais aussi de les faire apparaître comme des modèles mettant en oeuvre leurs recommandations pour le développement durable. Des communications américaines, mexicaines et anglaises ont montré comment jardins botaniques s'attaquent à ce problème. Le développement durable a été la philosophie de travail au Jardin

● Noticias

capítulos educativos del Plan de Acción Europeo para Jardines Botánicos, lanzado en España a principio del presente año. Puntos claves del congreso se incluirán en el próximo número de Roots.

Se presentaron ponencias y talleres de toda Europa incluyendo Francia, Italia, Eslovenia, Latvia, Gales y España por nombrar unos cuantos. Durante el congreso los participantes fueron en viaje de campo al Jardín Botánico de la Universidad de Oxford, a los centros de educación ambiental y exterior de Birmingham, y a la fábrica de papel Kappa Mill. La evaluación del congreso mostró que los participantes particularmente disfrutaron la oportunidad de conocer e intercambiar ideas y problemas con gente de trabajos similares y el compartir materiales y experiencias.

El Congreso Mundial de Jardines Botánicos

En junio del presente año cerca de 1000 delegados de todo el mundo participaron en el Congreso Mundial de Jardines Botánicos organizado por el Arboretum de Carolina del Norte, EUA. Personal de la Asociación Americana de Arboreta y Jardines Botánicos, de BGCI, del Centro de Conservación de Plantas y del propio Arboretum de Carolina del Norte trabajó arduamente en el exitoso congreso, el cual consistió de una gran variedad de ponencias y talleres.

La educación fue uno de los temas principales del programa. Una sesión de conferencias sobre prácticas de 'enverdecimiento' en jardines botánicos tuvo mucho éxito. Si los jardines botánicos pretenden ser efectivos en el cambio de valores y actitudes, necesitan ser modelos de las prácticas sustentables que ellos mismos predicen. Ponencias de EUA, México y Reino Unido presentaron cómo los jardines botánicos enfrentan este reto. La sustentabilidad ha sido la filosofía de trabajo del Jardín Botánico Cheyenne, EUA por más de 23 años y Shane Smith presentó algunas prácticas cotidianas de este Jardín que sustentan su filosofía. Edelmira

■ News

botanic gardens to raise public awareness about sustainable development and development issues. Sections on training and capacity building, public education and awareness, sustainable tourism and raising public awareness and empowering the community with regards to sustainable development are of particular relevance. Each BGCI member botanic garden has been sent a copy of this publication and further copies can be purchased from BGCI.

Roots Index

BGCI volunteer Chris Hobson has been working over the last few months to develop an index for the first 20 editions of Roots. This index will be very useful to botanic garden educators as it will provide an easy guide to locating articles, resources and news items in previous issues. The index will be posted out to each BGCI member with the next edition of Roots.

ARGENTINA

Botanic Garden Works with Teenagers

During this year the San Carlos Centro Botanic Garden has begun to work intensively with teenage students from local high schools. The garden has become a key focus for development through educational policy not only in the city but also in the region.



▲ Nouvelles

Botanique Cheyenne (Etats-Unis) depuis plus de 23 ans et Shane Smith a présenté quelques-unes des pratiques quotidiennes de ce jardin botanique pour illustrer cet aspect. Edelmira Linares du Jardin Botanique de l'Institut de Biologie au Mexique a montré des exemples de leurs actions pratiques de sensibilisation impliquant notamment l'association amicale de ce jardin et la boutique qui propose des articles botaniques issus du développement durable, produits par des petites industries et des groupes communautaires. Sue Minter et Dawn Sanders du Chelsea Physic Garden, (GB) ont présenté dans leur communication la façon dont ce jardin botanique historique a mis en oeuvre des pratiques de développement durable.

L'Agenda International

Au cours du Congrès Mondial des Jardins Botaniques, le BGCI a lancé l'Agenda International de la Conservation pour les jardins botaniques. L'Agenda International, mis au point grâce à une consultation avec institutions botaniques au niveau mondial, fournit un canevas général pour les politiques de développement de jardins botaniques et pour les programmes de conservation de la biodiversité. L'Agenda International est important pour les animateurs des jardins botaniques, car il identifie les priorités de base dont l'une souligne le

● Noticias

Linares del Jardín Botánico del Instituto de Biología en México dio ejemplos de sus programas de concientización pública usando técnicas que involucraron la formación de un grupo de Amigos del Jardín y de una tienda cuyos productos botánicos son producidos de forma sustentable por pequeñas industrias y grupos comunitarios. Sue Minter y Dawn Sanders del Jardín Físico de Chelsea, presentaron en su ponencia el reto que Chelsea, un jardín histórico enfrentó al implementar prácticas sustentables en el trabajo cotidiano de su organización.

Agenda Internacional

En el Congreso Mundial de Jardines Botánicos BGCI dio a conocer la Agenda Internacional de Conservación en Jardines Botánicos. Esta Agenda Internacional ha sido desarrollada a partir de un amplio proceso consultivo a nivel mundial con instituciones botánicas, y proporciona un marco de referencia global para el desarrollo de políticas y programas de conservación de la biodiversidad en jardines botánicos. La Agenda Internacional es relevante para los educadores ya que identifica prioridades esenciales para los jardines botánicos una de las cuales es cómo utilizar los jardines botánicos para la concientización pública del desarrollo y sustentabilidad. Secciones de capacitación y fortalecimiento institucional, educación pública y concientización, turismo sustentable y desarrollo comunitario bajo la perspectiva de sustentabilidad son de particular relevancia. A cada miembro de BGCI se le ha enviado un ejemplar de esta publicación pudiendo adquirir más copias con BGCI.

Indice de ROOTS

El voluntario de BGCI Chris Hobson ha estado trabajando en los últimos meses en la elaboración de un índice de los primeros 20 volúmenes de ROOTS. El índice será de gran utilidad para los educadores de los jardines botánicos, ya que será una guía fácil para localizar artículos, recursos y novedades de los números anteriores. El índice se enviará a todos los miembros de BGCI con el próximo número de ROOTS.

Left:
Ing. Rubén Broda from San Carlos Centro Botanic Garden works with local teenagers and GLOBE, a worldwide network of students, teachers and scientists, to study the global environment – satellites help the teenagers to network around the world

■ News

Education in environmental sciences, especially for young people, is the main objective of the botanic garden which has been working with GLOBE, a worldwide network of students, teachers and scientists working together to study and understand the global environment (see resources section for web site details). Video conference facilities have enabled students to listen to a range of talks, including one about the usefulness of satellite images in predicting climatic and environmental phenomena. Through satellite communication, students have posed questions to experts such as the NASA scientists in Washington, USA, and the National Aeronautics and Space Administration experts in Buenos Aires. This experience has prompted the botanic garden to work with students to study atmospheric topics such as cloud types, wind, temperatures and climatic changes. A meteorological cabin has been constructed to take daily measurements and the findings will be sent to a central base in Washington.

For further information contact: Ing. Rubén Broda Jardín Botánico Municipal Municipalidad de San Carlos Centro Tomas Lubary 452 San Carlos Centro, Departamento Las Colonias, Provincia de Santa Fe Argentina Tel/Fax: (54) 340 442 0021. Email: botmusat@scarlos.com.ar

CHINA

Global Change Exhibition Makes an Impression

Staff at Shenzhen Fairy Lake Botanic Garden have developed a new exhibition entitled Global Change and Our Situation targeting local citizens, middle school students, visitors, and environmental organisations. The exhibition is made up of 46 panels with four major parts:

Part One introduces the factors that have caused global change: air, water, soil and environmental pollution; rapidly increasing population; soil degradation; increasing earth temperatures; decreasing forested areas; biodiversity reduction; and so

▲ Nouvelles

rôle des jardins botaniques dans la sensibilisation au développement durable et aux des problèmes de développement. Les aspects tels que l'application pratique et le développement des savoir-faire, l'éducation et la sensibilisation, le tourisme durable sont particulièrement importants. Chaque jardin botanique membre du BGCI a reçu un exemplaire de cette publication et des exemplaires supplémentaires peuvent être commandés au BGCI.

Un Index Pour Roots

Un volontaire du BGCI, Chris Hobson a travaillé ces derniers mois à la réalisation d'un index pour les vingt premiers numéros de Roots. Cet index sera très utile aux animateurs des jardins botaniques, car il constitue un guide pour de localiser facilement les articles, les références et informations diverses des précédents numéros. L'index sera expédié à chacun des membres du BGCI avec le prochain numéro de Roots.

ARGENTINE

Collaboration Entre Les Lycéens et Les Jardins Botaniques

Au cours de l'année, 2000 le Jardin Botanique de San Carlos Centro a commencé une collaboration soutenue avec les élèves des lycées voisins. Le Jardin est devenu un point-clé pour le développement des politiques urbaines et également régionales.

L'éducation aux sciences de l'environnement, particulièrement pour jeunes gens, est le principal objectif du jardin botanique qui a collaboré à GLOBE, un réseau mondial de lycéens, enseignants et scientifiques travaillant ensemble à l'étude et à la compréhension de l'environnement global (cf. références pour des détails du site web). Des installations de vidéoconférence ont permis aux lycéens de suivre une série de conférences, dont l'une portait sur l'utilité des images satellite ans la prévision des phénomènes climatiques et environnementaux. En communiquant par satellite, les

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ARGENTINA

Un Jardín Botánico Trabaja Con Jóvenes

Este año el Jardín Botánico Centro San Carlos comenzó a trabajar intensivamente con adolescentes de las escuelas de educación media de la localidad. El jardín se ha convertido en un núcleo de desarrollo a través de una política educativa no solo en la ciudad sino también en la región.

La educación en ciencias ambientales, especialmente dirigida a jóvenes, es el objetivo primordial del jardín, el cual ha estado trabajando con GLOBE, una red mundial de estudiantes, maestros y científicos que conjuntamente tratan de estudiar y entender el ambiente global (véase sección de recursos para detalles del sitio web). Las video conferencias permitieron a los estudiantes escuchar una amplia variedad de pláticas, incluyendo una sobre el uso de imágenes de satélite para predecir el clima y los fenómenos ambientales. A través de comunicación vía satélite, los estudiantes pudieron hacer preguntas a expertos como científicos de la NASA en Washington, EUA, y a los expertos del Comité Aeroespacial Nacional de Buenos Aires.

Esta experiencia motivó al Jardín Botánico a trabajar con los estudiantes tópicos atmosféricos como tipos de nubes, viento, temperaturas y cambios climáticos. Se construyó una estación meteorológica para la toma diaria de datos, los cuales se enviarán a una base central en Washington.

Para mayor información contactar a: Ing. Rubén Broda, Jardín Botánico Municipal Municipalidad de San Carlos Centro Tomás Lubary 452 San Carlos Centro, Departamento las Colonias, Provincia de Santa Fe Argentina Tel/Fax: (54)340 442 0021. Email: botmusat@scarlos.com.ar

CHINA

Impresionante Exposición Sobre el Cambio Global

El personal del Jardín Botánico

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on. Part Two, entitled Our Situation, gives some examples about the difficult situation faced by humankind i.e. the shortage of natural resources including fresh water, soil, biodiversity, oil, and clean air and the increase of poverty. Part Three calls on everyone in the world to care about environmental protection, biodiversity conservation, and saving natural resources. Finally the last section focuses on news about environmental problem at home and abroad in the 20th century using famous examples to ensure that people leave the exhibition with a deep impression of the situation in their mind. A booklet has also been produced to complement the exhibition. For further information contact: Feng Huiling, Shenzhen Fairy Lake Botanic Garden, Liantang, Shenzhen 518004 P.R. China
Tel: (86) 0 755 573 6614
Fax: (86) 0 755 573 6917.

INDIA

Eco-Clubs in the Foothill of the Forest

During 1996-97, Eco-clubs were

étudiants ont posé des questions aux experts de la NASA, et à ceux du Comité Aérospatial de Buenos Aires. Cette expérience a incité le Jardin Botanique à aborder avec les étudiants des aspects météorologiques comme les problèmes de tempêtes et les changements climatiques. Un poste météorologique a été construit pour noter des relevés quotidiens dont les résultats seront centralisés à la base de Washington.

Pour de plus amples informations contacter: Rubén Broda, ingénieur au Jardin Botanique Municipal, Municipalité de San Carlos Centro, Tomas Lubary 452 San Carlos Centro, Departamento Las Colonias, Provincia de Santa Fe Argentine.
Tél./Fax: (54) 340 442 0021.
Email: botmusat@scarlos.com.ar

CHINE

Une Exposition Remarquable Sur Les Changements Climatiques Planétaires

L'équipe du Jardin Botanique du Lac Enchanté de Shenzhen a mis sur pied

Shenzhen Fairy Lake, desarrolló una nueva exposición denominada Cambio Global y Nuestra Situación dirigida a los ciudadanos locales, estudiantes de escuela media, visitantes y organizaciones ambientales. La exposición consta de 46 carteles divididos en cuatro partes:

La Primera Parte introduce los factores que han causado el cambio global: la contaminación del aire, agua y suelo, la explosión demográfica, la degradación del suelo, la creciente temperatura de la tierra, la deforestación acelerada, la pérdida de biodiversidad, el abandono del suelo y más. La Segunda Parte titulada Nuestra Situación, da algunos ejemplos de situaciones difíciles que enfrenta la humanidad, por ejemplo, la reducción de recursos disponibles incluyendo agua dulce, suelo, biodiversidad, petróleo y aire puro y el incremento de la pobreza. La Tercera Parte hace un llamado a los habitantes del planeta para la protección ambiental, la conservación de la biodiversidad y el ahorro de nuestros recursos naturales. Finalmente la Última Parte, se centra en noticias de problemas ambientales locales y del extranjero en el siglo XX, usando ejemplos muy conocidos de manera que la gente se lleve en mente una profunda impresión de la situación ambiental. También se elaboró un folleto complementario para la exposición. Para mayor información

Left:
Students
enjoying the
Global Change
and Our Situation
exhibition at
Shenzhen Fairy
Lake Botanic
Garden

Below:
Children at the
Shenzhen Fairy
Lake Botanic
Garden taking a
break during
their visit



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created in 20 schools in three districts (Karur, Trichy and Dindugal) of Tamil Nadu in India. The official launch of the Clubs began with a Green Peace Walk, a 9km walk with 1000 children from 20 schools in collaboration with the Environmental Directorate, Forest Department and a local college to create awareness against forest clearing and biodiversity conservation.

The Eco-clubs were started by an NGO, which manages the Inba Seva Sangam's Annai Genetic Garden in Sevapur. The garden is situated in the Kadavur basin adjacent to the foothills of the Toppaisami Reserve Forest, 95 km away from Trichirapalli. The role of the Annai Genetic Garden is to use the 5-acre conservation plot to conserve threatened flora. The idea behind the establishment of Eco-Clubs is to involve school children in the long-term conservation of forest resources and to create green consciousness. The schools selected to take part in the programme are situated near the foothills of the forest where staff, from the Annai Genetic Garden, are busy with floristic work.

The Eco-Clubs include 25-30 students ranging in age from 10-14, as well as interested teachers who enrol as Eco-

Below:
1000 children
took part in the
Green Peace
Walk to raise
awareness
against forest
clearance



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une nouvelle exposition intitulée 'Notre situation dans les Changements Climatiques Planétaires' visant le public local, les lycéens, les visiteurs et les acteurs de l'environnement. L'exposition se compose de 46 panneaux s'articulant sur quatre aspects:

La première partie présente les facteurs responsables des changements climatiques planétaires: air, eau, sol et pollutions; le rapide accroissement de la population; l'érosion des sols; le réchauffement climatique; le déboisement; la diminution de la biodiversité; la déprise agricole etc. La seconde partie, intitulée 'Notre Situation', présente quelques exemples sur la situation difficile de l'humanité devant l'appauvrissement des ressources naturelles notamment en eau potable, sols, biodiversité, pétrole, et air propre. La troisième partie lance un appel à chaque habitant de la planète pour protéger l'environnement, conserver la biodiversité et préserver les ressources naturelles. Enfin, le dernier aspect aborde des exemples précis et célèbres de problèmes environnementaux dans notre pays et à l'étranger au cours de ce 20ème siècle, destinés à frapper l'esprit des visiteurs quittant l'exposition. Une brochure a également été éditée en complément de cette exposition. Pour de plus amples informations contacter: Feng Huiling, Shenzhen Fairy Lake Botanic Garden, Liantang, Shenzhen 518004 R.P. de Chine. Tél: (86) 0 755 573 6614 Fax: (86) 0 755 573 6917.

INDE

Eco-Clubs au Piémont de la Forêt

Au cours des années 1996-97, des éco-clubs ont été créés dans 20 écoles de trois districts (Karur, Trichy et Dindugal) de la région de Tamil Nadu en Inde. Le lancement officiel des Clubs a débuté par une Marche Verte Pacifique, promenade de 9km pour 1000 enfants de ces 20 écoles en collaboration avec la Direction de l'Environnement, le Département des

● Noticias

contactar a: Feng Huiling, Jardín Botánico Shenzhen Fairy Lake, Liantang, Shenzhen 5180040 República Popular China Tel: (86)0755 573 6614 Fax: (86) 0 755 573 6917.

INDIA

Eco-Clubes a Los Pies de la Selva

Durante 1996-97, se crearon Eco-Clubes en 20 escuelas de tres distritos (Karur, Trichy y Dindugal) en Tamil Nadu, India. El lanzamiento oficial de los Eco-Clubes fue con una caminata de paz de 9 km. donde caminaron 1000 niños de las 20 escuelas acompañados de autoridades ambientales, el departamento de bosques y una universidad local, con el fin de crear conciencia sobre la deforestación y la conservación de la biodiversidad.

Los Eco-Clubes fueron iniciativa de una Organización No Gubernamental, la cual dirige el Jardín Genético de Inba Seva Sangam Annai, en Sevapur. El Jardín se encuentra en la cuenca de Kadavura a los pies de la Reserva Forestal Toppaisami, a 95km de Trichirapalli. El papel del Jardín Genético Annai es utilizar su área de 5 acres para conservar la flora amenazada. La idea del establecimiento de los Eco-clubes es involucrar a los estudiantes en la conservación a largo plazo de los recursos de la selva y promover una conciencia 'verde'. Las escuelas seleccionadas para participar en el programa se encuentran a los pies de la selva donde realiza trabajos florísticos personal del Jardín Genético Annai.

Los Eco-Clubes tienen de 25 a 30 estudiantes de 10 a 14 años, así como maestros interesados que los coordinan. Los maestros son responsables del Eco-club de su escuela y realizan actividades como elaboración de composta, propagación en un vivero, reforestación de los patios escolares, concursos de preguntas y respuestas ambientales, identificación de plantas medicinales, y el establecimiento de jardines de

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Club coordinators. Teachers are responsible for the Eco-Clubs in their respective schools and run activities such as: making organic compost, propagating seedlings in a nursery, planting trees within school grounds, environmental quizzes, identification of medicinal plants and the promotion of herbal gardens in the school grounds. Motivation and awareness generation is imparted through various programmes such as science exhibitions focusing on biodiversity conservation, and an essay competition on threatened flora of their village. Prize winners attend a special three-day environmental education programme at the Angalde Institute for Natural History (AINH) in Kodaikanal.

Nature camp workshops are run for the Eco-Club coordinators and school teachers and quarterly meetings are conducted for them to become acquainted with their work and share the difficulties during the implementation of activities in their respective schools. Each week one school visits the Annai Genetic Garden. The programme emphasises basic environmental concepts, includes a garden visit, demonstration of medicinal plants and their uses, waste recycling (vermiculture and bio-dynamic compost preparation), nursery raising, theory on threatened flora and fauna of the region, video and slide shows and nature games.

During the holidays, a three day Nature Camp is organised for active students focusing on forest ecosystems, forest walks, hill trekking, garden work, bird watching and night walks. Recently an environmental newsletter has been developed for the students; 75% of the articles were contributed by the village school children, the rest from schoolteachers and NGO staff. For further information contact: Alex Alexander, Genetic Garden Manager and Honorary Wildlife Warden Karur Dt, Inba Seva Sangam, Sevapur – PO, Tharagampatti (via) Karur D.T. Tamil Nadu, India. Email: inba_alex@hotmail.com

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Forêts et les collèges locaux pour faire prendre conscience des déboisements excessifs et de la conservation de la biodiversité.

Les éco-clubs ont été initiés par une ONG collaborant au Jardin Génétique d'Inba Seva Sangam's Annai de Sevapur. Le jardin is situé dans le Bassin de Kadavur, proche des contreforts de la réserve forestière de Toppaisami située à 95 km de Trichirapalli. Le Jardin génétique Annai mobilise ses 3 hectares de réserve pour la conservation de la flore menacée. L'idée sous-jacente de l'installation d'éco-clubs est d'impliquer les scolaires dans la conservation durable des ressources et de créer une conscience verte. Les écoles retenues pour participer au programme sont situées sur les contreforts forestiers, là où l'équipe du jardin génétique d'Annai effectue des travaux de floristique.

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hierbas en las escuelas. Se genera la motivación y concientización a través de diversos programas como exposiciones científicas enfocadas a la conservación de la biodiversidad y un concurso de composición sobre la flora amenazada de su comunidad. Los ganadores del premio participan en un programa especial de educación ambiental de tres días de duración en el Instituto de Historia Natural Angalde (AINH) en Kodaikanal.

Los coordinadores de los Eco-Clubes junto con los maestros organizan talleres sobre la naturaleza, y llevan a cabo reuniones cada 4 meses que les permiten poner al día su trabajo y compartir los problemas para implementar las actividades en sus respectivas escuelas. Cada semana una escuela visita el Jardín Genético Annai. El programa hace énfasis en conceptos ambientales básicos, una visita guiada, una demostración del uso

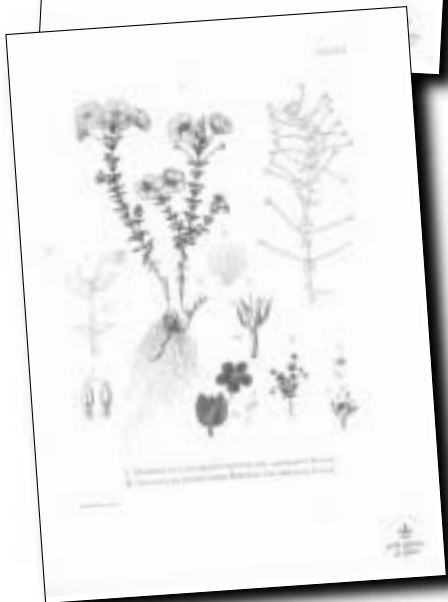
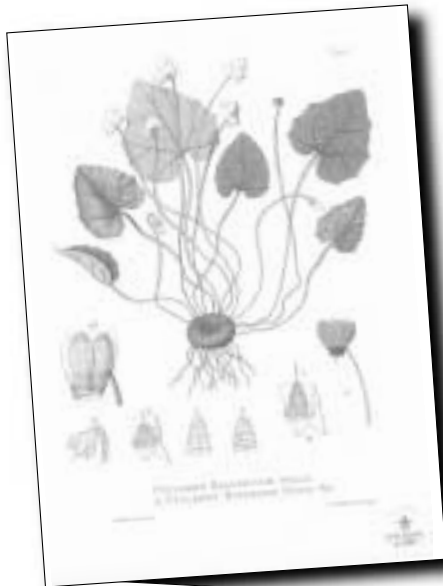
Below:
Children plant trees in their school grounds as part of the Eco-Club programme in Tamil Nadu, India



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Right:
Jardí Botànic de
Sóller has
produced a
series of 10
souvenir
postcards for
their visitors
featuring flora of
the Balearic
Islands

Les éco-clubs comportent 25 à 30 scolaires âgés entre 10 et 14 ans, ainsi que les enseignants motivés devenus animateurs d'éco-clubs. Ces derniers proposent des activités telles que la fabrication de compost organique, la multiplication de plants en pépinière, les plantations d'arbres dans les écoles, des questionnaires éducatifs sur l'environnement, des identifications de plantes médicinales et la promotion de jardins médicinaux dans les écoles. La motivation et la sensibilisation sont développées à l'occasion de programmes comprenant des expositions scientifiques centrées sur conservation de la biodiversité et un concours sur la flore menacée de leur village. Les gagnants suivent un programme éducatif spécial de 3 jours sur l'environnement à l'AINH (Institut Angalde d'Histoire Naturelle) à Kodaikanal.

Des ateliers camp nature sont mis en place pour les coordinateurs d'éco-clubs et les enseignants et des réunions ont lieu chaque trimestre pour s'échanger des informations sur leur travail et pour partager les difficultés de mise en oeuvre des activités dans leurs écoles respectives.

Toutes les semaines, une école visite le Jardin Génétique Annai. Le programme met l'accent sur les concepts environnementaux basiques, comportant une visite du jardin, une démonstration de plantes médicinales et de leurs usages, le recyclage de déchets (lombriculture et préparation de compost biodynamique), les techniques de multiplication, une présentation théorique de la flore et de la faune menacées de la région, des projections vidéo et diapo et des jeux-nature.

En période de vacances scolaire, un Camp Nature de trois jours est organisé pour des étudiants motivés portant sur les écosystèmes forestiers, les promenades en forêt et les randonnées, le jardinage, des sorties ornithologiques, et des promenades nocturnes. Récemment, une lettre d'information a été lancée auprès des étudiants; 75% des articles ont été rédigés par les scolaires du village, le

de plantes médicinales, recyclage de desperdicios (vermicultura y preparación biodinámica de composta), establecimiento de viveros, teoría sobre flora y fauna amenazada de la región, proyección de diapositivas y videos y juegos ambientales.

Durante las vacaciones, se organiza una campamento en la naturaleza de tres días para los estudiantes activos enfocado a los ecosistemas de selva, caminatas en las colinas y en la selva, jardinería, observación de aves y caminatas nocturnas. Recientemente los estudiantes crearon un boletín ambiental donde el 75% de los artículos son contribuciones de los alumnos de las escuelas de la comunidad; el resto son colaboraciones de los maestros y del personal de la organización no gubernamental. Para mayor información contactar a: Alex Alexander, Director del Jardín Genético y Guardián Honorario de la Vida Silvestre del Distrito de Karur, Inba Seva, Sangam, Sevapur – PO, Tharagampatti (via) Karur D.T. Tamil Nadu, India.
Email: inba_alex@hotmail.com

ESPAÑA

Programa Completo en Las Islas Baleares

El Jardín Botánico de Sóller ha desarrollado recientemente varias publicaciones. Un folleto sobre composteo proporciona una guía práctica para obtener una buena composta incluyendo secciones para controlar la temperatura y humedad de la composta así como un glosario. Además, un nuevo folleto general sobre el jardín el cual se obsequia a los visitantes junto con otros cuatro folletos de senderos autoguiados que resaltan las características más sobresalientes de cada estación y las adaptaciones de las plantas a cada una de ellas. Como a muchos visitantes les agrada tener un recuerdo de su visita al Jardín, el Jardí Botani de Sóller ha impreso series de diez postales que ilustran plantas de las Baleares como *Plantago coronopus* y *Cyclamen balearicum*.

■ News

SPAIN

Full Programme in the Balearic Islands

El Jardí Botànic de Sóller has recently developed several new publications. A booklet on composting provides a practical guide to developing good compost and has sections dedicated to controlling the temperature and humidity of compost and a glossary of terms. In addition, a new general garden brochure has been produced and visitors receive this brochure as well as one of four brochures featuring self-guided trails that highlight the seasonal features and adaptations of plants to the season. Many visitors to botanic gardens like to have a souvenir of their visit and Jardí Botànic de Sóller has produced a series of 10 postcards that feature illustrations of plants of the Balearics such as *Plantago coronopus* and *Cyclamen balearicum*.

As well as the above publications, the garden has recently inaugurated a new exhibition entitled 'Ethnobotany in the Balearics Islands: useful trees and shrubs'. The exhibition raises awareness of the use humans have made, throughout their existence, of trees and shrubs. It brings together aspects of ethnology and botany and enables visitors to find out in a scientific and educational way about the characteristics of 16 species of trees and bushes. Interpretative panels provide an introduction to the exhibition and individual exhibits display information and artefacts about each species. For further information contact: Jardí Botànic de Sóller Ctra. Palma, Port de Sóller km.30, apt. 47, 07100 Sóller Mallorca, Islas Baleares Spain Tel: (34) 971 634014 Fax: (34) 971 634781. Email: fjbs@bitel.es

UNITED KINGDOM

Year of the Environment

As part of Birmingham's Year of the Environment, the Study Centre at Birmingham Botanical Gardens and Glasshouses hosted a project with twelve teachers from nursery to secondary schools. The aim was to

▲ Nouvelles

reste par les enseignants et des membres d'ONG. Pour de plus amples informations, contacter: Alex Alexander, Genetic Garden Manager et Honorary Wildlife Wardeb Karur Dt, Inba Seva Sangam, Sevapur PO, Tharagampatti (via) Karur D.T. Tamil Nardu, INDIA. Email: unba_alex@hotmail.com

ESPAGNE

Programme Complet Aux Baléares

Récemment, le jardin botanique de Soller a mis en place plusieurs nouvelles publications. Un livret sur le compostage est en fait un guide pratique sur la réalisation d'un bon compost: ses principaux chapitres portent sur la régulation de la température et de l'humidité du compost et un glossaire. En outre, une nouvelle brochure générale sur le jardin a été éditée ; elle est remise aux visiteurs avec une des quatre autres brochures comportant des parcours fléchés mettant en relief les évolutions saisonnières et les adaptations correspondantes des plantes. Pour permettre aux nombreux visiteurs de conserver un souvenir de leur visite, le Jardin Botanique de Soller a édité une série de 10 cartes postales illustrant la flore des Baléares tels *Plantago coronopus* et *Cyclamen balearicum*.

En plus de ces deux publications, le Jardin a inauguré récemment une nouvelle exposition sur le thème 'Ethnobotanique aux Baléares: arbres et arbustes utiles'. L'exposition met en valeur le patrimoine ethnobotanique constitué par les habitants des Baléares tout au long de leur histoire, à propos des arbres et des arbustes. Il réunit les aspects botaniques et ethnologiques et permet aux visiteurs de découvrir de manière scientifique et pédagogique les caractéristiques de 16 espèces d'arbres et d'arbustes. Des panneaux explicatifs servent d'introduction à l'exposition; chaque espèce est mise en scène par des informations et des objets fabriqués à partir du ligneux présenté. Pour de plus amples informations, contacter Jardí Botanic de Soller Ctra. Palma,

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A la par de las nuevas publicaciones, el Jardín inauguró recientemente una exposición titulada 'Etnobotánica de las Islas Baleares: arbustos y árboles útiles'. La exposición crea conciencia del uso que el hombre ha hecho a lo largo de su existencia de los árboles y arbustos. Letreros interpretativos dan una introducción a la exposición y exhibiciones individuales brindan información y exhiben objetos de cada especie vegetal. Para mayor información contactar: Jardí Botanic de Sóller Ctra. Palma, Port de Sóller km. 30, apt. 47, 07100 Sóller Mallorca, Islas Baleares, España Tel (34) 971 634014 Fax: (34)971 634781. Email: fjbs@bitel.es

REINO UNIDO

Año del Ambiente

Como parte de la celebración local del Año del Ambiente, el Centro de Estudio de los Jardines Botánicos e Invernaderos de Birmingham, organizó

Below:
A teacher
participating in a
workshop at
Birmingham
Botanical
Gardens and
Glasshouses as
part of
Birmingham's
Year of the
Environment



■ News

provide them with skills they would be able to use back in their schools to produce three-dimensional structures such as murals, sculptures and mobiles. This was achieved by designing and making a trail of public art based on the theme of sustainable development under the direction of Claire Witcomb, a professional artist. Such was the enthusiasm and interest of the teachers that all the work took place in their own time. The trail was launched on July 18th and has proved to be a great talking point with all the garden visitors. For further information contact: Bill Graham, Birmingham Botanical Gardens and Glasshouses, Westbourne Road, Edgbaston Birmingham B15 3TR U.K. Tel: (44) 121 454 0784 Fax: (44) 121 454 7835. Email: botanic@rmpbc.co.uk

Below:
Teachers learning
how to produce
three-
dimensional
murals and
sculptures at
Birmingham
Botanical
Gardens and
Glasshouses



UNITED STATES

The 'Tree lab'

The Marie Selby Botanical Gardens now has a new youth learning center where families can touch, see, read and feel exhibits relating to tropical plants. They can become a botanist, donning helmets and harnesses to ascend into the 'tree lab' to count orchids, or they can see poison dart frogs that live inside the bromeliads and much much more! For further

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Port de Soller km. 30 apt 47, 07100 Soller Mallorca, Islas Baleares SPAIN. Tel: (34) 971 634 014 Fax: (34) 971 634 781. Email: fjbs@bitel.es

UNITED KINGDOM

Année de l'Environnement

Participant à l'Année de l'Environnement de Birmingham, le Centre d'Etude du Jardin Botanique et des Serres de Birmingham a accueilli un projet mené par 12 enseignants allant de la maternelle au second degré. Le but était de leur dispenser des savoir-faire à répercuter dans leurs établissements concernant la réalisation de structures tridimensionnelles telles que des fresques, des sculptures et des mobiles. Ce projet a été couronné par la conception et la réalisation d'un sentier d'art urbain basé sur le thème du développement durable, sous la direction de Claire Witcomb, une artiste professionnelle. L'enthousiasme et l'intérêt des enseignants ont été tels qu'ils ont pris toute la réalisation sur leur temps libre. Le sentier a été inauguré le 18 juillet et fut ensuite le sujet de conversation de tous les visiteurs du jardin. Pour de plus amples informations, contacter Bill Graham, Birmingham Botanical Gardens and Glasshouses, Westbourne Road, Birmingham B15 3TR ROYAUME-UNI. Tel: (44) 121 454 0784 Fax: (44) 121 454 7835. Email: botanic@rmpbc.co.uk

ETATS UNIS

'L'arbre Laboratoire'

Les jardins botaniques Marie Selby ont désormais un nouveau centre d'apprentissage pour les jeunes où les familles peuvent toucher, sentir, lire des objets ayant trait aux plantes tropicales. Ils peuvent devenir botanistes en s'équipant de casques et harnais pour escalader 'l'arbre laboratoire' pour compter les orchidées ou pour voir les crapauds aux dards toxiques qui vivent dans les Broméliacées et bien plus encore! Pour plus d'informations contacter: Raul Rivero Marie Selby Botanical Gardens,

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un proyecto con 12 maestros de preescolar a secundaria. El objetivo fue proporcionarles herramientas que pudiesen aplicar en sus escuelas para elaborar estructuras tridimensionales como murales, esculturas y móviles. Esto se logró con el diseño y elaboración de un sendero de arte para el público basado en el tema del desarrollo sustentable, bajo la dirección de Clara Witcomb, una artista profesional. Fue tal el interés y entusiasmo de los maestros que todo se desarrolló durante sus horas de trabajo. El sendero se lanzó el 18 de julio y ha mostrado ser un excelente punto para hablar del tema con los visitantes. Para mayor información contactar a: Bill Graham, Birmingham Botanical Garden and Glasshouses, Westbourne Road, Edgbaston Birmingham B15 3TR U.K. Tel: (44) 121 454 0784 Fax: (44) 121 454 7835. Email: botanic@rmpbc.co.uk

ESTADOS UNIDOS

El 'Árbol laboratorio'

El Jardín Botánico Marie Selby ahora tiene un nuevo centro de aprendizaje donde las familias pueden tocar, observar, leer y sentir las plantas tropicales en sus exhibiciones. Pueden volverse botánicos y con ayuda de un casco y un arnés escalar el 'árbol laboratorio' para contar las orquídeas, o para observar a las pequeñas ranas venenosas que viven dentro de las bromeliáceas y mucho más. Para mayor información contactar a Raúl Rivero Marie Selby Botanical Gardens, 811 Palm Ave, Sarasota F1 34236 USA Tel: (1) 941 366 5731 Fax: (1) 941 366 9807. Email: rrivero@selby.org

Fácil Acceso a La Naturaleza

Para poner áreas naturales al acceso de un amplio rango de gente, el Moreton Arboretum creó un 'sendero de fácil acceso' basándose en su camino más largo y sinuoso que recorre el Bosque y el Jardín del Patrimonio. El nuevo sendero de ¼ de milla proporciona a los usuarios una muestra de todos los senderos a través de diversos ecosistemas. El nuevo

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information contact: Raul Rivero Marie
Selby Botanical Gardens, 811 S.
Palm Ave, Sarasota FL 34236 USA
Tel: (1) 941 366 5731
Fax: (1) 941 366 9807.
Email: rrivero@selby.org

Easy Access to Nature

To put natural areas within reach of a wide variety of people The Moreton Arboretum has created an 'accessible trail' at the head of its longer and more rugged Heritage and Woodland trails. The new ¼ mile trail gives users a sample of the full trails' three diverse ecosystems. The new path is paved and gently sloping to accommodate wheelchairs, strollers and people who may have difficulty walking. In addition, the accessible trail is ideal for visitors who do not have a lot of time and want to experience the diversity of the ecosystems.

Interpretive signs will be placed along the accessible trail and these will help the arboretum meet its aim of increasing the Chicago area residents' appreciation and understanding of northern Illinois natural areas and the importance of maintaining biodiversity. For further information contact: Meredith Zelewsky or Valerie Budach
The Moreton Arboretum 4100 Illinois Route 53, Lisle IL 60532-1293, USA
Tel: (1) 630 719 5768
Fax: (1) 630 719 2433.

Ecological Gardener Programme

The Morton Arboretum is offering a new Ecological Gardener Certificate training programme for knowledgeable gardeners who want to learn more about plants and garden design from an ecological perspective. Upon completion of the programme students will have developed skills to plan, install and maintain a garden that builds on key elements of nature, including an understanding of native woodland, savanna and prairie environments. Lectures, laboratory demonstrations and field experiences will provide opportunities to introduce the students to the concepts of natural history and ecological responsibility. Aspects of the new Ecological

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811 S. Palm Ave, Sarasota F134236
USA. Tél : (1) 941 366 5731
Fax: (1) 941 366 9807.
Email: rrivero@selby.org

Accès Facile à la Nature

Pour mettre les espaces naturels à la portée d'une grande quantité de gens le Morton Arboretum a créé un sentier facile en tête de son plus long et plus accidenté sentier nommé Héritage et Forêt. Le nouveau sentier de ¼ de mile donne aux usagers un exemple de parcours à travers 3 écosystèmes différents. Il est dallé et borné de façon à faciliter le passage des fauteuils roulants et des personnes qui peuvent avoir des difficultés pour marcher. En plus, il est idéal pour les visiteurs qui n'ont pas trop de temps à y passer et qui cherchent à connaître la diversité des écosystèmes.

Des signes d'interprétation seront placés le long du sentier permettant ainsi de renforcer l'action de l'Arboretum concernant la connaissance et l'appréciation des milieux naturels du Nord de l'Illinois par les habitants proches de Chicago et l'importance du maintien de la biodiversité. Pour plus d'informations contacter: Meredith Zelewsky ou Valérie Budach, The Morton Arboretum, 4100 Illinois Route 53, Lisle IL 60532-1293, USA Tél: (1) 630 719 5768
Fax: (1) 630 719 2433.

Programme Pour un Jardinier Écologiste

L'Arboretum Morton offre un nouveau cours de Jardinier Ecologiste diplômant pour ceux qui veulent augmenter leurs connaissances sur les plantes et l'art des jardins dans une conception écologique. Avec l'acquisition de ces connaissances, les étudiants pourront développer leur habilité à faire des plants, installer et assurer la maintenance de jardins basés sur les éléments de la nature incluant un savoir sur l'environnement des bois, savanes et prairies. Conférences, démonstrations de laboratoire, expériences de terrain fourniront les opportunités pour préparer les étudiants aux concepts de l'histoire naturelle et de la responsabilité

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camino está pavimentado y habilitado para sillas de ruedas, carreolas y personas con dificultad para caminar. Además el sendero de fácil acceso es ideal para los visitantes que disponen de poco tiempo para recorrer el Jardín y que quieren experimentar una visita rápida a través de sus diversos ecosistemas.

Señales interpretativas se colocarán a lo largo del sendero de fácil acceso, lo que permitirá al Arboretum alcanzar su objetivo de aumentar en los residentes del área de Chicago la apreciación de las áreas naturales del norte de Illinois y la importancia de mantener su biodiversidad. Para mayor información contactar a: Meredith Zelewsky o Valerie Budach, The Moreton Arboretum 4100 Illinois Route 53, Lisle IL 60532-1293, USA.
Tel: (1) 630 719 5768
Fax: (1) 630 719 2433.

Certificado de Jardinero Ecológico

El Moreton Arboretum ofrece un nuevo programa de capacitación que certifica como Jardinero Ecológico, dirigido a jardineros con experiencia que quieran conocer más sobre plantas y diseño de jardines con una perspectiva ecológica. Al término del programa, los alumnos tendrán las herramientas necesarias para planear, instalar y mantener un jardín que se construya considerando elementos clave de la naturaleza como el conocimiento del bosque, sabana y pradera nativos. Conferencias, demostraciones en laboratorio y trabajo de campo ayudan a introducir a los estudiantes conceptos de historia natural y responsabilidad ecológica. El nuevo Certificado de Jardinero Ecológico beneficiará a horticultores profesionales, pero además el curso está estructurado para jardineros no profesionales con algunos estudios relacionados. El nuevo programa del certificado suplementa la currícula del programa previamente establecido Certificado del Arboretum en Horticultura del Paisaje, Historia Natural, Ornitología, Arte Botánico e Ilustración. Para mayor información contactar a: Meredith Zelewsky o Valerie Budach, The Moreton



Right: The children's garden at the Atlanta Botanical Garden includes a dinosaur garden with tree ferns, gingko trees, palms and other plants with a historic lineage; here children are digging for fossils buried in the sandbox

Gardener Certificate will benefit professional horticulturists, but in addition the course is structured to teach non-professional gardeners who have seriously pursued related studies. The new certificate programme supplements previously established Arboretum Certificate curricula in Landscape Horticulture, Natural History, Ornithology and Botanical Art and Illustration. For further information contact: Meredith Zelewsky or Valerie Budach The Moreton Arboretum 4100 Illinois Route 53, Lisle Il 60532-1293, USA Tel: (1) 630 719 5768 Fax: (1) 630 719 2433.

A Children's Garden in Atlanta

In September 1999 the Egleston Scottish Rite Children's Garden opened at the Atlanta Botanical Garden. The 2-acre interactive garden has been a collaborative project with the Egleston Scottish Rite Children's Health Care System and all funds were raised through private donations. The garden teaches children and families about health and wellbeing in a fun, hands-on natural setting and aims to develop

écologique. Des aspects de ce nouveau diplôme de Jardinier Ecologiste bénéficieront aux horticulteurs professionnels, mais le cours est aussi structuré pour apprendre aux jardiniers non professionnels qui ont de sérieuses connaissances. Des options à ce nouveau diplôme entrent dans le cursus en Horticulture, Histoire Naturelle, Ornithologie, Art Botanique et Illustration. Pour plus d'informations contacter: Meredith Zelewsky ou Valérie Budach, The Morton Arboretum, 4100 Illinois Route 53, Lisle Il 60532-1293, USA Tél: (1) 630 719 5768 Fax: (1) 630 719 2433.

Un Jardin Pour Enfants à Atlanta

En septembre 1999 the Egleston Scottish Rite Children's Garden ouvrait au Jardin Botanique d'Atlanta. Sur 2 acres ce jardin interactif a été le fruit de la collaboration avec le Egleston Scottish Rite Children's Health Care Système et tous les fonds qui ont été obtenus de donations privées.

Arboretum 4100 Illinois Route 53.
Lisle Il 60532-1293, USA
Tel: (1) 630 719 5768
Fax: (1) 630 719 2433.

Un Jardín para Niños en Atlanta

En septiembre de 1999 se inauguró el Jardín para Niños Egleston Scottish Rite en el Jardín Botánico de Atlanta. El jardín interactivo de 2 acres ha sido un proyecto de colaboración con el Sistema de Cuidado de la Salud Infantil Egleston Scottish Rite y todos los fondos se obtuvieron de donativos privados. El jardín enseña a los niños y sus familias el cuidado de la salud de una manera divertida e interactiva y pretende promover el conocimiento de la interdependencia de las plantas y los animales. Diseñado para niños de 4 a 11 años, el jardín tiene colecciones especiales incluyendo el jardín de Peter Rabbit, el Laberinto de la Oruga y el Pabellón de las Mariposas, una creativa 'fábrica de aire' y la fuente de los Girasoles que brota del suelo y un anfiteatro. Para mayor información contacta a: Geri Laufer, Atlanta

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children's understanding of the interdependence of plants and animals. Designed for children aged 4-11 the garden has special exhibits including Peter Rabbit's garden, the Caterpillar Maze and Butterfly Pavilion, an innovative 'air factory', and a Sunflower fountain that springs up from the ground and an amphitheatre. For further information contact: Geri Laufer, Atlanta Botanical Garden 1345 Piedmont Avenue, NE Atlanta, GA 30309 Tel (1) 404 876 5859 Fax: (1) 404 876 7472. Email: glaufer@atlantabotanicalgarden.org

Conferences

The Botanic Gardens Education Network and PlantNet are hosting a joint conference entitled 'From 4 to 94 New Audiences for a New Century' from 2-5 April 2001. The purpose of the conference is to bring together everyone concerned with the funding, cultivation, use and promotion of gardens and plants. It has been designed to improve the range and effectiveness of the messages emanating from plant collections in Britain and Ireland. For further information contact: Louise Allen, University of Oxford Botanic Garden, Rose Lane, Oxford OX1 4AZ U.K. Tel/Fax: (44) 1865 276 920. Email: louise.allen@botanic-garden.ox.ac.uk

Training Opportunities

The Royal Botanic Gardens Kew in partnership with Botanic Gardens Conservation International are running another International Diploma in Botanic Garden Education. The course will be conducted from 15 April - 10 May 2002. For further information contact: Mrs Elizabeth de Keyser, Royal Botanic Gardens Kew Richmond Surrey TW9 3AB U.K. Fax: (44) 020 8 332 5640. Email: E.Keyser@rbgkew.org.uk

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Le jardin apprend aux enfants et aux familles des détails sur la santé et le bien être dans un environnement agréable et a pour but de développer la conscience des enfants à l'interdépendance entre les plantes et les animaux. Prévu pour les enfants âgés de 4 à 11 ans le jardin comprend des expositions particulières comme par exemples 'Peter Rabbit's garden', 'the Caterpillar Maze and Butterfly Pavilion' et une innovante 'fabrique à air' ainsi qu'une fontaine tournesol qui saute à partir du sol et un amphithéâtre. Pour plus d'information contacter: Geri Laufer, Atlanta Botanical Garden, 1345 Piedmont Avenue, NE Atlanta, GA 30309 USA. Tél: (1) 404 876 5859 Fax: (1) 404 876 7472 Email: glaufer@atlantabotanicalgarden.org

Conférences

Le Réseau d'Éducatif des Jardins Botaniques et PlantNet organisent une conférence commune intitulée 'From 4 to 94 New Audiences for a New Century' du 2 au 5 avril 2001. Le but de cette conférence est de rassembler ceux qui sont concernés par le financement, la culture, l'usage et la promotion de jardins et de plantes qui sont conçus pour augmenter le niveau et l'efficacité des messages émanant des collections de plantes en Grande Bretagne et en Irlande. Pour plus d'information contacter: Louise Allen, University of Oxford Botanic Garden, Rose Lane, Oxford OX1 4AZ U.K. Tél/Fax: (44) 1865 276 920 Email: louise.allen@botanic-garden.ox.ac.uk

Proposition de Formation

Le Jardin Botanique de Kew, en partenariat avec le BGCI, proposent un diplôme international pour l'éducation dans les jardins botaniques. Cette formation se déroulera du 15 avril au 10 mai 2002. Pour plus d'informations contacter: Mrs Elizabeth de Keyser, Royal Botanic Gardens Kew Richmond Surrey TW9 3AB U.K. Fax: (44) 020 8 332 5640. Email: E.Keyser@rbgkew.org.uk

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Botanical Garden 1345 Piedmont Avenue, NE Atlanta, GA 30309 Tel: (1)404 876 5859 Fax: (1) 404 876 7472. Email: glaufer@atlantabotanicalgarden.org

Congresos

La Red de Educación de Jardines Botánicos y PlantNet están organizando conjuntamente el congreso 'De 4 a 94 Nuevas Audiencias para el Nuevo Siglo' del 2 al 5 de abril de 2001. El objetivo del congreso reunir personas interesadas en financiamiento, cultivo, uso y promoción de los jardines y las plantas, y se ha diseñado para mejorar el rango y efectividad de los mensajes que se transmiten a partir de las colecciones de plantas en Inglaterra e Irlanda. Para mayor información contactar a: Louise Allen, University of Oxford Botanic Garden, Rose Lane, Oxford OX1 4AZ U.K. Tel/Fax: (44) 1865 276 920. Email: louise.allen@botanic-garden.ox.ac.uk

Oportunidades de Formación

El Real Jardín Botánico de Kew en asociación con los Jardines Botánicos para la Conservación Internacional organizan una vez más el Diploma Internacional de Educación en Jardines Botánicos. El curso se llevará a cabo desde el 15 de Abril hasta el 10 de Mayo de 2002. Para más información contactar con Mrs Elisabeth de Keyser, Royal Botanic Gardens Kew Richmond Surrey TW9 3AB Reino Unido. Fax: (44) 020 8 332 5640. Email: E.Keyser@rbgkew.org.uk

Evaluation in Botanic Gardens – Luxury or Necessity?

■ Summary

Evaluation answers questions such as 'What about ...?', 'What would happen if ...?', 'Would this work?' and 'How can we make this better?'. Most importantly, the results from evaluation provide the answer to the most important question of all, 'If we don't know where we've been and where we're going, how will we know when we get there?'.

At a basic level, evaluation involves the collection of information; the analysis of this information in context; the reporting of both the results and their implications; and, arising directly from those implications, recommendations for action. In botanic gardens, evaluation is especially important in ensuring that educational and recreational facilities and services meet visitors' needs as well as management objectives.

Evaluation can help botanic garden staff prioritise visitor's needs by investigating quantitative information such as trends and patterns in visitation. In addition, investigating qualitative information about staff and visitor perceptions, values, attitudes, needs and affective (emotional) responses is key information for effective planning and implementation. There are several types of evaluation including front-end, formative, remedial and summative evaluation. The techniques used are many and varied from visitor questionnaires, interviews with visitors and staff, counting and observing visitors, informal conversations with visitors and observing how children use the gardens. The challenge for botanic gardens is to find the best evaluation technique for the specific situation and whatever the budget, whatever the situation, don't just think about evaluation – do it!

Introduction

Why is evaluation important in botanic gardens? Essentially, for the same reasons that evaluation is important to any agency; because it answers questions such as 'What about ...?', 'What would happen if ...?', 'Would this work?', 'How can we make this better?' and 'Did it work?'. Most importantly, evaluation is the only key to the most important question of all; 'If we don't know where we've been and where we're going, how will we know when we get there?'

So why do many botanic gardens, especially the smaller ones, regard formal evaluation as a luxury, to be engaged in only rarely, if at all? And why is even informal evaluation (for example, acting on verbal feedback from visitors) sometimes considered unnecessary (Beckmann 1988; Sutherland 1996)?

What Does Evaluation Involve?

At its most basic level, evaluation involves the collection of information; the analysis of this information in context; the reporting of both the results and their implications; and, arising directly from those implications, recommendations for action. In botanic gardens, evaluation is especially important in ensuring that educational and recreational facilities and services meet visitors' needs as well as management objectives.

Most commonly, because it is relatively easy to collect, evaluation data is number-based or quantitative (i.e. statistically documented), giving rise to indicators such as visitor numbers and satisfaction ratings. But even such simple visitor information, such as

numbers and origins, can provide useful planning information. For example, the 87 hectare Kebun Raya Bogor (Bogor Botanic Garden, Indonesia) had more than 1.3 million visitors in 1995, with a weekly average of more than 25 000 people (KRI 2000). Most of these visitors, more than 1.26 million annually, were Indonesians on day trips from Jakarta. The remaining 61 000 were international tourists, about half from The Netherlands.

While this kind of information is very basic in terms of evaluation, it can be extremely useful in helping managers prioritise visitors' needs. Even such simple statistics may help determine the need for internationally-recognised symbols or multi-language labels, show whether more emphasis should be given to the expectations of local visitors rather than international ones, or indicate the potential for user-pays guided tours in specific languages. Collecting reliable visitor statistics is thus the very first step in an effective visitor research and evaluation program that feeds into master planning processes.

The next step involves awareness of trends and patterns in visitation. Again using the Bogor example, Sundays in 1995 were the busiest days of the week, averaging 15 000 visitors, but on national holidays visitation could easily reach 40 000 (KRI 2000). Awareness of such trends has major implications for decisions related to site hardening, staffing, security and interpretation.

Of course, visitation trends in outdoor environments are prone to the impacts of weather, on both a daily and a seasonal basis. At the Holden Arboretum (Mentor, Ohio, USA), long-range planning in the late 1980s

included investigating seasonal differences in visitor populations. The findings showed substantial differences: in Winter, for example, about 80% of visitors were Arboretum members, with few people visiting for the first time, while in Summer and Fall more than half the visitors were non-members, with many being new to the arboretum (Hood 1988).

However, quantitative detail alone rarely provides all the clues needed in an evaluation puzzle. The missing information, about staff and visitor perceptions, values, attitudes, needs and affective (emotional) responses, is the qualitative data that comes from people giving their opinions and responses in their own words. Most effective are mixed method evaluations, which combine quantitative and qualitative techniques. Also vital, however, is the timing and context of the evaluation, as this determines the kind of information collected and the uses to which it can be put, as described in the next section.

Types of Evaluation

Audience research is an essential component of most evaluation, because it must be the visitors, the audience, who are the ultimate judges of the effectiveness of botanic garden facilities and services. Understanding who these visitors are and what they

are like, their needs, motivations, expectations, attitudes and recreational behaviours, is therefore a key preparation for effective planning and implementation. For example, understanding visitors' motivations and expectations (why they come and what they expect to see, find and do) makes it easier to provide appropriate facilities and services. But each botanic garden must understand its own audience. Do residents in urban areas visit gardens for the same reasons as people from rural areas (Bennett 1995)? Do visitors expect the same from a botanic garden in a capital city as they do from one in a small town? How important are cultural differences in visitors' motivations and interests? Should a botanic garden be satisfied with mostly local visitors or should it market itself to a broader visitor population? What environmental and horticultural messages are appropriate for different gardens and different visitor populations?

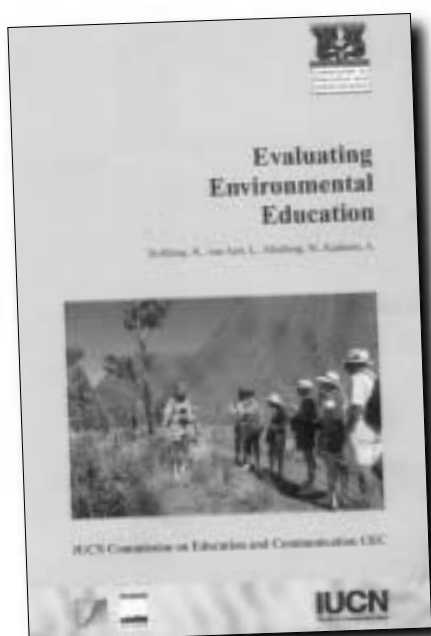
Front-end evaluation answers the early 'What about ...?' and 'What would happen if ...?' planning questions, allowing preliminary ideas to be discussed by the kind of people most likely to be affected by them. For example, the manager of a regional botanic garden may wonder whether to continue maintaining a display of exotic international species. Front-end evaluation would enable broad exploration of this idea with people who would be affected by such a decision, from the horticulturalists and volunteer guides to the regular visitors and local schools. Understanding the likely reactions of all the stakeholders before significant decisions are made, or major costs incurred, can prevent much heartache, recriminations or expensive errors.

Formative evaluation, or trialling, answers the 'Will it work?' planning questions by testing specific services with their specific audiences. For example, an educational worksheet for 6 to 10 year olds may have been designed for visiting school groups. Formative evaluation would mean testing the worksheet with such visitors, to ensure that the language is appropriate, that the children understand the directions to different parts of the gardens, and that the content is interesting. When formative

evaluation is included in the development of new facilities or programs, problems can be detected early, before 50 000 copies of a guidebook are printed, or expensive signs are finalised, or four-hour guided tours are scheduled. Mistakes rectified during trialling leave few scars, but when there is no trialling mistakes can prove very costly and embarrassing. Even big structures or facilities can and should be trialled, at least in model format (consider the recent embarrassment in my own city where a new airport 'Welcome to ...' sign was built facing away from the airport, so that it was readable only by people when they were departing the city!).

Remedial evaluation, or monitoring, answers the 'How can we make this better?' questions, enabling existing facilities and services to be kept at their peak of effectiveness. Whether considering the cleanliness of toilets, the value-for-money of an entry fee, the ease with which visitors can find and read plant labels, or the effectiveness of an interpretive sign in communicating an environmental message, the aim of remedial evaluation is to find out whether something is meeting its intended objectives, and if not, how to fix it so that it does. Time is therefore an important component in remedial evaluation; the monitoring must occur frequently and take little time, the results must be available shortly thereafter, and the implications of the results must be able to be acted upon very quickly.

Finally, **summative evaluation** provides the answers to 'Did it work?' At the end of a specific exhibition in the visitor centre, or of a 'Dance in the Gardens' program, or of a special children's summer guided tour program, it is valuable to analyse in detail the relevant objectives, achievements, costs, profits, and feedback from staff and visitors. On the basis of such an evaluation, for example, a botanic garden might decide to run a specific program again only if outside sponsorship can be obtained to defray costs; or to take on twice as many guides next summer because demand outstripped supply; or to put more emphasis into the environmental education program because visitors showed little interest in the photography course.



Left: Useful resources are available to help environmental educators tackle the challenge of evaluating their visitor, interpretive and educational services

Considering the Context

Naturally, these evaluation processes must occur in context. For example, anyone considering seasonal visitation in a botanic garden must consider the impact of the growth and flowering habits of the garden's plants and habitats. Peaks of visitation may occur at any time, even winter, if a particular species or habitat attracts attention at that time. In the Australian National Botanic Gardens in Canberra, for example, the Rainforest Gully is always extremely popular in summer, not only because of its natural beauty and interesting species, but also because it provides a wonderfully cool respite from the dry summer heat (often above 35°C) being experienced elsewhere in the gardens. Awareness of such effects allows interpretive programmers in botanic gardens to capitalise on normal human behaviour by scheduling guided tours at appropriate times and places.

Audience research often feeds into front-end evaluation. For example, the Holden Arboretum study showed that specific organised activities (such as hiking or bird watching) were of interest only to specific visitor groups in certain seasons, with most visitors preferring to learn about plants 'casually' (Hood 1988). This understanding came from using standard visitor survey methods, with 569 visitors providing information on their demographic attributes (age, gender, marital status, education, occupation and residence) as well as psychographic characteristics (attitudes, values, opinions, expectations, and levels of satisfaction with different aspects of the visit). Having this range of data allowed Hood

(1988) to examine links between specific demographic attributes and visitors' motivations in visiting the arboretum, especially in terms of Hood's previous research which had identified six important aspects of leisure activities (being with people, doing something worthwhile, feeling comfortable, having a challenge, learning, and participating actively).

Awareness of the value of detailed audience research for master planning prompted a year-long systematic visitor survey at the Chicago Botanic Garden (CBG, owned by the Forest Preserve District of Cook County), the USA's second most visited botanic garden. More than 2000 adult visitors provided information on their visit frequency and motivations, interest in special events and interpretive programming, perceptions of the garden, knowledge of plants, interest in gardening, and other leisure pursuits (Hood & Roberts 1994). In this case, respondents' age proved a useful distinguishing attribute. Visitors aged more than 55 (about 40% of the CBG audience) preferred audiovisual presentations, tour guides, and staff members to answer questions, and tended to be more interested in structured programming. Conversely, visitors aged 18 to 34 (about 20% of the CBG audience) liked the family discovery activities and hands-on exhibits, but tended to be seeking a casual (unprogrammed) experience. The CBG used their visitor data to establish audience and programming priorities, and decided to target the younger audience by developing programming and spaces for family groups (Hood & Roberts 1994).

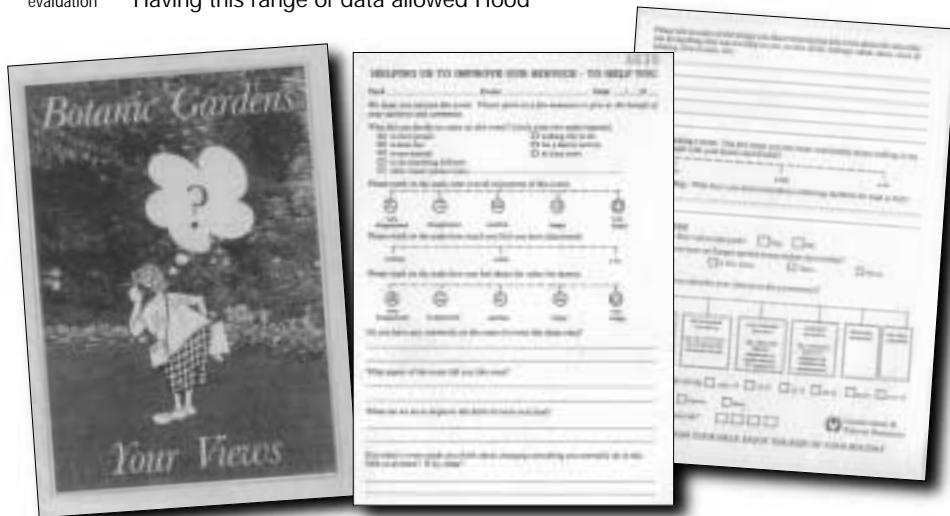
Balancing Your Findings with Your Mission

It is important to remember that the results of audience research must always be considered by botanic garden managers in the light of their own goals, as indicated by two examples.

At Otari Native Botanic Garden (Wellington, New Zealand), a survey in Summer 1995 found that most people visited because they enjoyed walking in the bush (66%), having opportunities for relaxation and tranquillity (55%), walking their dog (28%), physical exercise (28%) and picnicking (12%). About one third of those surveyed were first-time visitors, but a similar proportion were very frequent users, visiting at least once every two weeks. Most visitors came at weekends, and about a quarter were accompanied by children. While almost a fifth of the visitors were essentially neighbours of the botanic garden, living within 300 metres, overseas visitors were also represented in small numbers. Word of mouth was clearly the most important influence in attracting people to Otari, and visitors were generally very satisfied with the facilities, although they wanted more plant labelling.

Here then is a typical visitor profile for a 'community' botanic garden, where the recreational needs of the local clientele are dominant and largely satisfied. Should the managers sit back complacently? What about the garden's communication role? Although the survey showed that 82% of visitors were aware of Otari's special role in the cultivation and preservation of New Zealand's native plants, the findings about visitors' communication needs were unclear; 48% of visitors wanted to know more about the collections, but 52% did not. How should these findings be considered? In the Otari case, even though the 'majority' of visitors wanted no more information, the evidence was clear that at least half the visitors would be potentially receptive to additional interpretation. By using formative evaluation techniques to investigate the precise kinds of information wanted, and by creating effective

Below:
Examples of
questionnaires
used for
evaluation



interpretation suited to the community profile, the managers could work to communicate more subtle messages about native plant conservation without affecting Otari's primary popularity as a recreational area.

The second example illustrates a common use for audience research; to help identify new services or facilities that will meet visitor needs that are currently unrecognised by the gardens' managers. When 209 visitors at Albury Botanic Gardens (New South Wales, Australia) were asked what other facilities they wanted, about 36% identified 'picnic tables'.

At first, this appeared to be a relatively simple and inexpensive facility to provide to increase visitor satisfaction. However, the Albury managers asked themselves whether providing picnic tables was consistent with retaining the essential character and purpose of the Albury Botanic Gardens. Picnic tables would introduce a new element into the lawn areas that could easily result in visual clutter, as well as reducing the effectiveness of the lawns as a flat and open contrast to the rich textures of the garden beds and the vertical accents of the feature trees. The movements of visitors around tables would increase lawn wear, as well as making mowing and maintenance more difficult. While bench seating and lawn picnics had always been a feature of the relatively historic gardens (established in the late nineteenth century), tables were not part of this historic character, nor part of the tradition of other Australian botanic gardens of a similar age. Visitors who really wanted picnic tables could find them readily available in a park very close to the Gardens. Taking all these factors into consideration, the Albury managers decided not to provide picnic tables within the Botanic Gardens themselves, regardless of their visitors' apparent desires.

When audience research or evaluation identifies an apparent clash of visitor and management expectations, the most effective outcome is either to meet visitors' expectations (for example, by providing the required service) or to explain why the service is not being provided. Visitors at

Albury will no doubt be more than happy to remain without picnic tables as long as the reasoning is explained (most appropriately through on-site interpretation).

Evaluation on a Smaller Scale

While broadscale audience research and evaluation are essential, sometimes what is needed is the evaluation of an individual style of communication or programming. For example, many botanic gardens use interpretive signs or brochures to help visitors understand more about relevant plants, habitats, horticultural, environmental or cultural issues. Usually, such signs or leaflets are 'self-guiding', in the sense that they act as a major, if not the only, form of communication between the visitor and the staff. Obviously the way in which such signs or leaflets are presented, their graphic design, colour, language, writing style, use of pictures or diagrams etc., are crucial to the effectiveness of communication with the audience. Evaluation can help in these specific cases as well. While there is already much useful general research on communication techniques, it is often important to re-examine these findings with specific audiences, topics or design styles. This is especially important when a botanic garden is producing a Sign Manual or Publication Guidelines to establish precise standards for aspects such as font size and type, colours, writing style and other design elements.

Again in the Chicago Botanical Garden, Korn (1988) studied the effectiveness of self-guided interpretive brochures in the Japanese Garden. Effectiveness was measured by how much visitors increased their knowledge ('learning') about Japanese gardens. Adult visitors were given either a 'declarative-style' brochure (providing statements of facts) or an inquiry-style brochure (encouraging visitors to ask questions and find out answers for themselves, for example by careful observation), or not given any brochure at all (the 'control' group). While visitors who had been given a brochure learned significantly more than those who had not, the type of brochure appeared to have no significant impact

on the level of learning even though similar research in indoor museum settings had shown that people learn more from inquiry-style interpretive text. Korn (1988) argued that outdoor learning environments such as botanic gardens accommodated a broader range of visitor expectations and learning behaviours because of the more diffuse recreational focus.

Evaluation Techniques

The techniques of evaluation are many and varied, and include counting or observing visitors, interviewing visitors or staff (in either structured or unstructured ways), or asking visitors to fill in questionnaires. Both quantitative and qualitative information can be collected in these ways. Mock-ups or models may be used to stimulate visitor involvement. In front-end and formative evaluation, focus groups are often used. This involves up to twelve people with similar interests or backgrounds being brought together for about two hours, to explore the relevant issue or proposed service under the guidance of an experienced facilitator. Here the collected information is qualitative, emphasising perceptions, feelings, motivations, desires, opinions and attitudes.

Cost should not be an issue in remedial evaluation, which requires keen detective work more than fancy evaluation techniques. Being dedicated to continual improvement, as staff look for clues in visitors' behaviour and comments, and being humble enough always to respond to those clues, is really what makes evaluation effective. In high-cost consumer research, for example, the corporate clients view their focus groups through one-way mirrors or closed-circuit TV, with sessions recorded on video. But the benefits of focus groups need not be forsaken by those with more limited budgets, the crucial elements are: the focus (what exactly is being discussed?), the non-judgemental nature of the discussion (an individual's perceptions and opinions are valid and should be noted, even when they are not shared by others), and the effective neutrality of the facilitator (whose aim is to help the group address all aspects of the topic, not support any specific response).

Conclusion

There are many reasons why evaluation should be an essential and integral feature of the practices in botanic gardens, and many ways in which it can be implemented for minimal cost. But there is no recipe or magic formula that will work in every case. Quantitative and qualitative methods all have their advantages and disadvantages when it comes to designing, implementing, reporting or using evaluation studies (for detailed discussion see evaluation texts such as Miller 1991; Rossi & Freeman 1993). The challenge is to find a judicious balance in each situation, and to recognise that every little clue is important: informal conversations with visitors, noticing the shortcuts when paths go the 'wrong way', and observing how children use the gardens are all forms of evaluation. Whatever your budget, whatever your situation, don't just think about evaluation—do it!

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▲ Resumé

L'évaluation pose des questions telles que 'que se passerait-il si...?', 'est-ce que cela peut marcher?' et 'comment améliorer?' Les résultats de l'évaluation permettent de répondre à la question la plus importante qui est 'si nous ne savons pas où nous étions et où nous allons, comment pouvons-nous savoir où nous sommes?'

A la base, une évaluation consiste à collecter des informations, les analyser dans leur contexte, faire un compte rendu des résultats et de leur implication et en déduire des recommandations pour agir. Dans les jardins botaniques, l'évaluation est particulièrement importante pour s'assurer que les aménagements éducatifs et récréatifs et les services correspondent aux attentes des visiteurs autant qu'aux objectifs des responsables.

L'évaluation peut permettre aux responsables du jardin de classer par ordre d'importance les principales attentes des visiteurs à partir de l'étude des fluctuations des visites. De plus, les informations qualitatives sur les perceptions des responsables et des visiteurs, les valeurs, les attitudes, les besoins et les réactions affectives (émotionnelles) sont des éléments clé à connaître pour le développement et la mise en place efficaces des projets. Il existe plusieurs types d'évaluation : l'évaluation de départ, formative, de remédiation et sommative. Les techniques utilisées sont nombreuses et variées, depuis les questionnaires, entretiens avec des visiteurs et les responsables, le décompte et l'observation des visiteurs jusqu'aux conversations informelles avec les visiteurs et l'observation de la façon dont les enfants utilisent le jardin. Le défi pour les jardins botaniques est de trouver la meilleure technique d'évaluation quelle que soit le budget et la situation. L'évaluation, ne faites pas qu'y penser, faites la!

● Resumen

La evaluación le encuentra respuesta a las preguntas como : '¿Y si ...?' '¿Que pasaría si...?', '¿Funcionaria eso?' y '¿Como podría hacerse mejor?' Aun mas importante, los resultados de una evaluación le dan la respuesta a la pregunta mas importante de todos, '¿Si no sabemos de donde venimos ni adonde vamos, como vamos a saber si hemos llegado?'

A nivel elemental, la evaluación se trata de recoger información; analizar esta información en su contexto, reportar tanto los resultados como sus implicaciones, y, como resultado directo de estas implicaciones, sacar recomendaciones para las actuaciones. En los jardines botánicos, la evaluación es especialmente importante en asegurarse que las facilidades y los servicios educativos y recreativos están conformes con las necesidades de los visitantes y a la vez con los objetivos de la dirección.

La evaluación puede ayudar al personal del jardín botánico a priorizar las necesidades de los visitantes, al investigar tal información cuantitativa como las preferencias y los patrones de las visitas. Además, el investigar la información cualitativa sobre las percepciones, valores, actitudes, necesidades y reacciones afectivas del personal y los visitantes contribuye una información clave para la eficacia en la planificación y en la implementación. Hay varias maneras de evaluar, incluyendo la evaluación desde el frente, la formativa, la remedial, y la anadida. Las técnicas utilizadas son muchas y variadas, desde los cuestionarios a los visitantes, las entrevistas con estos y con el personal, el contar y observar los visitantes, las conversaciones informales y el observar como los niños utilizan el jardín. El desafío para los jardines botánicos es el de como identificar la mejor técnica de evaluación para cada situación específica sea cual sea el presupuesto, sea cual sea la situación. No pienses sobre la evaluación – ¡hazlo!

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Les Scouts au Service de la Conservation en Région Tropicale!

¡Las Girl Scouts Conservan las Plantas en los Tropicos!

23

Girl Scouts

Conserving the Tropics!



■ Summary

Formal and informal assessment is integrated into the management of all Girl Scout programs and the project between Fairchild Tropical Garden and the Girl Scouts is no exception. The partnership developed a range of plant identification and conservation activities suitable for girls of different ages and ability levels, providing them with an opportunity to earn badges at Fairchild, a natural area or the Girl Scout summer camps. This article describes how all components of the activities were field tested and assessed.

Introduction

At Fairchild Tropical Garden in Miami Florida, a collaboration with the Girl Scouts resulted in new badges in Native Plant Identification and Conservation. Formal and informal assessment is integrated into all Girl Scout program management and is a basic component of education program development at Fairchild. By implementing existing, familiar assessment methods and field testing all components, the partnership between Fairchild and the Girl Scouts created plant identification and conservation activities suitable for girls of different ages and ability levels and for their adult leaders. The badges can be earned at Fairchild, at a natural area or at Girl Scout summer camps where actual conservation activities are conducted as a component of the badge program.

Fairchild Tropical Garden and the Girl Scout Council of Tropical Florida, Inc. received a grant from the Florida Fish and Wildlife Conservation Commission in May 1998. The project, Tropical Heritage, involved the development of four products aimed at teaching Girl

Scouts and other children about native plant species and conservation. These include the Tropical Heritage Native Plant Patch, a Brownie Girl Scout Conservation Badge, a Junior Girl Scout Conservation Badge, and an Enviro-kit containing resource materials to help scouts earn these emblems. Evaluation was integrated throughout development and implementation. Girl Scouts are used to using evaluation methods to guide program development and determine effectiveness. Assessment methods developed by Girl Scouts and the project team had a significant impact on the success of the collaboration to make Tropical Heritage activities appropriate for girls of varying ages and abilities.

Miami-Dade County is a sprawling metropolitan urban area. Many adults and children spend little time outdoors, so we wanted to assess their willingness to participate in activities related to the natural environment. Adult Girl Scout leaders participated in front-end assessment to determine the communities interest in native plants and conservation, their knowledge about these topics and their willingness to learn and teach about them. Results from a questionnaire administered at workshops revealed a high degree of interest in the proposed project and a willingness to participate in the eradication of exotic pest plants at Girl Scout Camp locations. A similar questionnaire was administered to Girl Scouts to determine if they would be interested in activities to earn the Native Plant and Conservation badges.

The leaders questionnaire addressed personal interest and comfort in experiencing outdoor activities related to nature, knowledge of environmental issues in South Florida, willingness to lead outdoor nature activities,

willingness to visit Fairchild Tropical Garden with the Girl Scout group to learn about native plants, and acceptance of the Tropical Heritage patch and Conservation badge as appropriate Girl Scout activities.

The front-end assessment conducted with girls elicited 'Yes/No' responses to questions about their interest in science, interest in outdoor activities, knowledge of plants and the environment, and willingness to work toward a Native Plant or Conservation badge. We also asked if the girls had previously visited Fairchild Tropical Garden. To gain additional information about proposed Tropical Heritage activities, we conducted a sample program at Girl Scout Special events and summer camps. Informal recorded observation added to our understanding of the girls' ability to follow instructions and participate in activities. In addition to providing valuable planning data, groups of scouts who participated in sample activities began to sign up for leader training and participation. During evaluation of Girl Scout special events and camp experiences, girls and leaders listed Tropical Heritage as a preferred activity for the coming year. Implementing both Fairchild and Girl Scout assessment methods demonstrated a strong commitment by both organizations to the Tropical Heritage program.

Formative assessment consisted of field testing all activities and materials with scouts at Fairchild or at Girl Scout camps. We observed and recorded the ability of leaders to conduct the activities, how well girls followed instructions, their success at identifying native plants and communicating their knowledge to others, and their understanding of terms such as habitat, exotic, ecosystem and native plant.

Learning aids were developed to help them identify the leaves of native trees and shrubs. A paper and pencil activity for older girls was replaced by field-based activities that focused on plant characteristics.

Summative assessment for the Native Plant patch consisted of verification that Girl Scouts can identify at least five native plant species, distinguish leaf types, recognize the sabal palm (official Florida palm), identify mangroves and observe wildlife in a natural area, park or botanical garden. The Conservation badge assessment included completion of five of seven activities presented. These included selecting a local ecosystem to visit and research, conducting a species diversity test in a 10 meter area, researching the history of the Everglades water flow, determining the wildlife habitat requirements for a local neighborhood and planning a landscape that will support them, investigating careers in conservation and using the Internet to learn about natural areas. Conservation badges earned at a Girl Scout camp location included identification and removal of invasive exotic plants and replacement with species native to that region. Camps are located in three different south Florida environments. The appropriate patch or badge is presented upon completing the activities.

The Native Plant Badge can be earned at Fairchild Tropical Garden or at another site. Leader training was provided at regularly scheduled Girl Scout workshops. Girls aged 6-15 learn basic plant identification skills, identify native plant species including mangrove, and hardwood hammock species. They focus on endangered species and the need to conserve habitats. Families can earn the Tropical Heritage patch at Fairchild by completing activities presented in an Enviro-kit available at the entrance.

The Brownie Conservation Badge teaches girls aged 6-8 the basics of conservation. They learn the importance of conserving the natural world and are encouraged to try some conservation measures at home. Each girl grows a native wildflower and learns about important roles many women have played in conservation.

The Junior Conservation badge for girls aged 8-12, builds upon the Brownie Conservation badge. Girls investigate an ecosystem in their local area and participate in at least one conservation activity. Sampling species diversity, designing a wildlife habitat, learning about careers in conservation, and researching ethnobotany are among the activities from which they can select.

Tropical Heritage Enviro-kits contain the resource materials required for earning the patch or badges, as well as supplemental games, hand lenses, a resource booklet and laminated field guides. The kits are available from Fairchild, the Girl Scout offices and the Miami-Dade County Public Libraries.

During the course of the grant cycle, Tropical Heritage was introduced at local Girl Scout summer camps, special events, and at the Fairchild Ramble, a garden festival. Articles on Tropical Heritage have appeared in the Girl Scout publications sent to leaders and families of scouts. Presentations have been made at the annual conferences of the American Association of Botanical Gardens and Arboreta, the Association of Science and Technology Centers and the Girl Scouts of American Annual Meeting. Support from the Girl Scouts has been strong and many leaders are inquiring about conservation projects at camps and other natural areas.

Evaluation has been a significant component in the development of Tropical Heritage badges. It has guaranteed that program activities are effective and appropriate to the needs and interests of leaders and scouts. The desired outcome, measurable activities that increase awareness of the importance of plants and the need to conserve them, will continue to be a collaborative goal of Fairchild Tropical Garden and the Girl Scout Council of Tropical Florida.

▲ Resumé

Au Fairchild Tropical Garden une collaboration avec la section féminine des scouts a conduit à créer des labels récompensant la capacité à identifier et conserver les plantes indigènes. Une évaluation formelle et informelle est

intégrée dans le programme des scouts; celle-ci fait également partie du programme d'éducation de Fairchild.

En mettant en œuvre les méthodes d'évaluation habituelles et en testant sur le terrain tous les éléments, ce partenariat a permis de mettre en place des activités d'identification de plantes et un programme de conservation adaptées aux jeunes filles d'âges et de capacités différents ainsi que pour leurs accompagnants. Les labels peuvent être acquis à Fairchild, dans une réserve naturelle ou pendant un camp d'été durant lequel des actions de conservation sont menées dans le cadre de ce programme.

● Resumen

En el Fairchild Tropical Garden (Jardin Tropical de Fairchild) la colaboración con las Girl Scouts ha resultado en nuevos emblemas que pueden conseguir las chicas en la identificación de plantas autoctonas y en la conservación. Los asesoramientos formales e informales se integran en la gestión de todos los programas de las Girl Scouts y es un componente básico del desarrollo de los programas educativos en Fairchild. Usando métodos de asesoramiento familiares y ya existentes y comprobando todos los componentes sobre el terreno la colaboración crea actividades en la identificación de plantas y en la conservación, adecuadas para chicas de diferentes edades y habilidades y para sus líderes adultos. Los emblemas se pueden conseguir en Fairchild, en algún espacio natural o en los campamentos de verano de los Girl Scouts donde se llevan a cabo actividades prácticas de conservación como un componente del programa de emblemas.

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L'évaluation Donne Ses Résultats

La Evaluación Consigue Resultados

Evaluation Gets Results

■ Summary

In this paper, the results and consequences of a comprehensive evaluation of the Natural Science Institute for Elementary Teachers at the Missouri Botanical Garden, USA, are described. This teacher training project utilised a combination of formative and summative evaluations, science knowledge pre- and post-tests, surveys, personal interviews, and activity logs to evaluate the four objectives of the project and to answer a series of specific questions. General conclusions from the evaluation were that the project was attracting the target audience, that participants' knowledge of science concepts increased, that a reflective practice protocol resulted in better incorporation of new skills and lessons into school classrooms, and that the participants in the programme become formal and informal resources for other teachers. The evaluation also led to additional funding for teacher training programmes, and to fundamental changes in the nature of teacher training programmes at the Missouri Botanical Garden.

Introduction

In 1993, the education division at the Missouri Botanical Garden initiated the Natural Science Institute for Elementary Teachers. This teacher training programme was developed to help the education division test a training protocol which we hoped would provide biological content enhancement and upgrade teachers' pedagogical skills and leadership abilities. The purpose of this case study is to describe the process used to evaluate the Natural Science Institute for Elementary Teachers and



Left: Teachers investigating science concepts as part of the Natural Science Institute training program in organismal biology and ecology

present some of the results from the process. It is not the goal of this report to go into a detailed description of the results of the evaluation, but to feature the highlights. The consequences of the evaluation for education programmes at the Missouri Botanical Garden will also be discussed.

The Natural Science Institute for Elementary Teachers was started as a pilot project in 1992, when three teachers were hired during the summer to organise and teach a special summer programme for children. These teachers were paid for six weeks of work - two weeks for planning and preparation, three weeks for the delivery of classes to children, and one week to conclude the programme by preparing a brief report. Several months later, one of the teachers reported that the summer experience had been very helpful to him, in that he had incorporated many of the same lessons from the summer classes in his own teaching for the first time. He also mentioned that the opportunity to work with other teachers and interact with

them as they planned and carried out the programme was a valuable experience.

Essentially, the pilot project started in 1992 and the results and comments from the teachers hired to conduct the programme provided the first evaluative data for this case study, and represented a type of formative evaluation that was critical to the success of the project. The formative information from the pilot study significantly influenced the nature of the project as the Natural Science Institute was designed. A proposal was submitted to a major science foundation in the United States in 1993 to develop the Natural Science Institute, and the project was funded for 4 years as a result of that proposal.

Description of the Natural Science Institute for Elementary Teachers

The target audience for the Natural Science Institute for Elementary Teachers was classroom teachers in

grades K-5 who worked predominantly in schools with high percentages of students from economically disadvantaged backgrounds or ethnic minorities. National research indicates that these schools are in more critical need for improved science teaching and better classroom practices. The content focus of the Natural Science Institute was on organismal and ecological biology concepts, and conformed to the U.S. National Science Standards (National Research Council 1996).

The project had three components. The first component was a series of five workshops, initially for nine days and later ten days in length. The purpose of the workshops was to introduce organismal and ecological biology concepts to the participants. Garden staff used investigative and hands-on lessons to teach these concepts. The second component was a summer science programme for children taught by the participating teachers. The purpose of this summer programme was to allow the teachers the opportunity to work in teams to organise and teach many of these science concepts using the same lessons and activities they learned in their own training, and to receive support and guidance from each other as well as from the garden education staff. This reflective practice component was thought to be critical for helping the teachers incorporate new ideas and new lessons into their own classrooms. The final component of the programme was that the teachers were required to return to their classrooms and begin incorporating more organismal and ecological biology into their own teaching. In addition they were to serve as a resource to other teachers in their schools.

Were We Hitting the Target Audience?

The first objective of the programme was to provide training for teachers from schools with high percentages of students from economically disadvantaged backgrounds or ethnic minorities. The question we were most interested in answering was: were we hitting the target audience? The method used to evaluate this outcome



was to collect demographic data on the students enrolled in the classes for which the teachers were responsible. Over the four years of the project, 59 teachers completed the Natural Science Institute. A total of 40 of these teachers taught in schools with more than 50% ethnic minority students, and 28 teachers were in schools with 80% or more of the students from ethnic minorities. Altogether, 31 teachers taught in schools with more than 50% of the students from economically disadvantaged families, with 23 of those in schools with 80% or more of the students economically disadvantaged. From these results, we were generally confident that we were hitting our target audiences without excluding participation by teachers from other less disadvantaged schools.

Did the Training Session Help Teachers Learn?

The second objective of the project was to ensure that participating teachers were more knowledgeable about science concepts and science teaching practices after undergoing training. Two questions were asked: how effective were the individual training sessions? and did teachers' levels of science knowledge increase? A series of five workshops were scheduled with the participants between January and May. These workshops focused on organismal and ecological science concepts, and used hands-on, investigative activities to teach these concepts to the participants.

The first question above was answered with short evaluation surveys given to the participants at the end of each session, and a longer summative evaluation at the end of the entire training programme. The basic questions on the survey were:

1. Was the science content information adequate and organised in a useful manner?
2. Were the activities well prepared and presented?
3. Which activities do you expect to be most useful to you in the classroom?
4. Which were of least use to you and why?
5. Are we generally meeting your expectations? If not, why not?
6. How can we improve the delivery of the programme?

The number of individual comments made by teachers over the four years of the project are too numerous to mention. The importance of the survey to us was that the feedback from the participants allowed us to identify weaknesses and strengths in the training and to make changes in future sessions and future years. As the project progressed each year, we were able to identify science concepts that teachers had difficulty understanding (such as adaptation), and we could schedule more instructional time with these concepts. We were also able to make some changes in the format of the training as a result of the evaluation. For example, the number of days of the workshops was increased from nine to ten each year and the organisation of the concepts, and the sequence in which they were introduced during the sessions, was changed in response to teachers comments.

The second question (whether the teachers' levels of science knowledge increased) was answered with content pre-tests given to participants on the very first day of the training sessions, and a post-test given on the last day of the training programme. The results of the pre-test and post-test were analysed using paired t-test protocols. We were disappointed in the first year of the project when the mean difference between the pre-test scores and the post-test scores was only 7 percentage points. Although this was a statistically significant difference ($p < 0.05$) our sense was that the participants learned a great deal more than reflected in the post-test scores. Therefore, we re-examined the pre-test and post-tests and discovered that the exam questions did not represent the content of the course very well. The

pre- and post tests were rewritten for subsequent years to be more closely aligned with the curriculum of the training sessions. During the second, third, and fourth years of the project, the mean difference between pre-test and post-test scores were 15.5, 17.0, and 18.4 percentage points, respectively. We felt more confident that the participants' science knowledge increased as a result of the project.

One final evaluation method used to assess this outcome was a summative survey at the very end of the training session. The purpose of the summative evaluation was to collect additional data about the training programme as a whole, rather than about each individual session. The questions asked of the participants were:

- Do you feel your content knowledge in ecology and organismal biology increased as a result of this programme? - The answer was an overwhelming yes, confirmed by pre-test and post-test scores.
- Which content areas were of greatest benefit? - There was no clear area that seemed to be more beneficial than others.
- How can we improve the delivery of this aspect of the programme? - The one important comment that came from this question was the desire for us to build in more time for the participants to process information and to think about the content in groups. The number of days for the training sessions was increased.
- What activities were of greatest use? - Many different activities were mentioned by the participants, and no specific activity was mentioned in a significant way. It was clear that those activities which were most active and hands-on were preferred over activities that were more passive.

Does Reflective Practice Work?

The third objective of the project was to test the effectiveness of the reflective practice model used in the teacher training. The basic questions we asked were: did the reflective

practice help? and were participants teaching different concepts and using new lessons and activities?

To answer the first question, a summative evaluation was administered at the end of the summer reflective practice component of the programme. Teachers were asked to assess how valuable the summer science programme was to them as a way to try out new science activities. The overwhelming response to this question was that the opportunity to teach in the summer science class was the most important part of the programme. We also asked them how we could improve their preparation for the summer programme. As a result of this question, we increased the planning time given to the teachers prior to the summer programme from one week to two weeks. Essentially, the results of the evaluation were responsible for fundamental changes in the structure of the programme.

The method used to answer the second question was to use written surveys and personal interviews with participants. The teachers were asked to list concepts and specific lessons and activities from the programme that they now include in their own classroom that they had not taught before. Although the specific concepts and lessons used by the participants varied from one teacher to the next, each participant reported that they taught an average of 5-6 new science concepts in their classrooms, and use an average of five new activities and lessons from the programme.

Were teachers helping other teachers?

The final outcome of the programme was to create a cadre of teachers who could serve as resources for other teachers. The fundamental question we asked was: were teachers being used as informal and formal resources for the classroom? The method we used to answer this question was to ask the participants to maintain activity logs. For one year after the teachers participated in the training sessions, they were asked to keep a log of the formal and informal activities that they had conducted to help other teachers. They were then asked to give these

logs to the project staff at regular intervals so that the project staff could calculate the number of times that the participants had served as a resource and determine the nature of the assistance that they gave.

Examinations of these logs indicated that the participants were conducting a minimum of 2-3 formal workshops each year for other teachers in their schools and were used an average of ten times a year as an informal resource. In the latter capacity, the teachers were being asked to serve on curriculum committees, to recommend lessons and activities that other teachers could use, to provide assistance in obtaining materials, to organise building science classrooms, and to help select future participants in the programme.

Some Generalisations From the Evaluation

Because of the success of the reflective practice approach, the Missouri Botanical Garden will continue to use the basic training model in future efforts. This represents a significant change in the way we view long-term teacher development. Our optimism about the structure of the training as a model for reflective practice has been reinforced. Feedback from participants during the entire project indicates that the combination of training and supervised practice was very helpful for teachers prior to their incorporating some of the concepts and lessons into their own classrooms.

Below:
Teachers introducing hands-on botany activities to their peers as part of the professional development component of the Natural Science Institute



Teachers participating in the programme have gained new knowledge and skills in organismal and ecological biology and are incorporating more science lessons into their own classrooms. They are also more knowledgeable about ways to teach these topics in an interactive and investigative manner. By extension, the children in the classes taught by the participating teachers will benefit from the teachers' new knowledge and skills. The reflective practice approach does appear to be working in changing what teachers do in the classroom.

The confidence level of the teachers in science changed. At the beginning of the teacher training sessions, the participants expressed a high level of anxiety and concern about the job they would be asked to do. By the end of the year, those same teachers were able to successfully conduct in-service programmes for other teachers and to teach science to children without hesitation. All participating teachers showed a high level of commitment to the programme and involvement in the project.

Consequences of the Evaluation

In addition to the impact the evaluation of the Natural Science Institute had on how the education division operates teacher training programmes, the evaluation has also resulted in a number of consequences for the Missouri Botanical Garden. First, the success of the project as documented in the evaluation, led to continued funding of the programme after the initial four years. When the initial four year grant was completed, the garden was asked to continue the training programme for the St. Louis Public School District. The school district agreed to pay for the programme from their own operating budget. It is rare that a project funded from an external grant is later built into a school district funding, and the success in this case is a result of changes made in the programme based upon evaluative data and the documentation revealing that the programme was effective in achieving its goals.

A second major consequence of the project evaluation, is that it led to a second grant from the same agency that funded the Natural Science Institute initially. This second programme funded by this foundation had many of those characteristics of the first programme that were shown to be effective. It is clear that a successful project, as determined by an evaluation component, will lead more easily to additional support.

Finally, confirmation that the reflective practice component of the programme is effective in helping to achieve changes in the classroom, has resulted in a change in philosophy about teacher training at the Missouri Botanical Garden. We have reduced the number of one and two day short-term workshops in favor of longer-term training programmes that include some kind of reflective practice component.

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▲ Resumé

Dans cet article sont décrits les conséquences et résultats d'une large évaluation menée par l'Institut des Sciences pour les enseignants du primaire du Jardin Botanique de Missouri. Ce projet de formation des enseignants a utilisé un mélange d'évaluations formatives et récapitulatives, de pré et post tests de connaissances, d'enquêtes, d'entretiens personnels, et de compte-rendus d'activités a permis d'arriver à quatre conclusions pour ce projet et de répondre à une série de questions spécifiques. L'évaluation démontré que le projet était attractif pour le public visé, que les connaissances scientifiques des participants étaient en augmentation, que le protocole choisi permettait une meilleure incorporation en classe des compétences et connaissances acquises et que les participants au programme deviennent eux-même des personnes ressources pour les autres enseignants. L'évaluation a aussi permis de recevoir des fonds

supplémentaires pour des programmes de formation des enseignants et à un changement fondamental de la nature des programmes pédagogiques destinés aux enseignants au Jardin Botanique de Missouri.

● Resumen

En este trabajo se presentan los resultados y las consecuencias de una evaluación comprensiva del Natural Science Institute for Elementary Teachers (el Instituto Científico Nacional para Profesores Elementales) en el Jardín Botánico de Missouri. Este proyecto de formación de profesores utilizó una combinación de evaluaciones formativas y anadidas, exámenes de conocimiento científico antes y después, encuestas, entrevistas personales, y notas de actividades para llegar a cuatro evaluaciones del proyecto y contestar algunas preguntas específicas. Las conclusiones generales de la evaluación fueron que el proyecto atraía la audiencia deseada, el conocimiento de conceptos científicos de los participantes aumentaba, que un protocolo de 'práctica reflexiva' resultaba en una mejor incorporación de nuevas habilidades y lecciones en las aulas, y que los participantes en el programa se convierten en recursos formales e informales para otros profesores. La evaluación también resultó en más fondos para los programas de formación de profesores, y en cambios fundamentales en los programas de formación profesional en el Jardín Botánico de Missouri.

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Le Tueur de Plantes et le Grand Arbre Nauséabond!
Las Plantas Asesinas y el Gran Arbol Maloloroso!

Killer Plants

and The Big Smelly Tree!

■ Summary

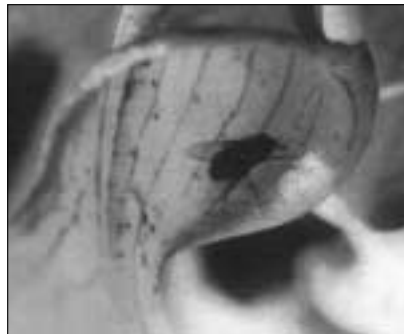
Our first impressions of a botanic garden, the journey we make through it, how this is negotiated, who we make this journey with and how we record it, are key factors in how we relate to the botanic garden and the plants within it. Dawn Sanders is currently researching botanic gardens as a learning environment and part of her research considers whether children connect with plants, and if so what factors contribute to connection.

Her study has involved working with three groups from three different primary schools in the London Borough of Kensington and Chelsea. The schools are state schools with mixed social and cultural rolls. After visiting Chelsea Physic Garden, U.K., each child in the class worked on post visit(s) recording sheets, which encouraged both written and illustrated responses. The recording sheets incorporated a wide range of questions focusing on aspects of their visit(s) to the garden and the nurturing of plants at home. This article considers responses to the questions: which plants did the children remember from their visit(s)?; what was their favourite plant? and why?

Introduction

'I fear that many young people are apt to consider botany a very dry study. They are naturally repelled by the long words and many technical terms used in describing plants' (Brightwen 1913).

Our first impressions of a botanic garden; the journey we make through it, how this is negotiated, who we make this journey with and how we record it, are key factors in constructing our relationship with both



the garden and the plants it contains. As a researcher looking at the question: 'Botanic Gardens: An Environment For Learning?' (for children aged between 7 and 12), one of my main interests is how children connect with plants: do particular plant groups in botanic gardens make a greater impact than others? If so, is this impact because of cultural factors, fascinating biological features, dissimilarity to the child's everyday landscape, and/or the botanical interests of garden educators?

The Study

The initial part of my study has been to work with three year groups from three different primary schools in the London Borough of Kensington and Chelsea:

- **School 1** (Class A) Year 3 (26 children, 7-8 year olds)
- **School 2** (Class B) Year 4 (26 children, 8-9 year olds)
- **School 3** (Class C) Year 5 (23 children, 9-10 year olds)

Classes A and C have visited Chelsea Physic Garden more than twice; Class B has visited once. All the schools are state schools with mixed social and cultural rolls. Following a visit to Chelsea Physic Garden each child in the class worked on post visit(s) recording sheets, which incorporated a wide range of questions focusing on aspects of their visit(s) to the garden and the nurturing of plants at home. This article will consider responses to the questions:

- Which plants do you remember from your visit(s) to Chelsea Physic Garden?
- What is your favourite plant? (generally-not site specific)
- Why?

The children worked on their recording sheets in the classroom, away from the garden, with the support of their class teacher and myself (as non-directive facilitators). The recording sheet encouraged the children to give both written and illustrated responses. From a total of 75 recording sheets distributed, 71 were returned complete, a 94.7% return rate.

The responses given by the 25 children in Class A to the question 'Which plants do you remember?' generated ten groups of plants. If the groups are closely examined, different descriptions of the same plants are revealed, for example *Phormium tenax* was called 'N.Z. flax', 'the flax' and 'NZ plant' by the children. If we amalgamate these

Left:
Carnivorous plants were a favourite for one child visiting Chelsea because of their 'killing' technique

descriptions into one group entitled NZ Flax then Class A would have remembered a total number of eight groups of plants ranging from the very specific 'venus fly trap', 'drosera' to the very general 'trees'.

The most commonly 'remembered' plant group in Class A was 'cacti' which was chosen by 8 children. However, for nearly one quarter of Class A their responses to the question 'Which plants do you remember from your visit(s) to Chelsea Physic Garden?' were similar to their responses to the question 'What is your favourite plant?' Of the six plant groups which were both 'remembered' and a 'favourite', 'rose' was the most common choice with five children choosing it.

In Class B, the 25 children completing the recording sheet 'remembered' 20 groups of plants, 12 more than Class A. These named plant groups ranged from 'bluebells' through to more generalist groups such as 'weeds', and also included specific popular names such as 'Elephants ear'. The children also chose to use descriptive terms such as 'spiky plant' and 'prickly plant' (interestingly the youngest group, Class A did not use descriptive terms, but Class C did e.g. 'The big smelly tree', *Ginkgo biloba*). It was found that 'bluebells' were 'remembered' by 10 children in Class B (40% of the class respondents). Their one and only visit to Chelsea Physic Garden was in late Spring indicating that seasonality could possibly be an important factor in shaping plant perceptions. The programme of study in the garden also seemed to frame the plants that children remembered from the visit (not surprisingly!). Both Classes A and C had significant experiences with carnivorous plants both at school with the garden education staff and in the garden, whilst Class B had them briefly included in a general guided tour in the garden.

Consequently Class B made no mention of carnivorous plants in response to the 'remembered' plants question and only 2 children from Class B included 'the one that eats flies' as a favourite plant. Hopefully further study will illuminate this relationship in more depth. In Class B,

10 children chose 'roses' as their favourite plant (40% of the class respondents). In answering the question why was it their favourite plant, four of the children commented on the colour red.

With Class C (23 year 5 children) 20 groups of plants are featured in the 'remembered section'. As with Class A, carnivorous plants feature strongly both as the broad group 'carnivorous plants' and as separate species, 12 children mentioned 'venus fly trap', 4 children mentioned 'pitcher plant' and 2 mentioned 'sundew'. 'Cacti' also featured highly with one third (8 children) of the class respondents mentioning them as 'remembered', but significantly 'cacti' were not included in the favourite group. Carnivorous plants also had a high profile in the favourite plant group ('venus fly trap' were chosen by 9 children, 'pitcher plant' by 2 and 'sundew' by 2).

Roses are Red

The one plant group that was common to both the 'remembered' and 'favourite' sections through all year groups was 'roses'. Interestingly, the Physic Garden has no designated area for roses. Indeed, rose spp. make up only 0.8% of the living collection. Nevertheless, 'roses' had a higher numerical profile in the group 'favourite' with 17 children choosing them through the three year groups, a third (22.6%) of the total number of children in the study. If we look at 'roses' as a 'favourite' plant choice, distinct differences between the classes emerge:

- 5 children in the Year 3 (Class A) group chose 'roses'
- 10 children in the Year 4 (Class B) group (the group with the least experience in the botanic garden)
- 2 children in the Year 5 (Class C) group (the group with the most experience in the botanic garden).

Overall, 'roses' have a much higher profile in the 'favourite' group than the 'remembered'. Does this mean that 'roses' are seen as domestic rather than botanic garden specimens? One child commented 'Because it reminds me of my family' as his reason why 'roses' were his favourite plants.

Many of the children helping with my research do not have access to a private garden, but I would suggest that their connection with roses does not simply come from a 'being in the garden' experience, but could be a cultural link with nursery rhymes and fairy tales for example were the 4 children that equated roses with the colour red influenced by the nursery rhyme 'Roses are red, violets are blue....?' Was the Year 5 girl who described the rose as 'a dangerous beauty' drawing on fairy tales? Was the East End boy who yelled 'cowboys' one day in the Cacti conservatory, making a connection with movies that he had watched?

Learning to Look

In the book *Private Life of Plants*, David Attenborough makes the comment:

'For most of the time their lives remain a secret to us, hidden private events. The reason is merely a difference of time. Plants live on a different time-scale from ours...we only need to learn to look' (Attenborough 1995).

In facilitating learning to look, do botanic garden educators inspire children to remember certain plants? If we are using the framework of the guided tour as a basis for the children's experiences, what impact does tiredness and time have on which plants excite them? If carnivorous plants are an early part of the tour, will this make a greater or lesser impact than if they are at the end?

Is Gender a Factor in 'Favourite' and 'Remembered' Plant Choice?

If we look at the responses of Class C to the 'favourite' plant question, 12 boys out of a possible 14 chose a carnivorous plant; whereas the 9 girls chose 7 different plant groups. When asked why they liked their favourite plant, six of the boys commented either on the function of the trap or mechanism e.g. '...because its a killer' '...because of the way it catches flies'.

In this class only one girl chose a carnivorous plant, 'the sundew', as her favourite. In her response she used a

combination of function: '...because it is amazing how they trap flies' and mechanism: '...because it is sticky'. Gender differences were substantially less marked in the Year 3 group (Class A). This class contains substantially more boys than girls, a ratio of 19:7. In explaining their reasoning for their favourite plant choice, 4 of the girls commented on colour and shape. Interestingly with this class, carnivorous plants did not have a high profile as favourite plants (especially since this class had a carnivorous 'hands-on' study day in their school).

Given that gender difference became more substantially marked in the oldest class, can we infer that gender and interest in plant groups is an age-based relationship? I would be loathe to do this from such a small localised sample, but intend to pursue these three key questions with a larger group; both in number and geographical spread.

Conclusion

In a letter to the Journal of Biological Education in 1990, David R. Hershey made the comment 'Plants are generally easier to handle in a classroom situation than animals since they do not bite, run away or produce odours'. From my initial study it seems that it is precisely those active, odorous characteristics that excite children; long live 'Killer Plants' and 'The Big Smelly Tree'!

References

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▲ Résumé

Nos premières impressions sur un endroit, le trajet que nous faisons pour le traverser, la façon dont nous l'abordons, comment nous faisons le parcours et comment nous le reconnaissons, sont les facteurs clés de la façon dont nous décrivons le lieu et les plantes qui s'y trouvent. Comme un chercheur qui considère la question

des Jardins Botaniques comme un environnement pour apprendre (pour les enfants âgés de 7 à 12 ans), l'un de mes principaux intérêts est la manière dont les enfants communiquent avec les plantes; faire des groupes de plantes particulières dans les jardins botaniques a-t-il un impact plus important que les autres choses? Si oui, l'impact est-il dû à des facteurs culturels, des caractéristiques attrayantes de la biologie, à la dissemblance quotidienne de l'aménagement des enfants et/ou les intérêts botaniques des éducateurs environnementaux.

Le départ de mon étude a consisté à travailler avec trois groupes de trois écoles primaires différentes de la Ville de Londres, de Kensington et Chelsea:

- école 1 (Classe A) 3ème année (pour les 7-8 ans)
- école 2 (Classe B) 4ème année (pour les 8-9 ans)
- école 3 (Classe C) 5ème année (pour les 9-10 ans)

Les classes A et C ont visité le Chelsea Physic Garden plus de deux fois, la classe B une seule fois. Toutes les écoles sont des écoles d'Etat avec des sensibilités sociales et culturelles différentes. Au début de mon étude, chaque enfant de la classe résumait la visite sur une fiche, ce qui l'encourageait à écrire et illustrer à la fois les réponses. Les fiches enregistrées comprenaient une grande gamme de questions concentrées sur les aspects de leur(s) visite(s) au jardin et les plantes que l'on peut trouver à la maison. Cet article prend en considération les réponses aux questions suivantes:

- De quelles plantes vous souvenez-vous le mieux?
- Quelle est votre plante préférée (généralement pas de réponse précise)?
- Pourquoi?

● Resumen

Nuestra primera impresión de un lugar, del viaje que hacemos a través de él, con quien lo hacemos y como lo anotamos, son los factores claves que determinan como nos relacionamos

con aquel lugar y con las plantas que contiene. Como alguien que investiga la cuestión: El jardín botánico: ¿un medio para aprender? (para niños de 7 a 12 años) es para mí de interés primordial el ver como los niños conectan con las plantas; ¿algunas agrupaciones botánicas tienen más interés que otras? Si es así, ¿es el impacto a razón de factores culturales? ¿o de características biológicas fascinantes? ¿difieren del paisaje diario del niño? ¿y/o reflejan las aficiones botánicas de los educadores del jardín?

La primera parte de mi estudio a sido el trabajar con tres grupos de tres diferentes institutos de educación primaria en el distrito londinense de Kensington and Chelsea:

- Instituto 1 (Clase A) Año 3 (7-8 años de edad)
- Instituto 2 (Clase B) Año 4 (8-9 años de edad)
- Instituto 3 (Clase C) Año 5 (9-10 años de edad)

Las Clases A y C han visitado el Chelsea Physic Garden más de dos veces; la Clase B lo ha visitado una vez. Todos los institutos son estatales con alumnos de clases sociales y culturales mixtas. Al comienzo de mi estudio cada niño en la clase respondió a un cuestionario post-visita que permitía respuestas tantas escritas como dibujadas. Los cuestionarios incorporaban una gran gama de preguntas que trataban sobre diferentes aspectos de su(s) visita(s) y del cuidado de plantas en casa. Este artículo considera las respuestas a las siguientes preguntas:

- ¿Qué plantas recuerdas de tu(s) visita(s)?
- ¿Cuál es tu planta favorita? (en general no se especificaba localidad)
- ¿Por qué?

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Improving on Previous Best - Prompts for Self Review

■ Summary

The draft checklist in this article has been devised to help botanic garden staff reflect on their environmental policies and practices. Based on the 'Success For Everyone' initiative produced by Birmingham Education Authority (UK), which encourages schools to improve standards through a process of self review, the statements cover areas of management, community links, education for sustainability and action that promote a greener lifestyle. The statements describe characteristics at emergent, established and advanced levels.

Policies and practices in any one garden are likely to be a mixture of all levels and the process should ensure some lively debate. By providing statements at clearly defined levels it is easy to identify starting points as benchmarks, enabling gardens to set challenging but realistic targets. The democratic process of using the prompt sheets with staff can contribute towards improving communication and motivation and hopefully the process will provide a shared understanding of common values, an expectation of progress and a commitment to 'improve on previous best'.

Most people attempt to live up to a set of principles or values although often conscious that their daily actions sometimes fail to match that intention. This is also true of organisations such as botanic gardens. It is generally accepted that we could perform better and are therefore seeking to develop and progress by improving against previous best.

However we need more than words of advice and support to truly engage in self-improvement. When thinking about what we do, what is the difference between carrying out our tasks at a competent level and carrying them out at a higher and transformational level? In order to meet this challenge, the Birmingham Botanical Gardens and Glasshouses have developed a series of prompt sheets, summarised in the table overleaf.

The sheets are based on the 'Success For Everyone' initiative developed by Birmingham Education Authority (UK) to encourage schools to improve standards through a process of self review. For various aspects of the curriculum such as art, science and health education, working groups were set up to develop statements under headings such as management, organisation, staff development and collective review. These statements were then ordered under the headings of emergent, established and advanced and their meaning was to define a level of achievement. The intention is that schools look at their current practise and place themselves on this continuum so that they can assess what they have achieved and consider what more they could do.

In order to help botanic gardens reflect on their environmental policies and practices, a similar process of producing statements could be carried out. Examples of these have been prepared addressing the areas of management, community links, education for sustainability and action that promotes a greener lifestyle.

The intention is that botanic garden members of staff gather together in a participatory workshop to discuss the statements and agree on those that describe their current level of achievement. Choosing should ensure some lively debate amongst staff! The statements will give a clearly defined starting point from which a route can be plotted to reach the more challenging levels of achievement in botanic gardens. These levels of achievement will allow staff to help with the establishment and implementation of a development strategy.

However, the strategic framework needs to be supported and reinforced by patterns of day to day actions. The democratic process of using the prompt sheets with staff can contribute towards improving communication and motivation. Hopefully, the process will provide a shared understanding of common values, an expectation of progress and a commitment to 'improve on previous best'.

This is an evolutionary process and is a method of evaluating products, processes and services both within and outside an organisation. It is often referred to as benchmarking, the purpose of which is to promote best practice within botanic gardens.

How do you think your botanic garden performs? Which level does your environmental education programme correspond to? Talk to the other botanic garden staff, what do they think?

▲ Résumé

Les premières check-lists dans l'article ci-dessus ont été dressé pour aider les personnels de jardins botaniques à réfléchir sur leur politique environnementale et leur pratique basée sur l'initiative 'succès pour chacun' produite par le Birmingham Education Authority (UK), qui encourage les écoles à améliorer les méthodes par un processus d'autocontrôle, l'établissement de techniques de gestion, de liens communautaires, d'éducation pour la gestion durable des ressources, et d'actions visant à promouvoir un type de vie plus naturel. Les rapports décrivent les caractéristiques à des niveaux émergents moyens ou avancés. Politiques et pratiques dans n'importe quel jardin sont probablement un mélange de tous les niveaux et le procédé peut être sujet à débat. Par la production de rapports à des niveaux définis il est aisé d'identifier les bases comme point de repère, pour des jardins habilités à accomplir des objectifs ambitieux mais réalistes. Le processus démocratique

du vote avec le personnel peut contribuer à faciliter la communication et la motivation et optimiser le processus qui permettra une meilleure compréhension des valeurs communes et une espérance de progrès ainsi qu'un engagement pour 'tendre à améliorer'.

● Resumen

Las listas de control preliminares del artículo anterior han sido creadas para ayudar a que el personal del jardín se centre en sus prácticas y políticas medioambientales. La iniciativa desarrollada por Birmingham Education Authority (Autoridad Educativa de Birmingham) se basa en el 'éxito para todos'. Esta iniciativa anima a los colegios a mejorar la calidad mediante un proceso de revisión propio, informes que cubren las áreas de dirección, unión entre comunidades, educación para el mantenimiento y un acto que estimule un estilo de vida más verde. Los informes describen características a niveles establecidos y avanzados.

La política y las prácticas de cualquier jardín son probablemente una mezcla de todos los niveles y el proceso debe asegurar algún debate animado. Proporcionando informes a ciertos niveles definidos, no es difícil identificar los puntos de partida que permiten a los jardines establecer retos pero con objetivos reales. El proceso democrático de los papeles con el personal puede ayudar a mejorar la comunicación y la motivación y, se espera que el proceso ofrezca un conocimiento compartido de valores comunes, una expectativa de progreso y un compromiso para 'mejorar lo anterior'.

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	EMERGENT SOME COMMITMENT SOME PRACTICE IN PLACE	ESTABLISHED COMMITMENTS MADE AND PRACTICES ESTABLISHED. MONITORING AND REPORTING ON PERFORMANCE OCCURS	ADVANCED COMPREHENSIVE POLICIES AND PRACTICES THAT ARE KEPT UNDER REVIEW AND ENHANCED IN THE LIGHT OF RESEARCH AND EXPERIENCE
MANAGEMENT ~ auditing ~ policies, priorities, practices ~ embedded in gardens documentation ~ monitoring and review	<ul style="list-style-type: none"> The Garden has identified a need for an entitlement of environmental knowledge, understanding, skills and experience for all staff and visitors Individual staff identify training courses they wish to attend to familiarise themselves with issues relating to Agenda 21. Information is shared between staff so that work in different areas might contribute to the development of an environmental theme across the garden The Garden is aware of the need for aims and objectives which support the principles of sustainability The Garden is becoming aware of environmental issues that need to be incorporated into its mission 	<ul style="list-style-type: none"> The Garden has developed an appreciation of how environmental objectives can be embedded within staff training and visitor education The Garden's aims and objectives include statements which are supportive of sustainability The training and development programme within the Garden includes an opportunity for staff to update themselves with regard to issues relating to Agenda 21 The Garden has identified a member of staff who has the full support of management in promoting a programme which heightens environmental awareness Following a 'green' audit the Garden includes issues of sustainability in its plans for the future 	<ul style="list-style-type: none"> There is a collective understanding of how environmental objectives are used to positively impact upon the ethos of the gardens The training and development programme provides opportunities for staff to develop the knowledge and skills required to take action on issues relating to Agenda 21 in their working environment A co-ordinator ensures that a coherent programme of environmental developments is carried out Staff are involved in defining objectives which support the Garden putting sustainability into practice Following an audit, the Garden includes issues of sustainability in an action plan

<p>COMMUNITY LINKS</p> <ul style="list-style-type: none"> - community involvement - participation in local issues - involvement in local consultative and decision making processes 	<ul style="list-style-type: none"> • The Garden responds to requests for planning and or practical assistance with projects to improve the local environment. • Practical horticultural experience is offered to volunteers • Schools can carry out horticultural activities in the Garden on request • The Garden is available for events which promote the environment • The Garden is consulted about issues concerning local Agenda 21 and is aware of the work of other environmental organisations in the region 	<ul style="list-style-type: none"> • The Garden is considering ways to become involved in assisting the neighbourhood to improve the local environment • Courses on horticultural skills are provided to the local community • An area of the Garden is set aside for schools and community groups to use for horticultural activities • The Garden works with a diversity of groups within the local community to provide events which promote the environment • The Garden takes an interest in aspects of local Agenda 21 and works in collaboration with local organisations 	<ul style="list-style-type: none"> • The Garden initiates and is actively involved in local 'green-up' projects • A programme of certified courses and practical training is provided to the local community • A scheme exists to actively encourage schools and community groups to take part in horticultural activities • The Garden is a focal point for cross cultural community events which promote the environment • The Garden plays an active role in the development of policies to support local Agenda 21
<p>EDUCATION FOR SUSTAINABILITY</p> <ul style="list-style-type: none"> - links within the curriculum - topical and controversial issues - local and global Agenda 21 	<ul style="list-style-type: none"> • An area of the Garden is used to develop environmental themes • Some interpretation refers to issues of sustainability by celebrating the importance of plants • Formal educational programmes provide curriculum enrichment opportunities linked to the environment • Informal education indirectly raises environmental issues 	<ul style="list-style-type: none"> • The site has been audited and a number of specific improvements have been made to develop environmental themes • There is thematic interpretation of the plant collection based on case studies drawn from different parts of the world which raise awareness of issues relating to biodiversity, development and sustainability and how these may affect the well being of future generations • Opportunities are made available for the visitors and schools to investigate, enquire into and debate the complexity of issues associated with Agenda 21 • The promotion of environmental issues is planned within formal and informal education programmes 	<ul style="list-style-type: none"> • All aspects of the hard and soft landscape have been developed to enhance public understanding of the issues raised by Agenda 21 • The interpretation operates on a series of levels based on different types of environmental issues • Links are made between decisions taken in one area and their impact globally in order to promote environmentally responsible values and behaviour • Approaches to teaching and learning and the use of appropriate resources actively promotes the development of environmentally responsible values and behaviour • There is a consistency between the values which underpin the informal education programme and those held by the Gardens
<p>ACTION THAT PROMOTES A GREENER LIFESTYLE</p> <ul style="list-style-type: none"> - energy conservation - re-use and recycling - purchasing - transport 	<ul style="list-style-type: none"> • The Garden is aware that it should recycle and re-use and provides facilities for the collection of some materials e.g paper • Individuals are aware of the need to conserve water and energy • The Garden purchases a limited number of materials which minimise damage to the environment • Some staff are aware of the importance of taking action which promotes a greener lifestyle 	<ul style="list-style-type: none"> • The Garden actively encourages the recycling and re-use of a wide range of materials on a day to day basis • The Garden encourages the conservation of water and energy • The Garden purchases some materials that minimise damage to the environment. This covers all site operations including catering, horticulture, office, cleaning and maintenance • All staff understand that their work practices can contribute to a greener lifestyle and that these are perceived by the general public 	<ul style="list-style-type: none"> • There is a policy which sets targets to achieve the highest possible rates for the recycling and re-use of all materials where feasible • An audit has been carried out and there is a policy to minimise the use of water and energy including alterations to existing facilities. Water and energy conservation is taken into account with all future site developments • There is a purchasing policy that takes into account the impact on the environment, sustainability and fair trade. This policy also includes site developments e.g new buildings, soft landscaping etc • There is a collective understanding by both staff and visitors that the Garden is playing an active part in creating a greener lifestyle

Evaluar

Antes de Actuar

● Resumen

La evaluación es un componente importante del programa educativo en el jardín botánico de la Universidad de Valencia, España. Las encuestas, antes y después de las visitas se utilizan para investigar el nivel de comprensión por los visitantes de la interpretación en el Jardín. El Jardín también trabaja con los profesores y los estudiantes para evaluar el conocimiento y las necesidades de los colegios que logren la utilización del jardín como un recurso para la enseñanza. Esta evaluación de primera línea se utiliza también como herramienta para desarrollar las exposiciones. De esta manera, determinando el tipo de audiencia a las que dirigir las exposiciones y el nivel de conocimiento de la misma sobre ciertos conceptos, el Jardín ha podido desarrollar y lanzar una exposición llamada 'Plantas del Futuro' que ha sido de gran éxito.

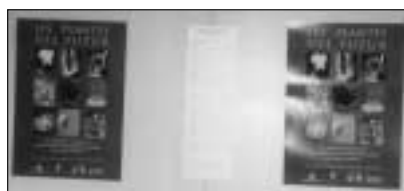
El trabajo que desarrollamos cada uno de nosotros en nuestros jardines, tiene un amplio abanico de connotaciones ya que pretendemos divulgar, difundir, dar a conocer, mejorar una serie de conceptos y temas relacionados con el medioambiente, la sostenibilidad, la botánica, la etnobotánica, las tecnologías y en general con la ciencia de la biología.

Cada día aparecen nuevos conocimientos y conceptos, cada día los programas escolares cambian, así como cambian los alumnos y alumnas, los profesores y profesoras y la sociedad en general. Conocer las repercusión de nuestro trabajo, las repercusión real que tiene en los ciudadanos y ciudadanas para los que trabajamos y para su futuro, es una

tarea que puede desbordar nuestro propio trabajo y a veces no contamos con la suficiente preparación y conocimientos para llevarlo a cabo de una manera rigurosa y científica.

Sin embargo pienso que es importante **la evaluación**, pues nos permite establecer la categoría de nuestro proyecto de trabajo, así como nuestro papel a desempeñar en los Jardines Botánicos. En nuestro jardín comenzamos a evaluar a través de encuestas, ya que nos permitía realizarlas en el propio jardín, en el momento de la visita, antes o después, para saber el grado de comprensión de nuestras explicaciones.

Las encuestas se planteaban de acuerdo a un tema, con pocas preguntas ya que habitualmente se contestaban de pie y no en un espacio como un aula, con mesas y sillas, por ello trabajamos con preguntas cerradas generalmente en número de 4, donde sólo hay que marcar la cuestión que creas que es correcto, y un par de preguntas abiertas donde expresar un concepto y que detecta el nivel de vocabulario y de conocimientos sobre el tema. Nuestra metodología de trabajo varía en función de la disponibilidad de tiempo de los grupos visitantes, por ello se podía realizar a un grupo completo o seleccionando un porcentaje de alumnos al azar, ya que nuestro número de visitantes nos proporciona la población adecuada para poder baremar diferentes tipos de



poblaciones, de diferentes localidades, de procedencia urbana o rural y con distinta gama de edades, contrastar los niveles de conocimiento y relacionar aspectos, como si existen diferencias entre centros escolares urbanos y centros rurales, etc.

Más tarde trabajamos con los profesores y los alumnos, para conocer los grados de conocimiento y las necesidades que tenían los centros escolares de materiales didácticos, con ello pretendíamos elaborar materiales adecuados y necesarios que podían permitir utilizar el Jardín Botánico como un centro de recursos didácticos. A partir de la detección de carencias, elaboramos un material didáctico para utilizar en la visita al Jardín sobre el tema de las hojas, para escolares de 14 a 16 años, donde se potenciaba la observación acerca de las hojas, y un material para edades entre 7 y 10 años para diferenciar entre el concepto botánico de fruto y el concepto coloquial de las frutas, siempre asesorando al profesorado para la utilización de acuerdo a los conceptos trabajados en el aula.

Después nos planteamos realizar exposiciones para facilitar la utilización del Jardín y los recursos que se pueden obtener del mismo y utilizar en las escuelas. Colecciones de semillas, de hojas, de frutos, necesitaban de una información adicional y una presentación diferente que permitiera su uso en los centros escolares. También las encuestas nos permitieron realizar sondeos acerca de los niveles de conocimiento y de las necesidades que tenía el profesorado.

Otro trabajo se planteó como un proyecto de investigación acerca de los conocimientos de las nuevas

Izquierda:
Un panel de la
exposición
Plantas del
Futuro

tecnologías que se utilizan actualmente en diferentes campos de la biotecnología y que se concretó en una exposición sobre las plantas del futuro. Para ello se pasaron encuestas previas en los centros escolares acerca de los conocimientos que tenían los escolares sobre temas como el cultivo in vitro, la reproducción, las técnicas de la genética molecular y las aplicaciones de ésta. Se determinó para que tipo de población iba a ser dirigida y se elaboró una encuesta para un determinado nivel escolar que nos pareció el más adecuado de acuerdo a los currículos

escolares que tenían en ese nivel. Con estos datos elaboramos los contenidos de la exposición, acentuando aquellos conceptos que se detectaron en las encuestas que no existían, que no eran correctos y que necesitaban de un refuerzo esclarecedor.

Solamente queremos con nuestro trabajo y con lo que sabemos, conseguir dar lo mejor y transmitir la importancia que tienen las plantas en la vida de nuestro planeta.

Derecho:
Un modelo de
una encuesta
para evaluación

JARDÍ BOTÀNIC DE VALÈNCIA
UNIVERSITAT DE VALÈNCIA

tenemos interés en conocer tu opinión acerca de los siguientes conceptos

1. Que significa BIOTECNOLOGIA ?
Creación de vida a parte partir de un organismo en un laboratorio (y en estudio)
2. Conoces algún ejemplo de planta transgénica ?
→ Las injertadas de una planta para que produzca mejores productos o de otra clase.
Un almendra es posible injertarla de cítricos.
3. Sabes que es un cultivo "in vitro" ?
Cultivar en probeta una especie y insertar "materia viva" que se crece.
4. Como definirías la ingeniería genética ?
Ciencia que estudia la posibilidad de cambiar los genes a "organismos" para crear al ser vivo.

Summary

Evaluation is an important component of the education programme at the University Botanic Garden of Valencia. Surveys are used, before and after visits, to investigate the level of visitor comprehension of the interpretation in the garden. The garden also works with teachers and students to evaluate the knowledge and the needs of the schools and in so doing appropriate materials can be developed for schools to enable them to use the garden as a teaching resource. Front-end evaluation is used as a tool for the development of exhibitions. By determining the type of audience the exhibitions are targeting and the level of knowledge the audience has about certain concepts, the garden has been able to develop and launch a successful exhibition called 'Plants of the Future'.

▲ Résumé

L'évaluation est un élément important des programmes éducatifs au Jardin Botanique de l'Université de Valence. Des questionnaires sont utilisées, avant et après les visites, pour apprécier le niveau de compréhension et d'interprétation des visiteurs du jardin. Le jardin travaille également avec les enseignants et les étudiants pour évaluer les connaissances et les besoins des enseignants. Ainsi des moyens appropriés peuvent être développés pour les écoles ce qui leur permet d'utiliser le jardin comme ressource d'enseignement. Les évaluations sont utilisées comme outil pour le développement d'expositions. En déterminant le type d'audience que les expositions cherchent à atteindre, et le niveau de connaissances du public de certains concepts, le jardin a pu développer et lancer un programme d'expositions réussies sous le titre 'les plantes du futur'.

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Environmental Ambassadors for Conservation

■ Summary

During the past two years, the Botanic Garden of the Biology Institute of the Autonomous University of Mexico has supported a pilot programme, in collaboration with the Public Secretary of Education, to train a group of primary children in environmental themes and the protection of nature. These children are known as Environmental Ambassadors.

After training, the ambassadors then share and teach younger children what they have learnt and implement their own programmes within schools. The article describes some of the activities carried out by the ambassadors including workshops and an exhibition, in which children from pre-school level (4-5 years old) to sixth grade (12 years old) participated. Evaluation of the pilot programme has revealed that children can be key people in awareness raising and the dissemination of information for the conservation of natural resources.

Introduction

Mexico City is one of the most populated cities of the world with nearly 20 million inhabitants. This population has a tremendous impact on the environment and a large issue is that in urban areas the limited contact with nature has made children unaware of today's environmental problems.

One of the more important fields to have a major impact on conservation, is education. Affolter (1997) considers that education, mostly for children and young people, is extremely important because these will be the people that will contribute to a greater extent to support plant conservation in the

future. Experiences with nature received at an early age represent the most important factor in personal development in relation to the environment (Palmer 1993; Tanner 1980 both cited in Wilson 1997). Among the fundamental teaching fields that play an essential role in plant conservation, are horticulture and ethnobotany (Linares 1999). Hence the importance of initiating children at an early age in plant conservation practices as a scientific and practical discipline.

In order to support our aim of conservation we need to encourage children and young people to become familiar with plants, organising practical actions and awaking their need to know more about them.

Concerned for nature conservation awareness, the Ministry of Public Education asked the Botanical Garden of the Institute of Biology of the National Autonomous University of Mexico (UNAM) to develop and conduct a course for fourth to sixth grade elementary school children that could increase their awareness of the significance of the environment and its conservation. This course began by training a group of children between 10-12 years old interested in environmental problems. The children were selected by their schools according to the following criteria: their interest in environmental care, their performance, their ability to take good notes, their personality, and their ability to establish relationships and be creative.

The following stage of this project was carried out during the 1999-2000 school term at a school that had previously participated in this

programme. The programme was broadened to include activities for children from pre-school age (4-5 years old) to children from the first to sixth grade elementary school (6-12 years old) as well as their parents and teachers. Since other authors, such as Hewitt (1997), had reported that students who initially had low interest in responsible behaviour towards the environment may modify their attitude, we also included children with low school performance and low self esteem hoping to raise their environmental awareness.

As part of the programme we held exhibitions and conducted educational activities such as workshops that included practical sessions of observation and experimentation.

Objectives

The project's objectives were to:

- Train the Environmental Ambassadors to develop the different activities described in this study thereby enabling them to reproduce or adapt these activities in the future to their own schools to help their youngest friends.
- Assist the students to acquire knowledge, competence, and teamwork skills, and develop attitudes and values expressed through a responsible relationship with the natural environment, and develop suitable habits for the preservation of the environment.
- Motivate children of pre-school age and first grade elementary school to get to know the plants through practical and appealing activities.

- Motivate parents and teachers to support children in their environmental activities as a part of their everyday lives.
- Motivate children to show their initiative by creating and designing their own environmental programmes.

Environmental Ambassador Activities

Training as teaching assistants:

The workshop *Recognising Plants through Their Smell* was aimed at the youngest children (4-6 years old). They had to use their senses in order to recognise some native and introduced plants with a characteristic smell that were of frequent use. The aim was for children at an early age to recognise aromatic plants and therefore to motivate them to develop concern for the conservation of some of these plant species. The plants observed were old spice (*Pimenta dioica*), clove (*Syzygium aromaticum*), cinnamon (*Cinnamomum zeylanicum*), vanilla (*Vanilla planifolia*), lavender (*Lavandula officinalis*), pericón (*Tagetes lucida*) and rose (*Rosa* sp.). Children recognised the anatomy and structure of these plants, and made identification cards and a little aromatic bag.

The workshop *From the Test Tube to My House: Insectivorous Plants and African Violets* targeted children 8-9 years old. With the help of a researcher using insectivorous plants

and African violets, children were introduced to the techniques of plant propagation by means of tissue culture and its relevance to the conservation of natural resources. Later, using laboratory material such as petri dishes, dissection tweezers and distilled water bottles, they performed activities involving the transplantation from in vitro culture medium onto soil in a small pot. After the activity the children were able to keep the small pot and care for their plant.

Training as an interpreter under supervision:

The Nochebuena exhibition

The aim of this exhibition was to teach children the importance of this Mexican plant that is widely cultivated around the world and has many different varieties. They were taught the anatomical characteristics of the inflorescence in order to distinguish the different varieties, as well as its cultural aspects and how to cultivate. With this information the Environmental Ambassadors, with the assistance of the trainer, prepared a script that they themselves could use to interpret the exhibition to their friends, teachers and parents that visited the display.

Changing the Landscape of My School: A Green Roof with Vegetables workshop

This workshop was created to show children an alternative for cultivation in places where there are no green areas. This involved using the school roofs as a 'garden', while at the same time,

improving the appearance of their school. In other countries, such as South Africa, great success has been achieved in the improvement of life quality by conserving and promoting their environment for the benefit of the communities through horticulture programmes in schools (Ashwell 1998).

During the *Green Roof* programme children aged 10-12 were trained to perform sowing, watering, fertilisation, covering of the roots, pest control and the harvesting of three vegetables: radish (*Rhaphanus sativus*), beetroot (*Beta vulgaris*) and carrot (*Daucus carota*). They carried out observations and wrote daily notes recording the changes that they observed in their crops. They relied on their teachers' supervision as well as on that of the school environmental coordinator.

In Mexico, these kinds of programmes are unusual and the teachers rarely allow them to run for longer than one month. However, this programme was unique, the children were very motivated and the teachers allowed the children to water and follow the development of the plants for four months.

Activities as autonomous interpreters:

The final exhibition

At the end of the school year children organised, designed and mounted an exhibition in coordination with their teachers to show their friends and parents their achievements during the past year.

Results and Conclusions

Throughout the project it was observed that the activities carried out by children stimulated their observation capability and gave them assurance to pose questions and give simple explanations, as well as possible solutions, to problems of resource conservation.

The creation of a green roof with wooden boxes was a real innovation. We managed to teach the children an orderly working method to attain results in the short and long term and they carried out all the activities to guarantee the success of their project.

Right:
T. Balcázar from
UNAM works
with the
Environmental
Ambassadors to
harvest garden
products





We confirm that children were able to pass on their knowledge and experiences to other children, parents and teachers by means of the different educational activities. We observed that children at an early age felt great admiration for their older friends (Environmental Ambassadors) thus motivating them to learn more about environmental and conservation topics. We gladly observed that parents, watching their children enthusiasm, actively participated in supporting them in the creation of their own vegetable growing at home.

We also observed that the teachers were enthusiastically involved in the activities. They reinforced the treated

subjects and enriched others e.g. in Spanish, children did a composition on the plants they observed; in Mathematics they put into practice aspects of measures, time and space; in Natural Sciences they reinforced their knowledge on environment; and in Social Science and Geography they looked for possible cultivation zones in Mexico according to the climate and kind of vegetable crop.

With regard to responsibility and attention it is important to point out the achievements of the children with a previous low school performance and low self-esteem. These children showed significant changes, becoming more responsible for their crops and

modifying their behaviour. We found that they became more involved, and their interest increased as well as their self esteem. This attitude change was observed after their participation as interpreters of information with their younger friends and parents as well as with the authorities of the Ministry of Public Education.

Through organising, designing and mounting the final exhibition themselves as well as the achievements reached during the school activities, the children demonstrated to their friends and teachers that they had the capacity and ability to communicate to a larger group their concern for the environment and its conservation.

We consider that these results show the objectives have been met. We will continue during the next school term to assess the Environmental Ambassador's activities during the third part of the project, and in addition this first group of Environmental Ambassadors will help us to start the programme in other schools.

Acknowledgements

To Dr. Robert Bye, Head of the Botanical Garden of IB-UNAM for his support on the fulfilment of this project; to the teacher Gabriela Dueñas, environmental coordinator of the Marianne Frosting School for her enthusiasm and effort in the fulfilment of the activities; to Dr. Víctor M. Chávez, researcher of the Botanical Garden of IB-UNAM for the workshop *From the Test Tube to My House: Insectivorous Plants and African Violets*; to all teachers at Marianne Frosting School; to the children that participated in the programme and to the following Environmental Ambassadors: Iván García (10 years old), Samanta García (10 years old), Miguel Martínez (10 years old), Luis Resendiz (10 years old), Guadalupe Granillo (10 years old), Carla Carrillo 11 years old), Noé Cruz (11 years old), Guillermo Guevara (11 years old), Ana Velázquez (11 years old), José Resendiz (11 years old), José Gómez (12 years old), Anilú Peña (12 years old), Karla Vargas (12 years old), Iván Vallejo (12 years old) and Mariana Andrade (12 years old).

Left:
In vitro culture is
part of the
training for the
Environmental
Ambassadors

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● Resumen

Durante los dos últimos años el Jardín Botánico del Instituto de Biología de la Universidad Nacional Autónoma de México (J.B. IB-UNAM), ha apoyado un programa piloto, en colaboración con la Secretaría de Educación Pública (SEP) para capacitar a niños de

educación primaria, en temas ambientales y de protección de la naturaleza. Estos niños son conocidos como 'embajadores ambientales'. En este artículo se explican las actividades que se han desarrollado con estos embajadores ambientales en su colegio, capacitándolos para que puedan compartir y enseñar a otros niños más pequeños lo que han aprendido y logren implementar sus propios programas de acuerdo a las necesidades de su escuela. Aquí se presentan las experiencias de tres talleres y una exposición, en los que participan niños desde nivel preescolar (4 a 5 años) hasta sexto grado de primaria (12 años); se analizan los resultados, avances y problemas a los que nos enfrentamos y que han permitido constatar que los niños son elementos clave en la sensibilización y multiplicadores de la información para trabajar en pro de la conservación de los recursos vegetales.

▲ Résumé

Durant les deux dernières années, le Jardin Botanique de l'Institut de Biologie de l'Université autonome de Mexico a soutenu un projet pilote en

collaboration avec le Secrétariat d'Etat à l'Education, afin de former les enfants des écoles primaires sur des thèmes touchant à l'environnement et à la protection de la nature. Ces enfants reçoivent le titre d'ambassadeurs de l'Environnement.

Les ambassadeurs sont formés et leur rôle est ensuite de partager et d'enseigner aux enfants plus jeunes ce qu'ils ont eux-même appris et de mettre en place leurs propres programmes au sein de leur école. L'article décrit quelques-unes des activités menées par les ambassadeurs: ateliers, expositions qui sont proposées aux enfants, du niveau pré-scolaire (4-5 ans) à la sixième (12 ans). L'évaluation du programme pilote a révélé que les enfants peuvent être des éléments clef de la prise de conscience environnementale et de la dissémination de l'information pour la conservation des ressources naturelles.

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Right:
A graduate of
the
Environmental
Ambassador
programme uses
her experience
to teach other
children

International Partnerships

■ Summary

This article discusses an exciting joint project between the Adelaide Botanic Garden, Australia and the Cabang Balai Kebun Raya Eka Karya botanic garden in Bali. Key education staff from both gardens were brought together in Bali for five weeks to produce materials to support the development of a schools program in Bali and to collect first-hand ethnobotanical and ecological information and images for a CDROM on traditional Indonesian plant use. As a result of the project, the botanic garden in Bali appointed an education officer and education team to implement the education program. Increasing numbers of schools are now using the garden for education purposes and the materials produced have been used as a model for other Indonesian botanic gardens. The Adelaide Botanic Garden has also benefited from the project. It now has much more up-to-date information on Asian and Indonesian plant use and its teaching programs have greater integrity and validity.

Introduction

Botanic garden educators rarely get the chance to work with international colleagues over an extended period of time. Busy schedules and tight budgets make it difficult, however, the mutual benefits of professional collaboration can far outweigh the effort in overcoming the obstacles.

An opportunity for such collaboration arose recently between the Adelaide and Bali botanic gardens. Bali was keen to produce materials to support the development of a schools program similar to the one in Adelaide. They wanted to develop educational

materials to support a village based research project. Adelaide, on the other hand, needed first hand ethnobotanical and ecological information and images for a CDROM on traditional Indonesian plant use.

Taking the Initiative

Frank Zich, an Australian aid volunteer and Bali Director, Ida Bagus Ketut Arinasa initiated the partnership. They were familiar with some of the earlier work done on Indonesian language and culture programs in Adelaide and suggested working together. Following official approval key education staff from both gardens were brought together in Bali for five weeks. Team members included: IBK Arinasa - Project supervision (Bali); Bayu Adjie - researcher and translator (Bali); Drs I Wayan Sumantera - ethnobotanical expert, educator (Bali); I Made Sumerta - trainee illustrator (Bali); Steve Meredith - education officer (Adelaide).

A Practical Solution

Work began with a short orientation, goal setting and planning phase in which it was agreed that a range of self-guiding trail booklets would be produced. The booklets would focus on activity based learning for students and provide user-friendly information for teachers. Illustrations were to be used throughout the student sections to enhance understanding and minimize lengthy explanations. It was agreed the booklets would be used as a practical resource and relevant to a wide range of audiences. They were to be produced in a simple digital MSWord format because it was easily modifiable to reflect teacher feedback, changes in the garden and school curriculum.

Interpretive Trails

Following a review of the plant displays, themes were developed to complement the local science, environment and culture curriculum areas. Trail booklets were completed on six topics for four levels of schooling in Indonesia (kindergarten, elementary, junior and senior high). They were:

1. Treasure Hunt Garden Introduction (for Kindergarten)
2. Plant Study (for Elementary School)
3. Plant Classification (for Junior and Senior High School)
4. Plants and the Environment (for Elementary, Junior and Senior High School)
5. Tropical Rainforest (for Elementary, Junior and Senior High School with Indonesian and English versions)
6. Traditional Balinese Plant Use (for Elementary, Junior and Senior High School with Indonesian and English versions).

English versions were also designed to improve students' English language skills.

Bali Aga Project

Our work also coincided with a joint ethnobotanical project between the Northern Territory Conservation Commission and the Bogor and Bali Botanic Gardens. The project aimed to document traditional plant use of the Bali Aga people, descendants of the original Balinese prior to the arrival of Hindu people from Java around the 14th century. The Bali Aga villagers' use of plants and management of local rainforest is different and more traditional than other Balinese villages.

The education team was able to visit some of the villages as a part of the project including a junior high school in

the village of Sepang. Using ethnobotanical information collected by the survey team, activities were developed for Sepang teachers to use in the classroom and school grounds. Some of the activities encouraged village elders to share their traditional knowledge in the school setting.

Outcomes

Seven months since the work has been completed what did the project achieve? In order to implement and further develop the program the Bali garden has created an education officer position and education team. The education officer is responsible for coordinating, implementing, documenting and developing the education program in the Garden.

Their work has included:

- Contacting schools throughout Bali to publicise the booklets and encourage visits.
- Requesting official approval for the booklets to be used in public schools as a part of the curriculum.
- Organising training conferences with teachers and school principals at the Bali Botanic Garden.
- Developing a questionnaire for students and teachers to review the value of the material.
- Reviewing and making changes to existing booklets from the results of questionnaires and arranging for a redraft and reprint after a year of using the booklets.
- Planning special events and schools days at the Garden (eg. Dinosaur day)
- A successful conference for Senior High School students based on the materials.

The publication of the activity booklets has opened many new options for environmental education at the Bali Botanic Gardens. A number of schools have been visited to explain the program with the result that more schools are now using the garden for education purposes. The booklets have been used as a model for other Indonesian Botanic Gardens to develop their own programs and for display at many promotional events. The material has also been included in the conservation-training curriculum program for school teachers of junior and senior high school students.

Benefits for the Adelaide garden include much more up-to-date information for a number of Asian and Indonesian plant use projects. As a part of an ongoing association between the gardens Bali staff are referencing Indonesian studies material prior to publication. The first hand ethnobotanical and ecological information collected on the visit has also provided face to face teaching programs with greater integrity and validity in daily lessons in the garden.

Keys to Success

There were a number of reasons for the success of the project. Firstly, the staff selected possessed a diverse range of complementary skills. Secondly, a reasonable, uninterrupted length of time was allowed for the work to be completed. No phones, no meetings, no diversionary tasks meant a continuity that allowed close knit, productive working relationships to develop. Working together over an extended time frame also had many benefits beyond the work itself. It created an informal framework for vigorous discussion that involved sharing, questioning and refining ideas.

Finally, as one might guess, the language barrier did present a few headaches at times. However, more often than not it was also cause for much humour and laughter as we tried to make ourselves understood in each other's native language. Luckily the plant names were all in Latin.

▲ Resumé

Cet article traite d'un projet commun très intéressant entre le Jardin Botanique d'Adélaïde en Australie et le Jardin botanique Cabang Balai Kebun Raya Eka Karya à Bali. Les responsables de l'éducation des deux jardins se sont retrouvés à Bali pour cinq semaines pour produire du matériel afin de développer des programmes scolaires à Bali et collecter des informations et des images dans le domaine ethnobotanique et écologique pour un CDROM sur l'utilisation traditionnelle des plantes en Indonésie. Suite à ce projet, le jardin botanique de Bali a recruté un animateur et une équipe

pour l'éducation pour implanter le programme éducatif. Un nombre croissant d'écoles utilise maintenant le jardin dans un but éducatif et le matériel mis au point a été utilisé comme modèle pour les autres Jardins botaniques indonésiens. Le Jardin Botanique d'Adélaïde a aussi tiré bénéfice de ce projet. Il possède beaucoup plus d'informations actualisées sur l'usage des plantes en Asie et en Indonésie et ses programmes sont basés sur des données plus justes et plus valides.

● Resúmen

Este artículo expone un proyecto conjunto muy estimulante entre el Jardín Botánico de Adelaida, Australia, y el Jardín Botánico Cabang Balai Kebun Raya Eka Karya de Bali. Durante cinco semanas personal educativo relevante de ambos jardines trabajó conjuntamente en Bali en el desarrollo de programas escolares, recopilando información de primera mano etnobotánica y ecológica, así como imágenes para un CDROM sobre usos tradicionales indonesios de las plantas. Como resultado del proyecto, el JB de Bali designó un responsable y un equipo para el cumplimiento del programa educativo. Cada día son más las escuelas que utilizan este Jardín como recurso educativo, y los materiales elaborados en este proyecto han servido de modelo para otros jardines botánicos de Indonesia. El JB de Adelaida también se ha beneficiado del proyecto, ya que ha puesto al día la información sobre el uso de las plantas en Asia y, en particular, en Indonesia. Además sus programas de enseñanza han adquirido una mayor validez e integridad.

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Resources

Recursos

Disponibles

resources

Evaluating Environmental Education

Stokking, H., van Aert, L.,
Meijberg, W., Kaskens, A.
ISBN 2-8317-0499-5

Publishers: IUCN Commission
on Education and
Communication, IUCN
Publications Services Unit,
219c Huntingdon Road,
Cambridge CB3 0DL, U.K.

Tel: (44) 1223 277894

Fax: (44) 1223 277175.

Email: info@books.iucn.org.

Price: £12.50 or \$US 20 plus
postage and packing

This book looks in depth at evaluation of environmental education programmes. It takes a fictional character 'Sandra' and looks at how she can adopt a more systematic approach to the activities she runs in the Environmental Education Centre where she works. The book explains the purpose of evaluation, outlines the steps behind the evaluation process and demonstrates how evaluation can be introduced as a regular activity in an organisation.

More detailed information is presented later in the book, dealing with both the theory and practice of carrying out large scale and comprehensive evaluations of education programmes and addressing areas such as:

- clarifying objectives
- identifying target groups
- data collection methods
- developing appropriate research tools
- collecting, processing, analysing and interpreting data
- compiling and evaluation report.

disponibles

Evaluer l'Éducation à l'Environnement

Stokking, H., van Aert, L.,
Meijberg, W., Kaskens, A.
ISBN 2-8317-0499-5

Editeur : IUCN Commission
sur l'Education et la
Communication, IUCN Service
des Publications, 219c
Huntingdon Road, Cambridge
CB3 0DL, U.K.

Tel: (44) 1223 277894

Fax: (44) 1223 277175.

Email: info@books.iucn.org.

Prix : £12.50 ou \$US 20, plus
les frais de port et
d'emballage.

Ce livre analyse en détail les méthodes d'évaluation des programmes d'éducation à l'environnement. A partir d'un personnage fictif, Sandra, il décrit comment celle-ci peut adopter une approche plus systématique des activités qu'elle conduit dans le Centre d'Éducation à l'Environnement où elle travaille. Le livre explique les objectifs de l'évaluation, souligne les étapes à suivre avant le processus d'évaluation, et démontre comment l'évaluation peut être vécue comme une activité régulière dans le fonctionnement d'une structure.

Des informations complémentaires détaillées sont présentées à la fin de l'ouvrage, sur la façon théorique et pratique de conduire des évaluations à grande échelle, d'effectuer une évaluation détaillée des programmes éducatifs, et aborde des sujets tels que:

- clarifier les objectifs
- identifier les publics cibles
- connaître les différentes méthodes de collecte des données

recursos

Evaluando la Educación Ambiental

Stokking, H., van Aert, L.,
Meijberg, W., Kaskens, A.
ISBN 2-8317-0499-5

Publicado por: IUCN
Commission on Education and
Communication, IUCN
Publications Services Unit,
219c Huntingdon Road,
Cambridge CB3 0DL, U.K.

Tel: (44) 1223 277894

Fax: (44) 1223 277175.

Email: info@books.iucn.org.

Precio: £12.50 o \$US 20 más
gastos de envío

Este libro hace con profundidad una evaluación de los programas de educación ambiental. En éste se usa un personaje ficticio 'Sandra' y describe como ella puede hacer un aprovechamiento más sistemático de las actividades que ella desarrolla en el Centro de Educación Ambiental, donde ella trabaja. El libro explica el propósito de la evaluación, delinea los pasos detrás del proceso de evaluación y demuestra como la evaluación puede ser introducida como una actividad regular en la organización.

Posteriormente, más información detallada es presentada en el libro, tratando con ambos, la teoría y la práctica, de llevar a cabo evaluaciones comprensivas y a gran escala de los programas de educación y destacando áreas tales como:

- clarificación de objetivos
- identificación de grupos objetivos
- métodos de colección de datos
- desarrollo de herramientas de investigación apropiadas

■ resources

The text is illustrated throughout with case studies of evaluations carried out in Holland and elsewhere.

ESDebate - International Debate on Education for Sustainable Development
Frits Hesselink, Peter Paul van Kempen, Arjen Wals
Publishers: IUCN Commission on Education and Communication, World Headquarters, Rue Mauverney 28, CH-1196 Gland, Switzerland.

Tel: (41) 22 999 00 01
Fax: (41) 22 999 00 02.
Email: ctn@hq.iucn.org
Available free of charge plus postage and packing

In 1999, members of the IUCN Commission on Education and Communication participated in an internet 'debate' on education for sustainable development (ESD). How the debate was structured and organised, as well as a summary of the

▲ disponibles

- collecter, traiter, analyser et interpréter les données
- compiler et préparer un rapport d'évaluation.

Le texte est illustré par des cas concrets d'évaluation réalisés en Hollande et dans d'autres pays.

ESDebate - Débat international sur l'Éducation au Développement Durable
Frits Hesselink, Peter Paul van Kempen, Arjen Wals
Editeur : IUCN Commission sur l'Éducation et la Communication, Siège Central, 28 Rue Mauverney, CH-1196 Gland, Suisse.

Tel: (41) 22 999 00 01
Fax: (41) 22 999 00 02.
Email: ctn@hq.iucn.org
Disponible gratuitement. Frais de port et d'emballage en plus.

En 1999, les membres de la Commission sur l'Éducation et la Communication de l'IUCN ont participé à un débat sur l'Éducation au Développement Durable sur Internet. Cette publication rapporte comment les débats étaient organisés, ainsi que les résumés des discussions.

La lecture de ce livre permet de recueillir un grand nombre d'informations précieuses, et donne un aperçu des différents points de vue qui existent dans l'Éducation au Développement Durable. Le chapitre 5 traite des étapes et des conseils pour mettre en place des programmes d'Éducation au Développement Durable, et le dernier chapitre fait une évaluation du débat sur l'Éducation au Développement Durable. L'envoi comprend un CD-ROM qui reprend tous les éléments du forum du site web.

● recursos

- colecta, procesado, análisis e interpretación de datos
- compilación y reportes de evaluación.

El texto es ilustrado con casos de estudio de evaluación llevadas a cabo en Holanda y algunas otras partes.

ESDebate- Debate Internacional Sobre Educación para Desarrollo Sostenible
Frits Hesselink, Peter Paul van Kempen, Arjen Wals
Publicado por: IUCN Commission on Education and Communication, World Headquarters, Rue Mauverney 28, CH-1196 Gland, Switzerland.

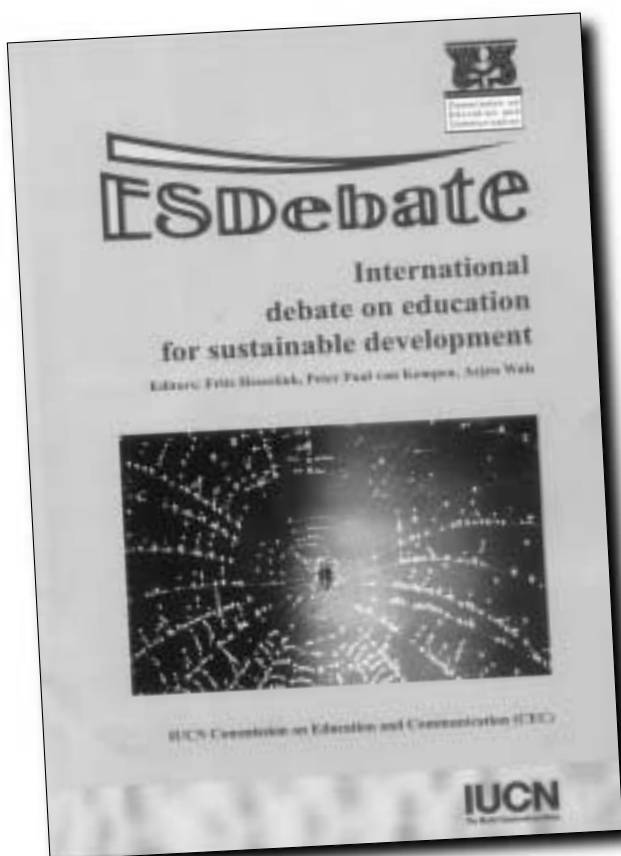
Tel: (41) 22 999 00 01
Fax: (41) 22 999 00 02.
Email: ctn@hq.iucn.org
Disposición libre de cargo más gastos de envío

En 1999, miembros de la Comisión sobre Educación y Comunicación de la IUCN participaron en el 'debate' sobre educación para el desarrollo sostenible (ESD). En esta publicación se documenta la forma en que se estructuró y organizó el debate, así como también un resumen de las discusiones. Una gran cantidad de información valiosa puede ser colectada de la lectura de este libro y una enseñanza ganada en la variedad de puntos de vistas que existen sobre educación para el desarrollo sostenible. El Capítulo 5 ofrece algunos pasos y lineamientos para el desarrollo de programas ESD, mientras el capítulo final evalúa el debate ESD. Se incluye un CDROM que captura todos los elementos del sitio web.

Waking up - Using Plants to Investigate Sustainable Development at KS2
Development Education Centre [Birmingham], 998 Bristol Road, Selly Oak, Birmingham B29 6LE, U.K.

ISBN 0 948838 65 5
Precio £7.00 mas £1.40 por costos de envío

Este libro se enfoca al uso de las plantas como un estímulo para la



resources

discussions, are documented in this publication. A great deal of valuable information can be gathered from reading this book and an insight gained into the variety of views that exist on education for sustainable development. Chapter 5 offers some steps and guidelines for developing ESD programmes, while the final chapter evaluates the ESD debate. A CDROM is included that captures all of the elements of the website.

Waking up - Using Plants to Investigate Sustainable Development at KS2
Development Education Centre [Birmingham], 998 Bristol Road, Selly Oak, Birmingham B29 6LE, U.K.
ISBN 0 948838 65 5
Price £7.00 plus £1.40 postage and packing

This resource book focuses on using plants as a stimulus for education for sustainable development (ESD). Aimed at teachers, it encourages them to support young people to investigate issues of sustainability through asking challenging questions centred around four areas: natural, economic, social and political. The book is packed with plenty of practical ideas for teaching ESD as well as providing background information on sustainable development and reasons for using enquiry-based learning. A section is also included on resources and contacts.

The Elemental Suitcase
Royal Society for the Protection of Birds (RSPB), Education Department, The Lodge, Sandy, Bedfordshire SG19 2DL U.K.
Price £25 inclusive of package and postage

The Elemental Suitcase has been created for leaders of out-of-school clubs for 7-11 year olds. It contains a leader's guide, full colour posters, 'elemental passports' (for the children to keep their own record of the project) and stickers for the passports and children after each session. 16 sessions of activities are offered to encourage children to explore

disponibles

Réveil - Utiliser les Plantes Pour Sonder le Développement Durable au KS2
Development Education Centre [Birmingham], 998 Bristol Road, Selly Oak, Birmingham B29 6LE, U.K.

ISBN 0 948838 65 5
Prix £7.00, plus £1.40 de frais de port et d'emballage

Cet ouvrage traite de l'utilisation des plantes comme 'stimulant' pour l'Education au Développement Durable. Destiné aux professeurs, il les encourage à pousser les enfants à soulever les problèmes liés au Développement Durable, en posant des questions pertinentes centrées autour de quatre thématiques:

l'environnement, l'économie, le social et la politique. L'ouvrage est proposé avec une foule d'idées pratiques pour enseigner l'Education au Développement Durable, tout en fournissant des informations sur ce concept, et l'intérêt d'utiliser l'enquête comme méthode d'apprentissage. Une partie est également consacrée aux ouvrages disponibles sur ce sujet et une liste de contacts.

La Valise Pédagogique 'Les Éléments de la Nature'
Société Royale pour la protection des oiseaux (RSPB), Département Éducatif, The Lodge, Sandy, Bedfordshire SG19 2DL U.K.

Prix: £25 incluant l'emballage et les frais de port

'Les éléments de la nature' est une valise pédagogique destinée aux responsables qui accompagnent des groupes d'enfants de 7 à 11 ans lors de sorties de découverte de la nature. Elle comporte un 'cahier pour l'accompagnateur', des posters en couleur, des passeports 'éléments de la nature' (sur lesquels les enfants peuvent inscrire leurs notes), et des autocollants à coller dans les passeports et pour les enfants après chaque session. 16 sessions ou activités sont proposées pour encourager les enfants à explorer les problèmes d'environnement et de société. L'accent est mis sur l'action, la découverte, l'art et les activités manuelles.

recursos

educación sostenible (ESD). Dirigido a los maestros, los llama a apoyar gente joven a investigar temas de sustentabilidad a través de preguntas de reto centradas a cuatro áreas: natural, económicas, sociales y políticas. El libro está lleno de ideas prácticas para la enseñanza ESD así también como provee información básica sobre desarrollo sostenible y razones para usar el aprendizaje basado en la pregunta. También se incluye una sección sobre recursos y contactos.



El Estuche Elemental
Royal Society for the Protection of Birds (RSPB), Education Department, The Lodge, Sandy, Bedfordshire SG19 2DL U.K.
Precio £25 incluyendo envío por correo

El estuche elemental ha sido creado por líderes de clubes fuera de escuela para 7-11 años de edad. Contiene una guía para el líder, poster a todo color, 'pasaportes elementales' (para que los niños mantengan sus propios registros del proyecto) y etiquetas para los pasaportes después de cada sesión. Se ofrecen 16 sesiones de

■ resources

environmental and community issues. The emphasis is on doing, discovery and art and craft. A host of colourful characters join the children as they develop an understanding of 'how the world works', breathing life into environmental education in an original way.

Electronic Resources

<http://eval.cgu.edu/info/othereval>
This site provides useful links to a range of organisations concerned with evaluation. It also lists FREE resources for methods in evaluation and social research. The focus is on 'how-to' do evaluation research and the methods used: surveys, focus groups, sampling, interviews and oral history. Most of these links are to resources that can be read over the web.

<http://amol.org.au/evrsig/evrsig.html>
This is the web site for the Evaluation and Visitor Research Special Interest Group (EVRSIG) of Museum's Australia. Museums are renowned for being leaders in the evaluation field and so it is well worth visiting this site. There is a methodology section, which provides advice on evaluative research tools, as well as a library that links to a range of papers presented at the 1998 Conference on Evaluation and Visitor Research in Australia. Here papers can be found on front-end evaluation, programme evaluation and applying visitor research and evaluation to outdoor interpretation. This site also connects to worldwide resources including national evaluation organisations around the globe and publishers who feature books on evaluation.

www.cee.org.uk
This site, developed by the UK Council for Environmental Education, provides information to support teaching and learning for sustainable development. It includes details of organisations supporting ESD and provides details of resources, competitions, awards, grants, training and events.

▲ disponibles

Une foule de personnages colorés accompagne les enfants afin développent une compréhension de 'comment le monde fonctionne', une façon originale d'aborder l'éducation à l'environnement.

Les Ressources Électroniques

<http://eval.cgu.edu/info/othereval>
Ce site fournit des liens très utiles sur un choix important de d'organismes concernés par l'évaluation. Il liste également des documents gratuits sur les méthodes d'évaluation et sur la recherche sociale. L'accent est mis sur 'comment faire' pour conduire une recherche en évaluation et la meilleure méthode à utiliser: enquête, groupes cibles, échantillonnage, entretiens ou histoires orales. La plupart des liens font référence à des sites qui peuvent être visités sur le web.

<http://amol.org.au/evrsig/evrsig.html>
Ceci est le site web du groupe de recherche sur les visiteurs des muséums australiens (EVRSIG) sur l'évaluation. Les muséums sont réputés pour être leaders dans le domaine de l'évaluation, il est donc intéressant de visiter ce site. Il y a une section consacrée à la méthodologie qui fournit des conseils sur les outils de recherche en évaluation, ainsi qu'une bibliothèque qui propose des liens avec un choix de conférences présentées lors du congrès de 1998 consacré à l'évaluation et les recherches sur les visiteurs en Australie. Là, des textes concernant l'évaluation, les programmes d'évaluation, l'application de la recherche sur les publics, et l'évaluation sur l'interprétation en extérieur peuvent être trouvés. Par ailleurs, le site fait des liens avec des ressources disponibles au niveau mondial, ainsi qu'aux organismes du monde entier, et aux éditeurs qui proposent des ouvrages sur l'évaluation.

www.cee.org.uk
Ce site, mis en place par le Conseil pour l'Education Environnementale du Royaume Uni, délivre de l'information pour aider à l'apprentissage et à

● recursos

actividades para fomentar en los niños la exploración de los temas ambientales y sobre la comunidad. El énfasis radica en hacerlo, descubrirlo y en arte y artesanía. Un sinnúmero de caracteres coloridos unen a los niños conforme ellos van desarrollando un entendimiento de 'cómo el mundo funciona', respirando vida en educación ambiental en una forma original.

Recursos Electrónicos

<http://eval.cgu.edu/info/othereval>
Este sitio proporciona ligas útiles a un rango de organizaciones concernientes con la evaluación. Hay también recursos GRATIS para métodos en evaluación e investigación social. El enfoque se hace sobre 'Cómo hacer' investigación de evaluación y el método utilizado: encuestas, grupos de enfoque, muestreo, entrevistas e historia oral. La mayoría de estas ligas son para recursos que pueden ser leídos en el web.

<http://amol.org.au/evrsig/evrsig.html>
Este es el sitio web para los Grupos de Interés Especial en Evaluación e Investigación del visitante (EVRSIG) del Museo de Australia (Evaluation and Visitor Research Special Interest Group of Museum's Australia). Los museos son renovados para ser líderes en el campo de la evaluación así que vale la pena visitar este sitio. Hay una sección de metodología, que provee consejo sobre herramientas de investigación educativa, así también como una biblioteca que liga un rango de artículos presentados en la Conferencia sobre Evaluación e Investigación del visitante celebrada en 1998 en Australia. Aquí se pueden encontrar artículos sobre evaluación de principio a fin, programas de evaluación y aplicación de encuesta del visitante y evaluación a la interpretación extramuros. Este sitio también se liga a los recursos a nivel mundial incluyendo la evaluación nacional a organizaciones alrededor del planeta y editores quienes producen libros sobre evaluación.

resources



www.wwflearning.co.uk

Launched in October 2000, wwfllearning is an Education for Sustainable Development internet portal. It provides on-line access for Education for Sustainable Development news, opinion, information, downloadable resources and curriculum projects from a wide range of organisations.

www.peacechild.org/bethechange

Be the Change! is the first youth-led, web-based international development programme focusing entirely on projects developed and executed by young people aged 12-25. The aim of the programme is to inspire young people around the world to 'be the change they want to see in the world'. The web page documents projects proposed by young people to address problems within their communities and invites people to support their projects financially. A message board enables people to communicate directly with the young people or groups.

www.ltl.org.uk

Learning through Landscapes, a UK based charity, supports schools to develop well designed and managed school grounds for children. Its web site provides information on all aspects of the development of school grounds and a forum for teachers to share ideas and information. The information may be of use to botanic gardens working with schools to develop school gardens.

<http://jardinsdenfants.free.fr>

This is the site for a project which was created by several Brest (France) environmental education organisations who wanted to increase the awareness of school children as to the importance of green spaces in urban areas. The richness of this project comes from the different approaches as schools in 11

disponibles

l'enseignement des techniques de développement durable. Il comprend des détails sur l'organisation, les ressources, les concours, les prix, des exercices et des événements.

www.wwflearning.co.uk

Lancé en octobre 2000, wwfllearning est un portail sur l'éducation au développement durable. Il fournit un accès en ligne de nouvelles sur l'éducation au développement durable, des avis, des informations, des ressources téléchargeables et des projets d'études d'un grand nombre d'organismes.

www.peacechild.org/bethechange

Sois le changement ! C'est le 1er programme international de développement sur le web dirigé par des jeunes, consacré entièrement à des projets développés et exécutés par des jeunes gens de 12 à 25 ans. Les buts sont d'inspirer aux jeunes populations autour du monde d'être le changement qu'ils veulent pour la planète. Ces projets de pages web proposés par les jeunes posent les problèmes dans les communautés et demandent de l'aide financière pour les projets. Une messagerie permet aux gens de communiquer directement avec les jeunes ou les groupes.

www.ltl.org.uk

Apprentissage par le paysage, une association anglaise aide les écoles à promouvoir des espaces bien conçus et entretenus pour les enfants. Ce site web offre des informations sur tous les aspects de création de ces espaces pour les écoles et un forum pour les professeurs pour partager idées et informations. L'information, justement, peut être à l'usage des Jardins Botaniques qui travaillent avec des écoles à développer des jardins scolaires.

<http://jardinsdenfants.free.fr>

C'est le site d'un projet créé à Brest (France) par plusieurs organisations d'éducation environnementale qui cherchent à augmenter la connaissance des enfants des écoles au regard de l'importance des espaces verts dans les sites urbains. La richesse

recursos

www.cee.org.uk

Este sitio, desarrollado por el Consejo de Educación Ambiental de Reino Unido, provee información para apoyar la enseñanza y aprendizaje para el desarrollo sostenible. Este incluye detalles de organizaciones que apoyan el programa ESD y provee detalles de recursos, competencias, premios, apoyos, entrenamiento y eventos.

www.wwflearning.co.uk

Lanzado en Octubre del 2000, wwfllearning es un portal en internet para Education para el Desarrollo Sostenible. Este provee una línea de acceso para noticias, opiniones, información, recursos accesibles y proyectos en la curricula de una amplio rango de organizaciones sobre Educación y Desarrollo para Desarrollo Sustentable.

www.peacechild.org/bethechange

Haz el cambio! Es el primer programa de web dirigido a la juventud basado en el programa internacional de desarrollo enfocado totalmente a proyectos desarrollados y ejecutados por gente joven de entre 12-25 años de edad.

El objetivo del programa es inspirar gente joven alrededor del mundo para 'hacer el cambio que ellos quieren en el mundo'. La página web documenta proyectos propuestos por gente joven para solucionar problemas dentro de sus comunidades e invita a la gente a apoyarlos financieramente. Un mensaje al principio aconseja a la gente a comunicarse directamente con la gente joven o grupos.

www.ltl.org.uk

Aprendiendo a través del Paisaje, una organización no lucrativa establecida en Reino Unido apoya a las escuelas a desarrollar jardines bien diseñados y manejados para niños. Su sitio web provee información sobre todos los aspectos del desarrollo de jardines para las escuelas y un foro para que los maestros compartan ideas e información. La información puede ser de utilidad para jardines botánicos trabajando con escuelas para desarrollar jardines de escuela.

■ resources

towns across the world including North and Central Africa, Japan, USA and North and South Europe work together to introduce urban ecology and world biodiversity to 10-11 year old children.

This project started in September 2000 and will end in June 2001 and the web site will be used for communication between the organisers in the 11 towns. The project involves 330 children designing green spaces by taking part in activities that raise their awareness and understanding of urban ecology. During the project the children will create a green space model and the exhibitions will also be featured on the site.

www.globe.gov

Global Learning and Observations to Benefit the Environment (GLOBE) is a worldwide network of students, teachers and scientists working together to study and understand the global environment. In more than 90 countries 9500 students are working with research scientists to learn more about our planet.

GLOBE students make environmental observations at or near their schools and report their data through the Internet. Scientists use GLOBE data in their research and provide feedback to the students to enrich their science education. Through the internet, students from all over the world can communicate and improve their knowledge of the environment, other cultures and ecosystems.

▲ disponibles

du projet vient des différentes approches offertes par les écoles de 11 villes autour du monde comprenant le Nord et l'Afrique Centrale, le Japon, les Etas-Unis, le Nord et le Sud de l'Europe qui travaillent ensemble pour introduire l'écologie urbaine et la biodiversité mondiale auprès des 10-11 ans.

Ce projet a démarré en septembre 2000 et finira en juin 2001 et le site web sera utilisé pour la communication entre les organisateurs de ces 11 villes. 330 enfants sont concernés dans la conception d'espaces verts en prenant part à des activités qui augmentent la connaissance et la compréhension de l'écologie urbaine. Durant l'exercice les enfants créeront un espace vert modèle et des expositions qui se dérouleront aussi sur le site.

www.globe.gov

GLOBE est un réseau signifiant Apprentissage et Observation Bénéficiant à l'Environnement. C'est un réseau mondial d'étudiants, professeurs et scientifiques travaillant ensemble à étudier et comprendre l'environnement. Dans plus de 90 pays 9500 étudiants travaillent avec des scientifiques, des chercheurs à apprendre plus sur la planète. Les étudiants de GLOBE effectuent des observations sur l'environnement dans ou près de leurs écoles et consistent leurs données sur le Net. Les scientifiques utilisent les données de GLOBE dans leurs recherches et en échange retournent vers les étudiants leurs résultats pour enrichir leurs cours. A travers le Net des étudiants du monde entier peuvent communiquer et comparer leurs connaissances de l'environnement, d'autres cultures et des écosystèmes.

● recursos

<http://jardinsdenfants.free.fr>

Este es el sitio para un proyecto el cuál fue creado por algunas organizaciones de educación ambiental Brest (Francia) quienes quieren incrementar la atención de las escuelas de niños respecto a la importancia de los espacios verdes en áreas urbanas. La riqueza de este proyecto radica en el trabajo conjunto y diferentes apreciaciones que las escuelas de 11 pueblos a través del mundo incluyendo Norte y Centro de Africa, Japón, Estados Unidos y Europa del Norte y Sur hacen para introducir ecología urbana y biodiversidad a nivel mundial a 10 -11 años de edad.

Este proyecto se inició en Septiembre del 2000 y terminará en Junio del 2001 y el sitio web será usado para la comunicación entre los organizadores de los 11 pueblos. El proyecto involucra 330 niños diseñando sus espacios verdes como parte de las actividades que incrementarán su preocupación y entendimiento de la ecología urbana. Durante el proyecto los niños crearán un modelo de espacio verde y la exhibiciones serán presentadas en el sitio.

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Aprendizaje Global y Observaciones para Beneficio del Medio Ambiente (GLOBE) es una red de estudiantes, maestros y científicos a nivel mundial, que trabajan juntos para estudiar y entender el medio ambiente global. 9500 estudiantes de más de 90 países están trabajando con científicos que investigan sobre cómo aprender más acerca de nuestro planeta.

Los estudiantes de GLOBE hacen observaciones sobre el medio ambiente en o cerca de sus escuelas y reportan sus datos a través del Internet. Los científicos usan GLOBE en su investigación y proveen retroalimentación a los estudiantes para enriquecer su educación sobre la ciencia. A través del internet, estudiantes de todo el mundo pueden comunicarse e improvisar su conocimiento del medio ambiente, otras culturas y ecosistemas.

Botanic Gardens Conservation International

Membership Application Form

Established in 1987, BGCI works with botanic gardens and the wider conservation community in support of plant conservation around the world. Advocacy, capacity building, networking, sharing information, training and education are all key activities in pursuit of this goal. We currently have over 500 member institutions in 110 countries, working together to implement the new *International Agenda for Botanic Gardens*.

Garden members receive our regular publications *BGCNews (Botanic Gardens Conservation News)* and *Roots (Education Review)* and a wide range of other publications, materials and services, such as *The Darwin Technical Manual for Botanic Gardens* and *BG-Recorder 2*, a computer software package for plant records. Corporate members receive *BGCNews* and *Roots*, have access to wider partnerships, advice on conservation issues and opportunities for collaboration in key projects. Associate members and Conservation donors receive *BGCNews* and *Roots*, while Individual members have a choice of *BGCNews* or *Roots*. Members are invited to *The International Botanic Gardens Conservation Congress* and *The International Congress on Education in Botanic Gardens*, held every three years.

If you support the mission of BGCI and would like to belong to this world network for plant conservation and sustainable living, please join BGCI using this form. With your support, we can make a difference.

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Garden member (budget below US\$ 750,000)	160	220	220
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