

Botanic Gardens Conservation International Education Review

roots

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Education and horticulture

Science and the city

Permaculture and environmental learning in botanic gardens

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Cultivando plantas y personas en una de las ciudades más grandes y pobladas del mundo



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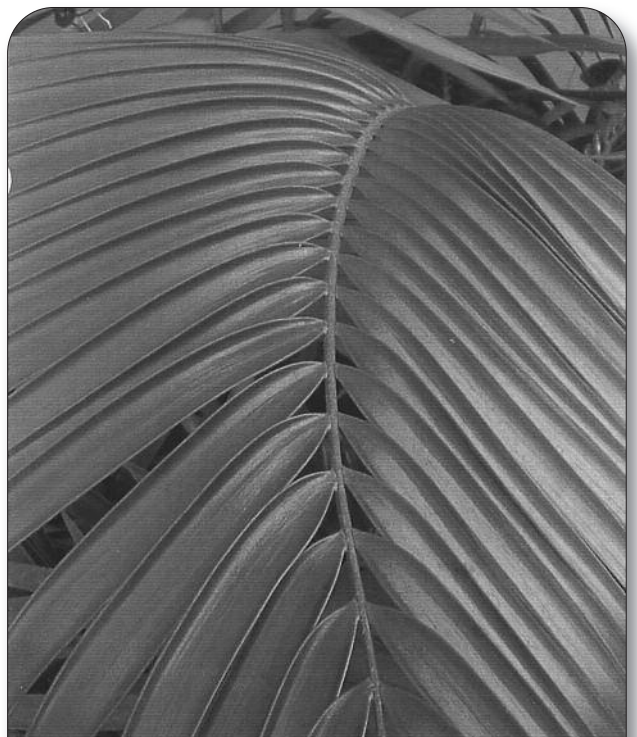
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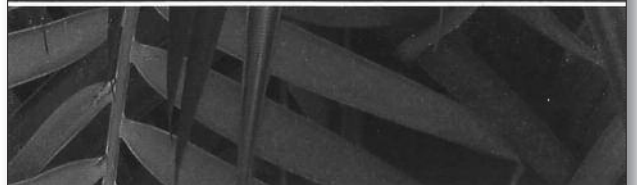
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First word: learning from horticulture's natural classroom

ENGLISH

The practice of horticulture – the cultivation of fruit, vegetables, flowers and ornamental plants – is one of the distinguishing characteristics of our species and, pursued in domestic back gardens or great commercial enterprises alike, is part of the fabric of almost every society in the world. We rely on horticulture for food and wealth, spiritual contemplation and aesthetic delight.

Today, with our growing awareness of the impact humankind is having on the environment, there is also recognition that horticulture has a significant role to play in implementing international strategies such as the Global Strategy for Plant Conservation (in particular Targets 8, 9 10 & 13) as well as the Millennium Development Goals. Hunger and poverty can be alleviated (MDG1) when people are given the means and skills to grow their own food. For women especially, the principal crop producers in many developing countries, horticulture has a considerable positive impact on livelihood and health (MDG3 & 5). Horticulture is also highly relevant to environmental sustainability (MDG7), encouraging selection of the most productive and disease resistant plant species in the face of global climate change.

2010 is the International Year of Biodiversity – affording botanic gardens an unmissable opportunity to highlight the intimate relationship between biodiversity and horticulture and underline the essential role that horticulture has to play in education. With over half the world's population now living in cities and the growth of the

FRANÇAIS

La pratique de l'horticulture, en d'autres termes la culture des fruits, légumes, fleurs et plantes ornementales, est l'une des caractéristiques propres à notre espèce et, réalisée autant dans les jardins de particuliers que par de grandes entreprises commerciales, fait partie du tissu qui constitue pratiquement toutes les sociétés du monde. Nous avons besoin de l'horticulture en termes d'alimentation et de source de richesse, de réflexion spirituelle et de plaisir esthétique.

Aujourd'hui, grâce à une plus grande prise de conscience quant à l'impact de l'homme sur l'environnement, l'horticulture est également reconnue pour son rôle important dans la mise en œuvre de stratégies internationales telles que la Stratégie mondiale pour la conservation des plantes (notamment les Objectifs 8, 9 10 et 13) et les Objectifs du millénaire pour le développement. La faim et la pauvreté peuvent être réduites (OMD1) si les populations reçoivent les moyens et les connaissances pour cultiver leur propre nourriture. Pour les femmes en particulier, principales cultivatrices dans de nombreux pays en voie de développement, l'horticulture a un impact positif considérable sur les moyens de subsistance et la santé (OMD3 et 5). L'horticulture est également fortement liée à la gestion durable de l'environnement (OMD7), par la promotion du choix des espèces végétales les plus productives et les plus résistantes aux maladies face au changement climatique planétaire.

2010 est l'Année internationale de la biodiversité, donnant aux jardins botaniques une opportunité à ne pas manquer en vue de mettre l'accent sur la relation étroite entre biodiversité et

ESPAÑOL

La horticultura - el cultivo de frutales, vegetales, flores y plantas de ornato- es una de las características distintivas de nuestra especie, y sea que se desarrolle en nuestros patios o en grandes consorcios comerciales, es parte del tejido de casi cualquier sociedad en el planeta. Dependemos de la horticultura para obtener alimentos y para cuidar nuestra salud, para deleite estético y espiritual.

Hoy en día, nuestra creciente toma de conciencia sobre el impacto de la humanidad en el ambiente, también se refleja en el reconocimiento del significativo papel de la horticultura en la implementación de estrategias tales como la Estrategia Global para la Conservación Vegetal (en particular las metas 8, 9, 10 y 13, así como los Objetivos de Desarrollo del Milenio (ODM). Hambre y pobreza pueden atenuarse (ODM1) cuando a la gente se le dan las formas y herramientas para cultivar su propio alimento. En particular para las mujeres, quienes son las principales agricultoras en muchos países en desarrollo, la horticultura tiene un considerable impacto positivo para la subsistencia y la salud (ODM 3 y 5). La horticultura también es sumamente relevante para la sustentabilidad ambiental (ODM 7), ya que promueve la selección de las especies más productivas y resistentes a enfermedades frente a la amenaza del cambio climático.

2010 es el Año Internacional de la Biodiversidad –aportándoles a los jardines botánicos una oportunidad que no pueden perder para destacar la estrecha relación que existe entre la biodiversidad y la horticultura así como para resaltar el papel esencial que puede desempeñar al



urban poor outstripping their rural counterparts, the link between horticulture and sustainable communities has never been more important or urgent. Located, as many of them are, in cities and urban settings all over the world, botanic gardens are natural classrooms for people to learn about horticulture. In this issue of Roots we showcase a number of innovative education programmes that demonstrate the potential and significance of botanic gardens in this area.

We start, as all good lessons do, with the basics – with training. From Scotland, Leigh Morris of Edinburgh's Royal Botanic Garden, brings us news of two training packages that have been developed at Edinburgh, one in field botany and the other in horticulture. Both certificated courses are structured, yet flexible, and directed primarily at staff working in botanic gardens. Leigh outlines RBGE's vision and its plans for encouraging a wider take-up of the courses in countries where a real need for trained horticulturalists has been identified.

Moving our focus to Mexico, González Mateos and colleagues, from Xochitla Botanic Garden in Mexico City explains how horticulture is integral to the garden's many training courses. Over the past 10 years the garden has developed substantial expertise in propagation, conservation, horticultural management and environmental education. It also has a commitment to practical sustainable development that informs its programmes. With a growing population now in excess of 20 million, Mexico City is confronting immense sustainability issues and the significance of Xochitla's courses cannot be underestimated.

Writing from South Africa, Martin Clement and colleagues at Durban Botanic Garden, describes how Durban's permaculture garden is challenging conventional perceptions of food

horticulture, et de souligner le rôle essentiel que doit avoir l'horticulture dans le domaine de l'éducation. Avec plus de la moitié de la population mondiale actuelle résidant en ville et la croissance de la pauvreté urbaine qui dépasse celle du milieu rural, le lien entre horticulture et communautés durables n'a jamais été si important ou urgent. Situés, comme la plupart d'entre eux, dans les villes et en cadre urbain de par le monde, les jardins botaniques représentent des écoles de la nature où le public peut s'intéresser à l'horticulture. Dans ce numéro de Roots, nous présentons une série de programmes pédagogiques novateurs, qui illustrent le potentiel et l'importance des jardins botaniques dans ce domaine.

À l'instar de toute bonne leçon, nous commençons par les bases, la formation. Du côté de l'Écosse, Leigh Morris du Jardin botanique royal d'Édimbourg nous informe sur deux maquettes pédagogiques développées à Édimbourg, l'une consacrée à la botanique de terrain et l'autre à l'horticulture. Les deux programmes donnant lieu à un diplôme sont structurés, mais flexibles, et essentiellement destinés au personnel de jardins botaniques. Leigh expose les idées et les projets du JBRE visant à inciter à une plus vaste participation aux programmes dans des pays qui ont été identifiés en raison de leur réel besoin en termes d'horticulteurs qualifiés.

Nous nous penchons ensuite sur le Mexique, où González Mateos et collègues du Jardin botanique Xochitla de Mexico City nous explique comment l'horticulture est une partie intégrante des nombreux programmes de formation du jardin. Avec une population croissante dépassant à présent les 20 millions, Mexico City se confronte à d'énormes problèmes de gestion durable et la portée des programmes de Xochitla ne peut donc être sous-estimée.

Martin Clement et collègues au Jardin botanique de Durban, nous écrit d'Afrique du Sud pour exposer comment le jardin de Durban en permaculture remet en question les perceptions conventionnelles quant à la culture d'aliments. Dans le centre éducatif du jardin, le public est non seulement formé à la culture durable d'aliments mais également encouragé à examiner de manière critique les contextes de société

horticulture en la educación. Con más de la mitad de la población mundial viviendo actualmente en las ciudades, y acompañada de un incremento de la pobreza urbana que despoja su contraparte rural, el lazo entre la horticultura y las comunidades sustentables nunca antes había sido tan importante ni tan urgente. Localizados, como muchos de ellos, en ciudades y asentamientos urbanos alrededor del mundo, los jardines botánicos son aulas naturales para que la gente aprenda horticultura. En este número Roots presenta una serie de programas educativos innovadores que comprueban el potencial y el significado de los jardines botánicos en este tema.

Empezamos, como en toda buena lección, con el aspecto básico: capacitación. Desde Escocia, Leigh Morris de los Reales Jardines Botánicos de Edimburgo, nos trae noticias sobre dos nuevos paquetes educativos que han desarrollado, uno sobre botánica y otro sobre horticultura. Ambos cursos están certificados y aunque estructurados son flexibles y están dirigidos principalmente a personal que trabaja en jardines botánicos. Leigh destaca la visión de los Reales Jardines Botánicos de Edimburgo y sus planes para promover una amplia cobertura de cursos en países donde se ha identificado una alta necesidad de capacitación de horticultores.

Moviéndonos a México, González Mateos y colegas, del Jardín de Xochitla en el valle de la ciudad de México explica cómo la horticultura es parte integral de muchos de los cursos del jardín. En los últimos 10 años, el jardín ha desarrollado una experiencia sustancial en propagación, conservación, manejo horticola y educación ambiental. Asimismo, el jardín tiene como compromiso incorporar las prácticas sustentables que menciona en sus programas educativos. Con una creciente población que rebasa los veinte millones, la ciudad de México está confrontando múltiples aspectos sobre sustentabilidad y la importancia de los cursos de Xochitla no puede subestimarse.

Desde Sudáfrica, Martin Clement y colegas del Jardín Botánico de Durban describe cómo el jardín de 'permacultura' está retando la percepción convencional del cultivo de alimentos. En el centro de capacitación del Jardín, no sólo enseñan

cultivation. In the garden's training centre, they not only educate people in growing food sustainably but also encourage them to critically examine the societal contexts in which horticulture is practiced. It could be argued that, through permaculture, Durban is fostering a revolution in the way people relate to plants!

In the UK, the Writhlington School Orchid Project is celebrated for successfully engaging children in horticulture. Lauren Gardiner from RBG Kew tells us how Writhlington's pupils learn about the diversity of the orchid family and its habitats around the world, how they propagate orchid species in vitro in school greenhouses and then sell their plants to the public. The funds they generate pay for students to undertake fieldtrips to orchid hotspots.

Another strength of horticultural education is its capacity for raising awareness about how horticulture impacts on our lives. An example is Newquay Zoo's 'dig for victory' garden, which has aroused considerable interest. In his article, Newquay's Mark Norris explains how this UK garden not only effectively communicates horticultural messages, but also encourages debate around associated issues such as food miles, food waste and recycling.

From China we hear about Shanghai Botanic Garden's Energy Plants Show, held in 2009. According to Yu-zhu Cai and colleagues, Shanghai's event highlighted the importance of horticulture in developing plants for new energy sources. In a metropolis of over 20 million people, Shanghai Botanic Garden is uniquely placed and has been officially recognised as a Science Education Base, exemplifying the key role of botanic gardens as communicators of science and horticulture.

The engagement of well-trained horticulturalists with an informed public is essential to biodiversity conservation in a rapidly changing environment and botanic gardens provide ideal venues for this interaction to occur. The task for us is to work to help them get the support and investment they need.

Julia Willison

dans lesquels l'horticulture est pratiquée. L'on pourrait soutenir qu'à travers la permaculture Durban encourage une révolution par rapport à la relation que les gens entretiennent avec les plantes !

Au Royaume-Uni, le Projet orchidée de Writhlington School est mis en exergue pour avoir suscité, avec succès, l'intérêt des enfants pour l'horticulture. Lauren Gardiner du JBR de Kew nous décrit comment les élèves de Writhlington se forment sur la diversité de la famille des orchidées et sur ses habitats à travers le monde, comment ils reproduisent des espèces d'orchidées in vitro dans les serres de l'école et vendent ensuite leurs plantes au public. Les fonds ainsi générés permettent aux étudiants de réaliser des sorties sur les sites les plus fameux pour observer les orchidées.

Un autre point fort de l'éducation à l'horticulture est sa capacité de sensibilisation quant aux impacts de l'horticulture sur nos vies. Le jardin « bêcher pour la victoire » du Zoo de Newquay est un bon exemple, qui a suscité un grand intérêt. Dans son article, Mark Norris, de Newquay, explique comment ce jardin du Royaume-Uni non seulement transmet des messages sur l'horticulture de manière efficace, mais encourage également au débat autour de problématiques liées telles que les kilomètres alimentaires, les déchets alimentaires et le recyclage.

Du côté de la Chine, des informations nous sont fournies sur la Manifestation sur les plantes énergétiques du Jardin botanique de Shanghai, tenue en 2009. D'après Yu-zhu Cai et collègues, de Shanghai, cet événement a souligné l'importance de l'horticulture pour le développement de plantes comme nouvelles sources d'énergie. Le Jardin botanique de Shanghai a été officiellement reconnu en tant que Centre d'éducation scientifique, illustrant le rôle clé que jouent les jardins botaniques dans la communication en matière scientifique et horticole.

L'engagement d'horticulteurs bien formés auprès d'un public averti est essentiel dans le cadre de la conservation de la biodiversité, dans un environnement livré à des changements rapides, et les jardins botaniques constituent des lieux parfaits pour la réalisation de ces interactions.

a la gente a cultivar plantas alimenticias de manera sustentable, sino que también los motivan para que exploren los contextos sociales en los que se practica la horticultura. Se puede decir que, a través de la permacultura, Durban está provocando una revolución en la relación de las plantas con la gente!

En el Reino Unido, el Proyecto Orquídea de la Escuela Writhlington celebra el éxito de involucrar a los niños en la horticultura. Lauren Gardiner de los Reales Jardines Botánicos de Kew, nos comenta cómo los alumnos de esta escuela aprenden acerca de la diversidad de la familia de las orquídeas, sobre sus hábitats alrededor del mundo, cómo se propagan lagunas de sus especies in vitro en los invernaderos de la escuela y luego venden sus plantas al público. Con los fondos de las ventas pagan viajes de campo para los alumnos a lugares donde crecen orquídeas.

Otra fortaleza de la educación en horticultura es su capacidad de crear conciencia acerca del impacto que puede tener la horticultura en nuestra vida. Un ejemplo es el jardín del zoológico Newquay, el cual ha despertado un inusitado interés. En este artículo, Mark Norris, explica cómo este jardín del Reino Unido no sólo comunica de manera muy efectiva sus mensajes, sino que también fomenta el debate acerca de temas relacionados como el kilometraje en la transportación de alimentos, desperdicio de alimentos y reciclado.

Desde China nos llegan noticias de la Exposición del Jardín Botánico de Shanghai sobre Plantas para Biocombustibles, la cual se realizó en 2009. Según Yu-zhu Cai y colegas, el evento destacó la importancia de la horticultura en el desarrollo de plantas como nuevas fuentes de energía. El Jardín Botánico de Shanghai ha sido oficialmente reconocido como Base de Educación para la Ciencia, siendo un ejemplo del papel central de los jardines botánicos como comunicadores de ciencia y horticultura.

La conexión entre de personas adecuadamente capacitadas en horticultura con un público informado es esencial para la conservación de la biodiversidad frente a un ambiente altamente cambiante y los jardines botánicos proporcionan el medio ideal para que esta interacción ocurra.

Certificate courses

changing the way you grow and identify plants



Sophie Neale (RBGE) delivers the Certificate in Practical Field Botany in Iraq (Anna Bachman)

“ These courses are designed to deliver the fundamental, practical, ‘key skills’ a field botanist or horticulturist requires ”

development of our own practical-based programmes. The aim was to create standardised yet flexible qualifications in practical field botany and horticulture, that would allow trainees to acquire the key basic practical skills and at the same time attain internationally recognised certificates. The courses also needed to be flexible so they could be tailored to any country or situation.

In December 2006 I had the opportunity to go to Oman, with a colleague from RBGE, Peter Brownless, to deliver training to staff of the developing Oman Botanic Garden. This was a great chance to formalise our training in propagation, mixing media and potting.

The Royal Botanic Garden Edinburgh (RBGE), Scotland, has successfully developed two new training courses in field botany and horticulture. **Leigh Morris** describes how these popular courses have been developed and his plans for their future.

When I first arrived at the RBGE in September 2004, I was impressed by the quality of practical training delivered, both to learners in Edinburgh and within capacity building projects abroad. I was surprised, however, that there were no formal certificated programmes, no firm guidelines for delivery, staff often had to develop new bespoke programmes and there was minimal link-up between the

Education Department and the botanists/horticulturists who carried out much of the training. There was, I believed, a need for RBGE to offer more structured practical training. We looked at other courses already in existence to see if they would suit our needs, but found that they were generally theory based, with a relatively small practical element. There was clearly a gap, so in early 2006 I started to plan the



Fiona Inches (RBGE) demonstrates propagation techniques at Oman Botanic Garden (Leigh Morris, RBGE)



The CPH and CPFB courses provide the key skills required by botanists and horticulturalists (RBG Edinburgh)

For each topic we produced a short, image-based PowerPoint presentation covering the key points, carried out demonstrations and then supported the learners while they practised the skills. This model was extremely well received by the Omanis and spurred me on.

The next significant stage in development occurred at the Nezahat Gökyiğit Botanik Bahçesi (NGBB) in Istanbul. I had previously met the Director of NGBB, Professor Adil Güner, in Edinburgh and told him about the practical course we were creating. He believed this was 'just what NGBB needed' and invited me to Istanbul to develop the course for them as part of our joint Darwin Initiative Project. I spent a week in Istanbul in February 2007 and wrote the first formal syllabus for the RBGE Certificate in Practical Horticulture (CPH). Two RBGE staff members then

visited Istanbul in 2008 to deliver the CPH to a group of staff as an intensive two-week course. In turn, the NGBB staff then delivered the CPH to adult learners over a longer period in 2009 (i.e. one day per week). In May I returned to observe and verify the Turkish students doing their practical exam at the garden. This was very successful and the standard of assessment was equivalent to that at RBGE. NGBB is now offering this certificate annually and RBGE continues to carry out verification of both training and assessment.

The CPH has subsequently been successfully delivered in Edinburgh to a group of Yemenis from new botanic gardens in Ta'izz and on Socotra. A group of 16 staff at the Oman Botanic garden are now halfway through the programme, delivered by myself and

RBGE horticulturalists in Oman. The course has also been provided for staff of the Lijiang Botanic Garden in China and, closer to home, to the horticultural team at Edinburgh Zoo. The Education Department at RBGE are now also delivering the CPH twice during the academic year to adult learners at weekends and there is a long waiting list for places.

We have established a close link with the Eden Project in Cornwall, who saw the new certificated course as an opportunity to involve their horticultural team in training the public. To facilitate this Greg Kenicer and I went to Cornwall in March 2008 to assist with the first two days of the course. Mark Paterson, who is CPH coordinator for the delivery at Eden, regards it as a huge success and they, like NGBB, are planning to widen their programme of recipients. We are delighted to be working with Eden and the latest version of the CPH syllabus was produced by us jointly at a workshop in Edinburgh.

The basic structure of the Certificate in Practical Field Botany (CPFEB) was scribbled down in my notebook while travelling in the back of a 4 x 4 on a botanical field trip, en route from Sa'na to Ta'izz in Yemen. It was then developed as a companion qualification to the CPH and has been extremely well received. Presently the CPFEB is used to train our own staff, BSc and MSc students; it is being offered by RBGE as a block course, with locations including the Kindrogan Field Studies Centre and the Isle of Eigg. We also took CPFEB students to Belize in January 2009 and in 2010 to do the course in a tropical setting. Further, RBGE taxonomists delivered the programme in Iraq last year and a course for Oman Botanic Garden staff is planned for 2010-11.



Seed propagation training day at Oman Botanic Garden (RBG Edinburgh)

The structures of the CPH and CPFEB are similar in terms of their syllabus, delivery and assessment. Each consists of eight mandatory modules and their descriptors list the learning objectives, key knowledge, practical activities, resources required, plus assessment guidelines. Each module is designed to be delivered in one day and each certificate can be delivered in a series of days or as a two-week block course. The format for each day starts with an interactive, highly visual presentation (minimal text so easily



Staff at Nezhahat Gökyiğit Botanic Garden during an intensive two week training in horticulture (Alan Elliot)

translated), followed by practical activities – students doing stuff! These courses are designed to deliver the fundamental, practical, 'key skills' a field botanist or horticulturist requires, but also award certificates, which reward and quantify success. We believe one of the main strengths of the two certificates is their simplicity. Flexibility is key and presentations and lesson plans are designed so that the plants and specific practices of the relevant country can be incorporated. The model shows that educationalists can play a vital part in facilitating botanists and horticulturists in their delivery of training by providing standardized, yet adaptable, teaching frameworks, presentations and support materials.

The plan now is to develop the two courses further. Student handbooks will be produced, as will improved materials to support the trainers, such as resource lists, lesson plans and skills checklists. We have looked at practical training in other vocations and the model used by the Professional Association of Diving Instructors to teach scuba diving around the world is an excellent example to learn from. We are currently in the process of appointing a coordinator for the programmes and they will lead on these developments. The model of RBGE acting as facilitators and verifiers for the CPH, enabling other gardens to deliver it, is

working extremely well at both NGBB and the Eden Project and we believe could work just as well in other botanic gardens around the world. I am going to Laos in

April 2010 to commence delivery of the CPH at Pha Tad Ke Botanical Garden. BGCI has recently endorsed the RBGE certificates and the joint vision is to expand delivery and offer 'train the trainer' workshops within different regions. We are looking at creating an accreditation process for instructors and

assessors and hoping that the two certificates will become benchmarks of practical training within the wider botanic garden community.

“ BGCI has recently endorsed the RBGE certificates and the joint vision is to expand delivery and offer 'train the trainer' workshops within different regions ”

RÉSUMÉ

Le Jardin Botanique Royal d'Edinburgh est réputé pour son aptitude à gérer des projets de grande envergure au Royaume-Uni et dans le monde. Durant les 3 dernières années, la formation est devenue formelle et nous offrons désormais des cours avec obtention de diplômes structurés mais flexibles dans le domaine de la botanique et de l'horticulture. Ces cours se concentrent sur le côté pratique et bien organisés avec des présentations illustrées qui peuvent être facilement traduites dans n'importe quelle langue. À ce jour, ces cours ont été fournis par le RBGE et le Eden Project au Royaume-Uni. Ils ont aussi connu un grand succès auprès des employés des

jardins botaniques en Chine, en Iraq, à Oman, en Turquie et au Yémen. Cet article passe en revue le développement de deux programmes et souligne leur avenir. Il contient une documentation d'enseignement et d'apprentissage revue et améliorée, en accord avec les programmes de formation professionnelle. Grâce à une collaboration avec BGCI, le RBGE prévoit un certain nombre de programmes « formation des formateurs » qui susciterait un engouement plus répandu pour de ces cours.

RESUMEN

Con una larga historia el Jardín Botánico Real de Edimburgo (RBGE) genera una alta calidad de proyectos de capacitación en el Reino Unido y fuera de éste. Durante los últimos tres años se han formalizado y ofrecen en la actualidad una serie de cursos flexibles con certificados. Estos son ampliamente prácticos y tiene como apoyo presentaciones profesionalmente muy bien ilustradas que pueden traducirse a diferentes idiomas. A la fecha estos cursos han sido impartidos en el reino Unido en el mismo RBGE y en el Proyecto Edén. Por otro lado miembros del personal del Jardín han impartido estos cursos en China, Irak, Omán, Turquía y Yemen. En este artículo se reseña el desarrollo de dos de esos programas y se da un resumen de la visión de los mismos al futuro, los programas incluyen materiales nuevos y mejorados para el apoyo y aprendizaje tanto para los tutores como para las personas que estarán aprendiendo a la par con otros programas vocacionales. A través de la colaboración con la BGCI, el RBGE ha formulado un numero de programas 'entrenamiento para entrenadores' el que facilitará mas ampliamente el interés a estos cursos.

For more information of both the certificates (and pdf files of both course handbooks), please refer to the RBGE web site: <http://www.rbge.org.uk/education/professional-courses>

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Taller de propagación de dalias - obtención de semillas (Fundación Xochitla)

Cultivando plantas y personas en una de las ciudades más grandes y pobladas del mundo

Fundación Xochitla, A. C. inició en el año de 1998 el desarrollo de un jardín botánico ubicado en Tepotzotlán, Estado de México, con el objetivo de promover el conocimiento y rescate de especies arbóreas, arbustivas y herbáceas de zonas templadas de México en 18 hectáreas. Explican. La tarea ha sido ardua ya que por más de seis décadas los terrenos que ocupa el jardín estuvieron destinados a la producción intensiva de cultivos como alfalfa, maíz y otras especies forrajeras, dando como resultado la pérdida de fertilidad y serios problemas de compactación (Martínez, 2008), factores que, aunados a la escasez de agua y condiciones climáticas extremas, implicaron retos importantes a vencer para desarrollar y conservar las 58 especies vegetales que actualmente componen el jardín botánico.

El Jardín Botánico de Fundación Xochitla se conforma de tres colecciones: Arboretum, plantas

Trabajando que a lo largo de 10 años, el Jardín Botánico de Xochitla, Mexico, ha generado una gran bagaje de conocimientos en aspectos de propagación, conservación, manejo hortícola y educación ambiental. **Nayeli González Mateos** y colegas explican como se usa este conocimiento para formar un análisis y solución de problemas prácticos cuyo fin último sea el desarrollo sustentable.

acuáticas y herbáceas silvestres. El desarrollo y seguimiento de las mismas ha permitido conocer la mejor manera de conservarlas y con ello documentar su manejo hortícola a fin de garantizar su óptimo desarrollo y su uso sustentable. Algunas de las principales líneas de trabajo son: la conservación y manejo integral de especies forestales; la propagación vegetativa de especies nativas, entre ellas algunas con

potencial ornamental y la reproducción sexual de especies vegetales con alguna categoría de riesgo según normas ambientales nacionales e internacionales.

El Arboretum de Xochitla se conforma principalmente de los géneros *Pinus*, *Quercus* y *Cupressus* (Romero y Rojas, 2000); el principal problema que se ha presentado en su conformación ha sido



Vista del Arboretum del Jardín Botánico de Fundación Xochitla, 2010 (Ismael Sánchez)

la deficiencia en el desarrollo radicular debido a la compactación del suelo, la poca humedad y la escasez de nutrientes. Para mitigar su impacto desde hace dos años se inició un programa intensivo de descompactación que durará cinco años, el cual incluye el barrenado vertical de hasta un metro de profundidad en diversos puntos del área del Arboretum a efecto de promover la aireación del suelo y mejorar su calidad a través del relleno de los orificios con una mezcla de lombricomposta con perlita (López y Hernández, 2008). También se ha intensificado el manejo cultural a través de la aplicación de composta y mulch, de la instalación de un sistema de riego por microaspersión,



Práctica de trasplante de dalias en el Taller de propagación de dalias en la comunidad de "San Buenaventura". Huehuetoca, Estado de México (Fundación Xochitla)

así como de la realización de deshierbes y del manejo integrado de plagas y enfermedades (donde se incluye el control biológico de ácaros y áfidos, principales plagas presentes (Ojeda, 2008), y la aplicación de agroquímicos de baja toxicidad).

El conjunto de estas acciones ha contribuido al manejo sustentable de las colecciones ya que se incluyen las medidas menos agresivas al ambiente y a la salud humana.

En lo que respecta a la propagación vegetal se han producido con éxito 28 especies (48% del total presente en el jardín botánico), 17 de ellas por propagación vegetativa, en su mayoría herbáceas anuales de rápido desarrollo (*Hydrocotyle*, *Equisetum*, *Berula*, *Dahlia*, *Salvia*, *Bouvardia*) las cuales son sustituidas de manera continua para su exhibición al público visitante. La reproducción sexual se ha enfocado a 12 especies, principalmente árboles, herbáceas y plantas acuáticas, las especies son *Dahlia coccinea*, *D. rudis*, *D. merckii*, *D. campanulata*, *Salvia microphylla*, *S. mexicana*, *Lobelia cardinalis*, *Cupressus guadalupensis*, *C. lusitanica*, *Nymphaea gracilis*, *Sagittaria macrophylla* y *Quercus germana*; las especies de *Cupressus*, *Nymphaea* y *Sagittaria* tienen alguna categoría de riesgo de acuerdo a la Norma Oficial Mexicana No. 59, Semarnat, 2001 (NOM 059) y, la de *Quercus*, está incluida en la lista roja de la UICN. A mediano plazo se contempla, además de la propagación sexual de estas especies, la implementación de diversas estrategias para garantizar su conservación *in situ* a fin de garantizar la permanencia de las poblaciones.

El conjunto de información hortícola obtenida en más de 10 años se ha ido sistematizando a fin de ser presentada en eventos y publicaciones académicas así como a través de diversos medios de divulgación dirigidos a diferentes públicos. Asimismo, esto ha permitido ofertar diferentes cursos-talleres de capacitación (propagación de plantas acuáticas; manejo integral de plagas y enfermedades, arboricultura, etc.) y formar recursos humanos a través de prácticas de campo, servicios sociales, tesis; incluyendo el desarrollo del personal técnico de campo de nuestra institución, a fin de promover la



Revisión de material vegetativo para la realización de trasplantes y propagación vegetativa en uno de los cursos de propagación y manejo de plantas acuáticas nativas de México (Nayeli González)

conservación de la diversidad vegetal por medio del desarrollo de habilidades en el análisis y solución de problemas prácticos.

La experiencia adquirida a lo largo de 11 años de trabajo continuo ha contribuido a recatar 28 especies de árboles, 15 de plantas acuáticas y 15 de plantas nativas silvestres con potencial ornamental. Asimismo, tan solo en el 2009 se logró capacitar a 140 personas entre biólogos, responsables de jardines botánicos, técnicos de campo o jardineros, directamente involucrados con el manejo de plantas en áreas verdes urbanas, así como otros interesados en la conservación vegetal. En dichos cursos además de los temas propios de la horticultura se busca incluir la dimensión social y económica para el uso sustentable de los recursos vegetales. Esta labor se complementa con actividades de educación ambiental orientadas a la conservación vegetal a las que acuden un promedio de 10 mil estudiantes de diferentes niveles educativos, así como cerca de 25 mil visitantes en fin de semana.

El trabajo que hasta ahora hemos logrado realizar tiene una gran relevancia, por el acelerado proceso de destrucción que presentan los ecosistemas urbanos. De ahí la importancia de contribuir a la preservación de la biodiversidad aun presente en la ciudad de México - una de las urbes más grandes y pobladas del mundo - a través de acciones de conservación, educación y capacitación ambiental. Sin embargo, se debe resaltar la importancia de impulsar alianzas con instituciones académicas y agencias ambientales nacionales e internacionales a fin de incrementar nuestros recursos económicos y humanos para garantizar la continuidad de nuestros proyectos de conservación, los cuales están alineados a las Estrategias Global y Mexicana de Conservación Vegetal.

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SUMMARY

This article presents the experiences of Xochitla Botanic Garden, Mexico, in conserving priority Mexican plants species. Working for more than 10 years,

“ En cursos... 'intenta incluir los aspectos sociales y económicos para el uso sustentable de los recursos vegetales ”

the garden has generated a huge body of knowledge in propagation, conservation, horticultural management and environmental education. All of which, is used to train people working in conservation where we promote the development of skills in analyzing and finding solutions to practical problems that ultimately result in sustainable development and the equitable sharing of plant resources in heavily populated areas such as Mexico City and its surroundings.

RÉSUMÉ

Cet article retrace l'expérience du jardin botanique de Xochitla au Mexique en ce qui concerne la conservation des espèces végétales prioritaires mexicaines. En place depuis plus de 10 ans, le jardin a généré une grande base de connaissance en matière de propagation, de conservation, de gestion horticole et d'éducation environnementale. Le tout est utilisé lors

de la formation des personnes travaillant dans le domaine de la conservation où nous faisons la promotion du développement des aptitudes à analyser et à trouver des solutions aux problèmes pratiques qui à terme sont le développement durable et le partage équitable des ressources végétales dans les zones surpeuplées telles que Mexico City et ses alentours.

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Día nacional de la dalia en Xochitla - el flor nacional de México (Fundación Xochitla)

Permaculture and environmental learning in botanic gardens

As global climate change and biodiversity loss dominate the agenda, **Martin Clement** and colleagues from Durban Botanic Gardens in South Africa argue that permaculture is both an effective ecosystems approach to food production and a practical expression of environmental learning.

In 2008, the Durban Botanic Gardens (DBG) in South Africa established an innovative permaculture food garden training centre to address ecological literacy and food sovereignty issues while meeting the educational needs of local communities. In an age of global climate change and biodiversity loss, permaculture offers an important, systems-thinking approach to botanic garden education practice, tools to promote environmental resilience and human well-being.

DBG Permaculture Centre

The garden is abuzz with bright-eyed learners deep in sensory investigations. They lift up comfrey leaves, sniff papayas, and look thoughtfully at the cakey soil, teaming with life, revealed under a bed of straw. These young people are observing, asking questions, making sense of permaculture principles at work.

This is a description from a typical school programme at the Durban Botanic Gardens (DBG) Permaculture Training Centre. Opened on World Food Day in October 2008, the centre is an integral part of DBG's mission, an active pilot phase of the larger Garden Window

Project that will represent a multi-purpose plant services hub for the city. Like many botanic gardens of the colonial era, DBG was originally a botanic station for the trial of agriculturally important plants (McCracken, 1996). Through the Permaculture Food Garden Training Centre, its food plant origins have come full circle.

Coined in the 70s by David Holmgren and Bill Mollison, permaculture ('permanent agriculture') is a way of designing ecological human habitats and food production systems that mimic natural processes, while promoting a healthy natural world (Mollison, 2002). Permaculture emphasizes the harmonious, complex interrelationship of plants, animals, people and the Earth, and is a model for working with, rather than against, nature (Jacke, 2010).

The chicken is a useful example. In its moveable tractor, the bird scratches the soil of an uncultivated bed, devouring grubs while aerating and fertilizing the soil, providing eggs and meat for sustenance and feathers for bedding. In the DBG garden, the acacia (*Acacia sieberiana*) tree is a visual focal point, offers shade for visitors, and fixes



Permaculture encourages a connection of head, hands and heart (Durban Botanic Gardens)

nitrogen for adjacent fruit trees. But rather than singling out the chicken or acacia, permaculture focuses on the multi-functioned relationships and eco-services that add up to more than the sum of their parts (Holmgren, 2002).

Being ecoliterate in an age of climate chaos

According to the Holistic Education Network, 'The great challenge of our time is to build and nurture sustainable communities. Understanding the principles of organization that ecosystems have developed to sustain the web of life is what we call ecological literacy, or ecoliteracy'. This goes beyond the mere teaching of the natural environment to foster a deep, personal appreciation of nature and our place in it. Just as language and mathematical literacies are considered vital for our culture, so ecoliteracy is key to the development of sustainable lifestyles, and ultimate survival of civilization. For David Orr, the goal of ecological literacy is 'built on the recognition that the disorder of



The garden is abuzz with bright-eyed learners deep in sensory investigations (Durban Botanic Gardens)

ecosystems reflects a prior disorder of mind, making it a central concern to those institutions that purport to improve minds. In other words, the ecological crisis is in every way a crisis of education.... All education is environmental education... by what is included or excluded we teach the young that they are part of or apart from the natural world' (Stone & Barlow, 2005). What matters then is the meaningful connection between head, hands, and heart.

Linking biodiversity and human well-being is now key, realizing the connection between conservation and poverty (Waylen, 2006). Food is one of the most obvious elements. Most urban children (rich or poor) and many rural ones follow an unhealthy, incomplete diet, the production of which has a profoundly negative impact on ecosystems. Offering a solution to poor diets, permaculture is an ecoliterate approach to producing food and an opportunity for inculcating an integrated response to environmental problems. Methods of mulch-bed

preparation address nutrient cycles, symbiosis between fungi, microbes and plants and the management of household waste. Companion-planting explores the complexity of ecological relationships, and the planting of and caring for a seedling encourages a 'heads and hearts' response in us.

“ Permaculture emphasizes the harmonious, complex interrelationship of plants, animals, people and the Earth, and is a model for working with, rather than against, nature ”

'There's nothing fundamentally wrong with people. Given a story to enact that puts them in accord with the world, they will live in accord with the world. But given a story to enact that puts them at odds with the world ... they will live at odds with the world.' (From *Ishmael: An adventure of the Mind and Spirit* by Daniel Quinn).

Permaculturist Gabriel Mngoma took into account the garden's need for multipurpose functions in his design, achieving both a cultivated ecosystem and outdoor classroom, with aesthetically high standards. We see how the learning process between permaculture and horticulture can help devise principles for

future landscape development at DBG, as well as programmes for deeper ecological literacy. The programmes created for school and community groups have already spurred environmental education centres and schools to set up permaculture education gardens. Nic Shaw at the Entabeni Environmental Education Centre in South Africa, created a permaculture garden linked to DBG's education centre after an Entabeni staff member attended our courses.

So far very few botanic gardens are using permaculture in education, land care/design, or otherwise, even though other sustainability-minded organizations are embracing it. Martea and Clement are currently investigating this apparent schism.

Next steps

There is now a strong call to re-story – to change the way we think about our cultural manner of living (McKenzie *et al*, 2009). Environmental education initiatives should go from messaging to action, inspiring 'creative, confident and innovative responses' (Taylor, 2010). Permaculture can be a powerful tool for botanic garden education in promoting food sovereignty, human health and ecological literacy, revealing how humans can be part of a sustainable system. Stella Simiyu, BGCI/SCBD GSPC programme officer, highlighted key questions in her presentation 'Botanic Gardens: Role, Image and Purpose in the 21st Century' at BGCI's Education Congress (2009):

- Are we responding to local challenges contextually?
- Are we demonstrating relevance?
- Are we providing a local interpretation of the global responses effectively?
- Are we too stuck in the past to think innovatively about responding to the future?
- What value addition do we bring to the institutional, technological and technical landscapes where we operate?
- Do our education programmes address these issues?

Botanic gardens might consider how permaculture can help address the following questions:

- How can we better connect food gardening, environmental learning and action?

“ Ecoliteracy is key to the development of sustainable lifestyles, and ultimate survival of civilization ”

- What are some of the important points to consider when linking indigenous knowledge systems and food garden programmes?
- How can we develop Ecological Literacy within existing botanic garden food garden programmes?
- How can we help develop a more active food garden learning network?

Gardens are places of story. In what way can food stories enrich our environmental learning?

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RÉSUMÉ

Graham Burnett, dans *'Permaculture – A Beginners Guide'* décrit la permaculture comme '...une révolution déguisée en jardinage biologique'. Alors que la Permaculture ('agriculture permanente') est une approche écosystémique à la culture alimentaire, il s'agit aussi d'une forme de jardinage qui est à la fois un art provocateur, une source d'inspiration, un moyen d'hygiène environnementale durable et une expression pratique de l'enseignement environnemental. Cependant, peu de jardins botaniques se concentrent sur la permaculture. Cela est intrigant étant donné que les plantes alimentaires sont déjà bien insérées dans beaucoup de jardins

botaniques, d'écoles et le jardinage communautaire est activement promu.

“ How can we better connect food gardening, environmental learning and action? ”

En 2008, le Jardin Botanique Durban, en Afrique du sud, a établi un centre de formation de permaculture alimentaire innovateur pour présenter les problèmes liés à l'éducation écologique et à la souveraineté alimentaire tout en reconnaissant les besoins éducatifs des communautés locales. A une époque où le changement climatique et la perte de la biodiversité nous sont présents à l'esprit, la permaculture propose une approche systématique significative aux pratiques éducatives des jardins botaniques, offrant des outils pour la résilience environnementale et le bien-être de l'être humain.

RESUMEN

Graham Burnett, en *'Permacultura – una guía para principiantes'* la describe como 'Permacultura ... revolución disfrazada de jardinería orgánica'. La Permacultura (agricultura permanente) es un ecosistema cultivado orientado a la producción de alimentos, al mismo tiempo es un tipo de jardinería que sirve de inspiración para la creatividad y el arte, es una manera sana y práctica para el aprendizaje y la sustentabilidad del medioambiente. Sin embargo, pocos jardines botánicos se enfocan globalmente en permacultura. Esto es interesante dado que las plantas alimenticias se muestran y encuentran muy bien representadas en numerosos jardines botánicos, además que la jardinería es promovida activamente en las comunidades y escuelas.

En el 2008, el Jardín Botánico de Durban en Sudáfrica creó un centro de entrenamiento en permacultura de jardín de alimentos como respuesta ecológica a la alfabetización y temas sobre la soberanía de alimentos satisfaciendo necesidades de las comunidades locales. Especialmente hoy en día en que nos atañe el cambio global climático y la pérdida de la biodiversidad, la permacultura es muy significativa, es un sistema de acercamiento práctico que provee herramientas para la recuperación del medio ambiente y el bienestar humano.

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Science and the city

With its Energy Plants Show in 2009, Shanghai Botanic Garden (SBG) highlighted the important role of plants in generating green energy. As **Yu-zhu Cai** and colleagues explain, the event reflects the SBG's commitment – as the only botanic garden in a mega city of over 20 million people – to remaining a vital hub for science education.



The importance of Shanghai Botanic Garden as an educational space cannot be underestimated – it is the only botanic garden in a city of over 20 million people (Shanghai Botanic Garden)

Shanghai is the largest city in China and one of the biggest in the world. Hailed as a green pearl, with its beautiful natural scenery and variety of plant-design, Shanghai Botanic Garden is the only one of its kind in the metropolitan area and it is therefore no surprise that it has become a key location for science education. Last year during a process of curriculum reform, the Shanghai Municipal Science and Technology Commission gave the go-ahead for the Garden to become a Science Education Base.

As a result, the SBG is publishing a series of activity packages for primary and secondary schools and constructing a children's garden which will be opened in 2011. A new exhibition hall is also being built.

Times change and learning is no longer confined to the classroom, and to purely theoretical knowledge. Nowadays, students like to go outdoors, to see with their own eyes what is described in their textbooks. This heralds the beginning of real environmental awareness. As its gardens are probably the city's nearest approximation to the natural environment, the SBG has launched a series of educational activities with a number of organizations. They include a gardening exhibition, popular science lectures, ecology talks, production of plant specimens, delphinium painting, and the most successful of all – the sunflower harvesting activity during the Autumn Flower Show which was held in 2008 and 2009.

As such a huge metropolis, Shanghai consumes massive amounts of energy all the time. To raise awareness of the energy crisis, SBG held the Energy Plants Show, and because public awareness of energy plants was low, the sunflower, which is well known to the public, was the main plant used for harvesting. This meant that visitors could enjoy the plant exhibition and at the same time learn how energy plants can be used.

The sunflower is a plant more representative of the countryside than the city. Most city people enjoy experiencing the natural world as

“ Our motto is: Turn your steps into the garden, turn your mind to nature ”



Visitors enjoying the sunflowers at the Energy Plants Show (Shanghai Botanic Garden)

relaxation from a busy working life, and sunflower picking is the kind of participatory hands-on activity that is met with enthusiasm from children, young people and older ones. Each person takes a pair of scissors, chooses and cuts a sunflower. Then, holding up the fruiting face of the plant they can take and taste the seeds – experiencing first-hand how the oil they consume every day comes from the seeds of these beautiful flowers.

Sunflower is one of the new kinds of 'energy' plant which could play a part in solving the crisis over fossil fuels.

Understanding the potential for sunflowers helps to make all of us aware of other energy-related plants. After participating in this particular activity both adults and children will remember the knowledge they gained about the sunflower and be able to apply it in related areas. This type of practical education is very successful compared to just attempting to teach information about energy plants in a traditional classroom way – we consider it to be twice as effective.

Each botanical garden needs to communicate with others about its plan of educational programmes. Firstly, SBG serves mainly the urban population, especially children and the elderly, whereas Chenshan Botanical Garden, another integrated botanical garden, is currently under construction in a rural area of Shanghai, so duplication of educational resources needs to be avoided and proper targeting of the different sectors to be planned. In addition, the nature of the education programme should also be carefully targeted in terms of selecting educational content and methodology. Only on this basis can there be successful education. Getting the children to enjoy learning is one of the big challenges; and planning activities that will feed the children's interest while enhancing the features of the garden itself is of prime importance to the development of SBG.

The latest plan formulated by SBG is to bring out a series of activity packages to teach popular science, and to renovate its education facilities. We will introduce these science activity packages for both primary and secondary school pupils,

designing them to cater for a variety of different ages, periods of time and needs, and with better quality services. Improving facilities is essential to ensure the best botanical garden education and SBG is in the process of building a new science exhibition hall, using sound, light, electricity and other more high-tech means to demonstrate the processes of plant growth, evolution and so on. Using both everyday and innovative techniques and combining these with features of the botanical garden will not only command the interest of the children but will play a vital role in science education.

At the same time, a second exciting development will be taking place. SBG has the largest hall of tropical and desert plants in Shanghai, the city's only bonsai garden and orchid room, as well as themed gardens. Currently, these excellent resources are not fully used for science education. This year, SBG has been approved as the new Science Education Base in the second curriculum reform by Shanghai Municipal Science and Technology Commission, which offers an excellent opportunity for the development of the Garden. In this process of reform, we will focus on cultivating a creative spirit and desire for innovation with practical ability, so that the joy of domestic gardening can really touch the hearts and minds of the children.

Long-term planning is always a key factor at SBG. A Children's Garden is seen as an important requirement for the future, to cater for both the physical and mental development of our children in Shanghai. SBG is planning the construction to begin in 2010 and to be completed the following year. The garden will be constructed with facilities for a variety of age groups, so that the children can acquire knowledge through playing games and carrying out activities in the appropriate areas. Such activities will include on-site talks, interactive workshops, demonstrations, multi-media seminars, signage and outdoor classes. Most areas will be able to accommodate a whole class engaged in collective activity, and in smaller spaces parent-child activities or playing alone can be arranged, allowing a good balance of public and private.

For the future, the Garden will concentrate on providing science education along these lines, with constant evaluation, while carrying out the second curriculum reform and the development of the children's garden, compiling data, relevant supporting materials, researching and designing further training programmes. Our aim is always to establish a sound scientific education system to foster students' appreciation of innovation, practical ability and the spirit of research. Our motto is: *Turn your steps into the garden, turn your mind to nature.*

RÉSUMÉ

Shanghai est la plus grande ville de Chine et une des métropoles les plus grandes au monde avec près de 20 millions d'habitants. Connu sous le nom de perle verte, le jardin botanique de Shanghai est le seul jardin botanique de la zone métropolitaine. Il est donc compréhensible qu'il s'agisse de l'une des destinations éducatives les plus populaires de Shanghai. En 2009, s'y est tenu le Energy Plant Show qui avait pour objectif de faire prendre conscience du potentiel des végétaux comme nouvelles sources d'énergies. Plus de 100 exemples de végétaux « énergie » en ont fait partie, tel le tournesol et le blé. On encourageait les gens à faire le lien entre les graines de tournesol et l'huile qu'ils utilisent pour faire la cuisine. L'an dernier, lors d'une révision du curriculum, le comité municipal des sciences et de la technologie de Shanghai a accepté que le jardin devienne une base pour l'Éducation Scientifique. Depuis, le jardin publie une série d'activités pour les écoles primaires et secondaires et construit un jardin pour enfants qui devrait ouvrir ses portes en 2011. Une nouvelle halle d'exposition scientifique, aussi en construction, démontrera les procédés variés des végétaux par le biais de sons, de lumière, d'électricité et autres moyens de haute technologie. Il encouragera aussi les enfants à s'intéresser à la science.

RESUMEN

Con casi 20 millones de gentes Shanghai es la ciudad mas grande de China y una de las mayores áreas metropolitanas del mundo. Aclamada como la perla verde, el jardín botánico de Shanghai es el único jardín en esa metrópolis. Es por ello que no es una proeza pequeña que sea uno de los lugares mas importantes en la ciencia educativa popular en Shanghai. Durante el 2009, el jardín tuvo la exposición 'Energía y plantas' para concienciar el potencial del recurso energético que existe en las plantas. Con mas de 100 formas de 'energeticos' para despertar el interés en la gente, entre estos se usaron como ejemplos el girasol y el maíz, orientando una conexión del aceite que se extrae de ellas y del cual dependemos comúnmente para cocinar alimentos. El año pasado durante la reforma del currículo educacional, la Comisión Municipal de Ciencia y Tecnología de Shanghai aprobó que el jardín sea Base de la Educación Científica. Como resultado, el jardín ha publicado una serie de paquetes de

actividades prácticas para las escuelas primarias y secundarias, además de la construcción de un jardín para niños que se inaugurará en el 2011. Al momento está en proceso una nueva área de exposición de ciencias, en esta se usaran temas como luz, sonido, electricidad entre otros de alto contenido técnico en vías de mostrar los procesos tan variados en

los que las plantas participan, animando oportunamente a niños a involucrarse en la educación científica.

“ *Shanghai Botanical Garden has been approved as the new Science Education Base in the second curriculum reform by Shanghai Municipal Science and Technology Commission* ”

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Yon don't have to get your hands dirty but...

using horticulture to teach biodiversity, conservation and science to 11-18 year olds

Horticulture, biodiversity and conservation are usually taught in the science curriculum at UK schools, yet rarely venture beyond the basics –photosynthesis, variation and food/energy webs. However the Writhlington School Orchid Project has taken a radically different approach, including engaging students in hands-on species propagation and marketing their plants to fund both the project and exciting field trips. **Lauren Gardiner** reports.

The Orchid Project has involved hundreds of students over the twenty-plus years it has been running. Led from the start by teacher Simon Pugh-Jones, this unusual venture grew out of an after-school Gardening Club that still forms a central part of the project. The club took over a set of old greenhouses, left from the days when the school offered rural studies as part of its vocational curriculum. After a small collection of orchids was donated to the club, Simon went on to instil in his students some of his own schooldays passion for this charismatic and diverse group of plants. Exhibiting and selling orchids at horticultural and local shows, and gaining awards for their plants, around 10 years ago the students took the next step to orchid propagation, growing their own plants from seed, using sterile techniques to grow the seedlings on nutrient agar.

In UK schools, primary schoolchildren may be lucky enough to have a school vegetable garden where they learn how to sow beans, have a 'Tallest Sunflower' contest, and cultivate pumpkins for Halloween, but there are rarely gardens at secondary schools. In lessons,



Sam Harvey and Georgia Grant pollinating Coeloglyne cristata (Simon Pugh-Jones)



Harry Seviour watering in the hot house (Simon Pugh-Jones)

students may learn the chemical reactions that plants use to survive, but the science (and craft) of nurturing plants is rarely touched upon.

At Writhlington, Simon has successfully worked aspects of the Orchid Project's horticultural work into the school curriculum, incorporating the aseptic techniques of seed sowing and seedling reflasking into science classes, also into the subjects of enterprise and manufacturing, for which the school offers diploma courses. Science teachers receive 'masterclasses' from Simon in the techniques used, which they pass on to the students in lessons. GCSE and A Level students use the Orchid Project as the basis for coursework assignments, satisfying the criteria for experimental design and statistical analysis in their experiments on altering the nutrient composition of the agar mix on which the orchids are grown *in vitro*.

The after-school Gardening Club (nominally Friday, but in reality taking place after the school bell rings most days), has spilled over into break and lunchtime – in the greenhouses, in the lab sowing fresh batches of seed (collected by the students from their hand-pollinated plants in the

greenhouse), transferring seedlings onto fresh media, or folding boxes and glueing on information labels. The latter are for ready-to-sell *in vitro* plantlets at shows and other outlets, a 'mini orchid kit' the students developed and designed. They wholesale their *in vitro* plants through botanic gardens and the Eden Project and sell them alongside adult *ex vitro* plants to the public at events such as the Royal Horticultural Society London's Orchid Show each March. Plant sales generate sufficient funds for the project, and its annual fieldtrips taking small groups of students to orchid hotspots and see conservation in action around the world. In recent years there have been many trips, including to the Sikkim Himalaya, South Africa, Laos, and Belize – rewarding experiences for the students who have given their time and commitment to the project.

The Orchid Project engages some of the school's most disadvantaged students, as well as the most able, and youngsters may be directed towards the Gardening Club by teachers or parents, even before

they have started at the school. Very shy students, perhaps bullied at other schools, or with behavioural problems over authority, attention, and social interactions, rapidly focus on a subject they perceive as 'less academic'. They are given a 'mentor', usually the same age but already involved in the project, to guide them round the greenhouses, teach them how to care for the plants – thus they begin to learn leadership and teaching skills for themselves. Students are assigned a particular taxonomic or geographical group of orchids whose care is their responsibility – watering, weeding, repotting, under the watchful eyes and guidance of Simon and their peers. In just two weeks, the students absorb an incredible amount of information, and are able to talk about 'their' species to visitors they have never met with a remarkable degree of authority. Some with behavioural problems may take time to settle down, but all are treated equally, no matter what. All are expected to live up to the high expectations Simon has of them, and it is recognized that they, like Simon, are there because they want to be, rather than 'have to be'. If a student wants to be involved, they have to take responsibility for part of the collection in the greenhouse, and all take great pride in looking after their charges, showing

“ The Orchid Project engages some of the school's most disadvantaged students, as well as the most able ”

them off to visitors and at shows. Very rarely are plants neglected by their carers, who are encouraged to make real decisions about how best to look after them – such expectations really seem to engage the students. They carry out

research on their species and attend the weekly lunchtime Orchid Science Club, where Simon explains pollination, orchid anatomy, and evolution of different morphologies.

A diverse group of plants such as orchids offers multiple learning opportunities. Collaborations with the Royal Botanic Gardens, Kew, BGCI, the Royal Horticultural Society, the Eden Project, and orchid growers, conservationists, botanic gardens, and schools around the world have built up over years, giving students the wider context. They learn about careers in horticulture, science, botany,

Box1 - Writhlington School

Writhlington School is a state-run secondary school with a business and enterprise specialism, in rural SW England. Over the last decade, the school has built its ethos around sustainability, enterprise and partnerships with other organizations and businesses. Under head teacher

Marie Getheridge, activities such as the Orchid Project have been encouraged, and the once-poor exam results are dramatically improved (from 22% of students attaining five or more A*-C GCSE exams in 2000, to 98% in 2009). The school is now heavily oversubscribed, and has been awarded £26 million of government funds for its new campus, opening May 2010.

fotosíntesis, respiración, la variabilidad existente, la importancia de los alimentos y redes energéticas. El proyecto 'Orquidea' de la escuela Writhlington, en el suroeste de Inglaterra, habilita a los maestros de ciencias atraer tanto algunos estudiantes sin muchos privilegios, como a los más hábiles, en un espíritu emprendedor, donde ellos aprenden la enorme diversidad y carismas de la familia de las orquídeas y sus habitats alrededor del mundo, por medio de la propagación in vitro en sus propios invernaderos, se producen plantas que se vende al público, generando así fondos para la auto sustentabilidad del mismo proyecto, y dan la oportunidad a sus colaboradores de realizar trabajo de campo en las áreas críticas de biodiversidad alrededor del mundo.

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conservation, business, policy even, and the value (in economic and biodiversity terms) of the species. For science studies, the plants provide a ready supply of demonstration materials and props for lessons. Different groups can be used to teach biodiversity and ecology, from pseudocopulation (ideal to pique the interest of teenagers studying botany!), to mycorrhizal fungi linking all the trees and terrestrial orchids in a forest, the interactions and dependencies orchid species have with and on other organisms graphically illustrating 'webs of life'. Geography and climate change go with evolution – why species live where they do, and why they look so different. Conservation, habitat destruction and human's impact on populations of species – even 'what is a species?' and 'why a species orchid is different from one bought from a supermarket' are engaging topics. Questions are more interesting, and answers more memorable, when students know the species they are responsible for, engendering a far more holistic understanding than they would gain from school lessons alone.

étudiants d'en savoir plus sur l'immense diversité de la famille charismatique des orchidées et leurs habitats à l'échelle mondiale, de reproduire des espèces in vitro et dans leurs propres serres, et de vendre leur plantes au public, générant ainsi des fonds nécessaires pour faire en sorte que le Projet, ses collaborations et les sorties éducatives aux hotspots internationaux des orchidées soient complètement autonomes.

RESUMEN

En las escuelas del Reino Unido, los temas relacionados con horticultura, biodiversidad y conservación son comúnmente impartidos dentro del currículo educativo, pero frecuentemente estos no van más allá de las bases como son qué necesitan las plantas para crecer,

RÉSUMÉ

Dans les écoles au Royaume-Uni, les matières se rattachent à l'horticulture, la biodiversité et la conservation sont en général englobées dans le curriculum des sciences sans qu'on en dépasse le stade des besoins à la croissance des plantes, la photosynthèse, la respiration, les différences existantes, et l'importance de la dépendances nourriture/énergie. Le projet Writhlington School Orchid, mené dans le sud-ouest de l'Angleterre, permet aux instituteurs de faire participer les élèves, des plus indisciplinés au plus performants. Le projet a déjà été primé et permet aux



Luke Barnes, Luke Lucas, and Ben Stokes holding gold medal at RHS Chelsea Flower Show 2009 (Simon Pugh-Jones)

World war zoo gardens

Sandbags, salad, shrapnel and sustainability

'World War Zoo' is the public part of a wider research project begun at Newquay Zoo on how zoos, aquariums and botanic gardens survived World War II (1939–45). Mark Norris explains how World War Zoo is about looking back and looking forward, learning from the past to prepare for our future.

For both zoos and botanic gardens, too much emphasis on education and environmental issues can be at odds with visitors' enjoyment of a 'good day out'. So a novel approach to addressing sustainability and resource issues has led to recreating a wartime 'Dig for Victory' garden at Newquay Zoo. Such a project communicates messages about food miles, food waste and recycling, but is also accessible, attractive and makes the most of an area's social history or archives. It reaches out to other curriculum areas such as history, creating an informal learning resource and community involvement across the generations. It's a source of food for animals as well as humans: history and heritage you can eat!

Green fatigue?

Newquay Zoo actually opened some time after the war, in 1969, but its sister zoo, Paignton Zoological Gardens opened in 1923 and was operational during all through the war. Both have been recognized with awards for sustainability, recycling and solar power. Newquay is signed up to the 10:10 carbon reduction campaign. Part of our mission statement involves 'inspiring in

The Second World War was a cataclysmic event in the history of the 20th century and almost every aspect of it has been scrutinised by historians and other commentators in the succeeding decades. Yet until now relatively little has been known about how the UK's zoos and botanic gardens coped with wartime privations and the austerity of the post-war years. But as **Mark Norris** reports, Newquay Zoo's World War Zoo project is also providing some important lessons for the future.



its many visitors a lifelong respect for animals and the environment'. But how do we encourage visitors and staff to continue and connect these efforts in their home lives while avoiding the worthy, but sometimes unachievable and guilt-ridden tone of environmental messaging, at best off-putting, at worst counter-productive?

Wartime gardening

Shortages, energy saving, food miles and 'grow your own' are not new messages. We've been in this situation before in recent history. Then, government coercion and clever propaganda (now known as 'social messaging') got everyone composting and recycling, with the famous 'Potato Pete' and 'Squander Bug' cartoon characters and the iconic boot-on-spade poster *Dig For Victory* (Davies, 1993). Books for beginners and radio talks by Mr Middleton encouraged gardening and

resourceful cookery on the 'Kitchen Front' (Middleton, 2009). Foraging for wild food and herbs is not a modern fashion, it was common wartime practice for Women's Institutes, children's salvage clubs and enterprising zoo keepers (Gardiner, 2005).

According to Kenneth Helphand in *Defiant Gardens*, the urge to garden in extreme conditions like war zones, ghettos, prisoner-of-war or internment camps is not just about food production (Helphand, 2009). Gardening fulfils an important psychological need, ever more so as we face an uncertain future in a technological, urban and climate challenged world (Palmer, 2006).

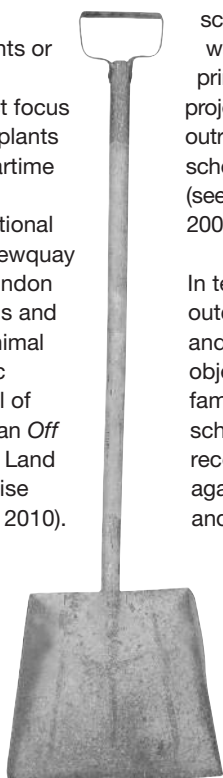
Our World War Zoo garden project developed from a chance discovery in a wartime newspaper that zoos (and other public entertainments) in Britain were closed in the early weeks of World War II for fear they would be bombed, the fate of some zoos in Holland and Poland (Ackerman, 2007).

Though British zoos were reopened and nominally encouraged to boost morale, they struggled until long after the war. In the years of austerity food was short and zoo animals had no ration books. Staffing was low with many keepers called up. Repairs were difficult and resources such as fuel for heating were rationed or scarce.

The problems were common across Britain, Europe and the wider world. Many zoos maintain a botanic garden function, and vice versa – Birmingham Botanic Gardens was one of many that kept an animal collection. But young keepers and gardeners left to fight, and animal collections were affected – dangerous snakes which could not be rehomed were euthanased, bear enclosures had to be reinforced to prevent escapes after bomb damage (Ballard, 1983).

Art and museum treasures were spirited away into shelters. The best that could be hoped for zoo animals was evacuation to Whipsnade or Paignton. Glasshouses were turned over to medicinal plants or vegetables. Today, botanic gardens like the Eden Project focus on food security and linking plants to everyday products – in wartime too, food production was a necessity, but also an educational opportunity. One visitor to Newquay on Armistice Day recalled London Zoo in wartime, with chickens and pigs occupying the exotic animal enclosures, while the botanic garden glasshouses were full of tomatoes. The zoo featured an *Off The Ration* exhibition, where Land Army girls showed how to raise back garden livestock (IWM, 2010).

A wartime-themed visit is common for heritage sites but unusual for zoos or botanic gardens. The success of the educational focus of World War Zoo is partly this ‘under the radar’ approach to sustainability, recycling, food waste and ‘grow your own’ ... for schools these topics can be cross-curricular, initially introduced through history, but embracing citizenship, sustainability and science. It all adds value to our zoos and botanic gardens as a socio-cultural resource. The



A junior keeper tends the vegetables in the wartime garden (M. Solomon)

schools history curriculum links on wartime life are well established at primary and secondary level with the project building towards outreach or offering school visits to the zoo (see Dig for Victory, 2007).

In terms of learning outcomes, behavioural and emotional objectives, we hope staff, schools and families will feel inspired to do more at school or home (Transition Town). It's recession friendly and fashionable again to grow your own and make do and mend.

Director of Newquay Zoo Stewart Muir felt the project should build up to an ‘international’ phase. The European experience was often worse than in Britain, as in the notorious ‘hunger winter’ of 1944–5, when ersatz coffee was made from acorns and the Dutch were driven to eat their precious and slightly poisonous tulip bulbs. Many fine zoos and botanic gardens were damaged or destroyed in the fighting, sadly true also in recent conflicts affecting Kabul, Baghdad,

Kosovo, Israel and the West Bank. Some zoos keep a memorial stone for staff lost in wartime.

“ A wartime-themed visit is common for heritage sites but unusual for zoos or botanic gardens ”

The experience of war for zoo keepers and supporters has much in common across nations. It must have been very hard to set aside the pre-war spirit of international

cooperation and friendly competition between staff of zoos and botanic gardens. World War Zoo does not focus on Allied victory, but on home front and non-military aspects, especially in resources and re-enactors chosen.

From the forties to facebook

As World War Zoo links past, present and future, we make use of IT, social networking and new media for communication and messaging. Up to date information with monthly entries is on our blog [http://worldwarzoo gardener1939.wordpress.com](http://worldwarzoogardener1939.wordpress.com) and a Blogger.com site. Twitter entries about the minor tragedy of frost hitting salad, a Facebook profile worldwarzoo gardener with a following of zoo, garden and 1940s re-enactor enthusiasts, plus RHS

blog/forum discussions about recycled planters made out of toilet rolls, have brought the project to a wide audience.

Visitor comments at the garden launch, at wartime weekends or history teachers' conferences where we set out our attractive display suitcases of wartime objects (gardens being less movable) all highlight the informal and lifelong learning aspects of World War Zoo. It was wonderful to hear visitors telling their stories and interacting with staff and volunteers (though difficult to formally evaluate). Family history is a potent connection and learning point. Messy planting opportunities at events offering take-home recycled pots and seeds work pretty well too!

“ The use of heritage varieties of fruit and vegetables in the wartime garden ties in to Plant Conservation Day ”

Your existing educational media can be used/adapted. Topical interpretive signage and family activity trails around plants in the wartime garden display plots, and around the zoo gardens, introduce both nutritional and morale boosting uses,

including animal and human food, medicine, and sympathetic planting as pest control and colour in a drab wartime world (Norris, 2009). Existing displays of sweet peas, sunflowers and nasturtiums can be niftily co-opted into the project with suitable signage.

Sweat your archives?

A collection of original and reproduction wartime gardening and recipe books is in the Newquay Zoo archive. These and other war memorabilia were acquired through e-Bay, junk shops, donations etc. Background material has been scanned with the help of education volunteers to prepare a schools resource pack suitable for classroom use. Older volunteers were especially helpful in organising and running display stands on wartime garden weekends.

The project also helps raise awareness of zoo and botanic gardens' own history or archives, often a neglected area when

funds or resources are limited. In business and wartime terms, this adding of new value is known as 'sweating your assets'. There can be partnerships with local schools, home front re-enactors, history societies, museums, and other botanic gardens and zoos – exciting ways of building your audience.

No one on the staff is left out of the 'war effort'! It brings together departments from management, gardens, maintenance, and education, to research and keepers (discussing what we can grow on-site for specific animals or for general animal welfare). It offers involvement for our junior club, junior keeper sessions and adult volunteers.

At Newquay the project links into our main events programme, with a wartime garden weekend in May 2010 running alongside a 'plant-hunter' family activity trail around the zoo. Also, the use of heritage varieties of fruit and vegetables in the wartime garden ties in to Plant Conservation Day. Seeds can be frozen and animals saved from extinction. But it is just as important to preserve the memories and experiences of living through wartime, especially as regards our zoos and botanic gardens, to ensure valuable knowledge is not lost.

A lasting benefit

Long term, it would be wonderful to see a 'dig for victory' project in every zoo or botanic garden, a living and edible memorial of our collective past and a reminder for our shared future. If President Obama can have a Victory garden, digging up the lawns at the White House, yes we can, too!

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Display suitcases with a selection of war memorabilia (Michelle Turton)

Top links

World War Zoo links into many UK government education vocational learning initiatives such as:

Growing Schools garden schemes, <http://www.growingschools.org.uk/>
Sustainable Schools, <http://www.teachernet.gov.uk/sustainableschools/>
Learning in School Grounds and Gardens, <http://www.thegrowingschoolsgarden.org.uk/>
Healthy Eating (several gov.uk sites)
Every Child Matters, <http://www.dcsf.gov.uk/everychildmatters/>
Learning Outside the Classroom Manifesto, <http://www.lotc.co.uk>

London, UK (see also her books *The Animal's War*, 2006, Imperial War Museum/ Portrait Books, London, UK and *Wartime: Britain 1939–1945*, 2004, Headline, London, UK and the WRVS archives).

- Helphand, K., 2009. *Defiant Gardens: Making Gardens in Wartime*. Trinity University Press, San Antonio, USA.
- Imperial War Museum, London (IWM, 2010) has photographs of this and other stranger European zoo uses in their image collection www.iwm.org.uk and a new Ministry of Food exhibition for 2010 /11 <http://food.iwm.org.uk> updating their victory garden collaboration with the Royal Parks in 2007.
- Middleton, C.H., 2009. *Dig On For Victory: Mr. Middleton's All-year-round Gardening Guide from 1945*. New edn. Aurum Press, London, UK.
- Norris, M., 2009. 'Get Lost?! Developing self-guided family activity trails for the zoo or aquarium public.' *IZE International Zoo Education Journal* **45**, 38–41. (available online at <http://www.izea.net>)
- Palmer, S., 2006. *Toxic Childhood*. Orion, London, UK (and others of her books).
- Transition Town movement began in 2007, see <http://www.transitiontowns.org>



poids face aux envies de ceux-ci de se distraire et de passer une bonne journée. Une approche inhabituelle aux problèmes de durabilité et des ressources était de recréer un jardin du temps de guerre « creusons pour la victoire » (de l'anglais 'dig for victory') au zoo de Newquay. Tout en étant bien agencé et tout en faisant la promotion de l'histoire sociale et des archives de l'endroit, ce jardin communique des messages au sujet des miles alimentaires, des déchets et du recyclage alimentaires. Il introduit des nouveaux aspects au programme d'études tels que l'histoire, il crée une ressource instructive informelle et une implication communautaire allant au-delà des générations. Il s'agit d'une source alimentaire pour les animaux et une immersion dans l'histoire, l'héritage ou les archives - le tout peut se manger !

RESUMEN

Quando se trata de comunicarse con los visitantes de los zoológicos y jardines botánicos, a veces se pone demasiado énfasis en los aspectos del medio ambiente, que estos pueden llevar al visitante a un a echar a perder el entretenimiento de 'un buen día fuera'. En el jardín del zoológico en Newquay a manera poco común de comunicar y hacer entender la sustentabilidad y los aspectos de los recursos, se presenta este entretenido tiempo de guerras "clavarse por la victoria". En este lugar se transmite el mensaje de millas de alimentos, desperdicio de los mismos y su reciclado, mientras allí mismo, se



During WWII everyone was encouraged to become a gardener (Michelle Turton)

observa de una manera atractiva y se promueve la historia social y sus archivos/filmoteca. Se incluye en el currículo nuevas áreas como son la historia, creando informalmente un recurso de aprendizaje que conecta a la comunidad presente y su historia a través de generaciones. Este es un recurso de alimento para animales y es una exposición absolutamente absorbente que proporcionan historia, patrimonio y archivos – ¡todos los que usted puede comer!

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RÉSUMÉ

Lorsqu'on veut communiquer avec les visiteurs des zoos et des jardins botaniques, une emphase éducative trop lourde sur les problèmes environnementaux peut ne pas faire le

Gardens, learning and fun a winning formula!



Some students enjoy physical work others prefer light tasks (Peter Grubb)

At Sir Harold Hilliers Gardens, students participate in woodland management, have allotments and a fruit cage, and keep journals of their work. Previously they designed and installed art features in the Education Garden. Although we do not have a formal assessment programme at the Gardens, we liaise with schools and colleges to ensure that tasks are relevant to coursework.

The Sir Harold Hillier Gardens

The former estate of the late nurseryman Sir Harold Hillier, the Gardens are in the south of England and contain an important collection of hardy trees and shrubs over 180 acres. A charitable trust since 1976, the Gardens are managed and financed by Hampshire County Council. The Education Service started working with local schools soon after the Children's Education Garden was established and this became more formalized in 1988 with the appointment of our first Education Officer.

The Gardens' Education Service is small but busy, last year working with nearly 15,000 schoolchildren, colleges and universities, as well as families. The Community Education Project is a natural extension of our work, seeking to reach and engage people who might otherwise find visiting the Gardens difficult. Education Officers have worked on and off-site in nursing homes, schools and with special needs groups, often integrating generations through shared tasks and an enthusiastic enjoyment of the outdoors. This Community Education Programme was funded in part by a three-year grant from the Esmée Fairbairn Foundation, an organisation particularly interested in charities that

The Children's Education Garden at the UK's Sir Harold Hillier Gardens is a highly regarded learning resource for high school and post-16 students. **Carla Thomas-Buffin** describes how weekly visits enable a broad spectrum of young people, including many with special educational needs, to acquire horticultural skills and contribute to the development and maintenance of the garden.

operate 'in the cultural life of the UK, education and learning, the natural environment and enabling disadvantaged people to participate more fully in society' (<http://www.esmeefairbairn.org.uk/>).

Although we would have liked to continue our outreach work after the grant finished, it was not something the Gardens could afford. So we were delighted to receive support from the Equitable Charitable Trust for our on-site work with young people. The Trust 'makes grants towards projects for children and young people under the age of 25 who are from disadvantaged backgrounds or disabled' (<http://www.equitablecharitabletrust.org.uk/>).

Our Youth Community Education Programme is aimed at students with special needs, whether physical, educational or because of socio-economic deprivation. Schools pay £85 per day, for up to eight students. Support staff or teachers must accompany the group. Most, although not all, of this work is focused on work related learning, helping students obtain essential life skills, as well as horticultural skills.

Work related learning

Usually, I work all day with one school, but on Wednesdays I have one in the morning, one in the afternoon, always a little tricky and today, cold and rainy, was no exception: two very different groups with very different needs.

The morning finds me with year-10 students (aged 14–15). I am working with the school to introduce WJEC (Welsh examination award body) Entry Level Land Studies into their coursework. This qualification is especially good for students with special needs who are not expected to leave school with GCSEs (General Certificate of Secondary Education) and is intended to provide a wide range of practical experience in the care, management and study of plants, animals, farms, gardens, and associated crafts and hobbies. This year every student in year 10 will come to the gardens in three 3–5 week rotations with a very tight horticulture curriculum. Assessment is 80 per cent by the teacher, the remainder through final examination. The school would like every student to sit the final exam, but as the programme is actually designed

for post-16-year-olds, the timings do not suit the secondary school academic year, so students may need to take two years to do so.

The afternoon finds me with a group of post-16 students on a more relaxed Essential Skills college course. The youngsters are gaining experience in a workplace environment. My first job is to convince them to go outside, in not-so-cool wellington boots and wet weather gear – some are more enthusiastic than others.

Many of these kids lead difficult lives, without good support at home. Some have been abused. They often resent or feel limited by their disabilities. And they arrive at class displaying anger, stubbornness, selfishness, and ‘attitude’ combined with low self-esteem and lack of confidence. My job is to make them all feel welcome, valued, listened to and part of a team.

So it’s not just about horticulture, gardening or science. It’s more holistic as I aim to encourage, enthuse, motivate as well as teach. I try to hit all the clichés: set clear boundaries and goals, keep promises, mix work with play, try to be firm but fair. When a teacher says we’ve got students who come to our garden scheme but won’t go to school, then I know we just might have tickled an interest in the future.

When a student looks at me with a rather embarrassed, nervous smile, and says, in front of his sodden and exhausted classmates, that we’ve got to remove the pond liner again because he doesn’t think it will be right or level if we don’t, then I know he cares and takes pride in his work. When an autistic student who wouldn’t make eye contact or talk approaches a colleague to say he’s just had the best day ever, then I know working together to build a snowman will be a lasting memory.

It helps to remain calm when, as occasionally happens, I find myself watching students intentionally sabotaging their own work. So many of them have been told their work is rubbish or below standard, that they feel it’s better not to try or care. To keep destruction to a minimum, I make sure students can see that they are working with professional materials, making it

obvious that I trust them to produce good results. I keep tasks simple until their confidence improves, building on success.

It helps to laugh while we learn. Many of these students don’t go outdoors often and enjoy the freedom our space can offer. Charlie, who says his younger siblings would rather watch telly or play computer games, wrote, ‘I enjoy walking around the Gardens and the air is so calm . . . I will give today ten stars’, following his first visit. He is applying for a work experience placement here in the summer.

Students learn that a positive attitude, along with acquired skills, can lead to more opportunities. The work related learning programme has been running long enough now for us to have seen students finish their time here and go on to further education at local colleges, and we enjoy hearing positive news from them. Gardens, learning and fun – isn’t that the formula for a great life?

RÉSUMÉ

Trois colléges et deux instituts pour les plus de 16 ans visitent les Jardins Sir Harold Hillier par semaine pendant l’année scolaire. Les étudiants reçoivent une formation horticole et participent activement à la maintenance et au développement du Jardin Educatif des Enfants. Ils participent aussi à la gestion des forêts, ont des parcelles à cultiver et une cage à fruits, et ils tiennent un journal de leur travail. Pour varier les plaisirs, les étudiants ont conçu, complété et installé des créations artistiques dans le Jardin Educatif des Enfants. Bien que nous n’ayons pas un programme d’évaluation formel, nous sommes en contact avec chaque école et collège pour nous assurer que chaque tâche entreprise a trait au cours.

RESUMEN

Tres escuelas secundarias y dos colegios de educación post-16 años acudieron durante los fines de semana del año escolar académico a los Jardines Sir Harold Hillier. Durante estas visitas recibieron entrenamiento en tareas de horticultura y contribuyeron activamente al mantenimiento y

desarrollo de la educación de niños del Jardín. Además de participar en el manejo del bosque, tuvieron un huerto y una área enjaulada de frutas, también elaboraron un diario del trabajo. Para hacer variada su tarea, los estudiantes diseñaron, completaron e instalaron aspectos artísticos en el programa de educación orientado a los niños. A pesar de que no hay un documento de evaluación formal, los jardines se encuentran en estrecha comunicación con las escuelas y colegios para asegurarse que las tareas realizadas sean relevantes a los cursos que los estudiantes están cursando.

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Students with poor attendance or behaviour records can blossom, even in the rain (Peter Grubb)

Difundiendo ampliamente el mensaje de conservación del medioambiente

Además de las habituales visitas a escuelas y charlas educativas a los visitantes que acuden al mismo jardín, se efectúan actividades dentro del marco institucional del territorio. Nuestro objetivo principal es que los sectores profesionales, estudiantiles, administrativos y la sociedad civil, aprecien los valores florísticos que le rodean y de alguna manera contribuyan activamente en su conservación. La provincia de Cienfuegos es la más pequeña del país, en el año 2000 presentó los mayores índices de deforestación. A pesar de ello, posee alrededor de 38 especies endémicas restringidas, y otras 60 endémicas o amenazadas de toda Cuba.

Para difundir nuestro mensaje, se muestran películas de las especies amenazadas del territorio. Como ejemplos se tienen:

1. Documental de la palma fibrosa barbuda endémica local en peligro crítico de extinción *Coccothrinax crinita* subsp. *brevicrinis*.
2. Comentario sobre las especies amenazadas provinciales en el día Mundial del Medio Ambiente, 5 de junio.
3. Documental sobre la elaboración de muestras de herbario, el que se transmite extensamente en la televisión nacional.

Por la radio se han emitido por ejemplo:

- En Radio Cumanayagua Municipal: celebrando el día de la ciencia cubana 15 de enero 2009, se hizo una entrevista que se realizó sobre las especies endémicas del municipio montañoso, en el se indica el mayor endemismo de plantas, y su gran vulnerabilidad.

El Jardín Botánico de Cienfuegos, en Cuba, se estableció en 1899. Tiene una historia larga y rica con lazos a la Universidad de Harvard en EEUU. **Pável Oriel Rodríguez** explica como en el siglo 21 el objetivo principal es que el público aprecia el valor de plantas y contribuye activamente en su conservación.

- En Radio Ciudad del Mar Provincial, programa sobre el logro de la reproducción en el jardín botánico de una especie endémica provincial ya extinta en la naturaleza *Clerodendron tuberculatum*, *Verbenaceae*.

Se promueve y da la oportunidad a líderes locales para que participen en las expediciones así ponerlos al tanto de los organismos en peligro y generar conciencia de protección conservacionista que las especies vegetales necesitan, siendo ellos los que difunden las ideas en la comunidad donde la planta se encuentra in situ que es donde ésta puede ser observada y protegida. Por ejemplo: en el Castillo del Jagua se trabaja con las poblaciones de *Agave grisea*, *Paspalum cubensis* y *Ekmanianthe longiflora*.

Las charlas a los niños de escuela primaria tienen temas como la existencia de especies en peligro en las zonas costeras frecuentadas en el verano, aquí se incluyen por ejemplo: *Acacia polyphyrgenes*, *Thespesia cubensis*, *Pilosocereus robinii*, *Leptocereus arboeris*, *Doerpfeldia cubensis*, *Diospyrus grisebachii* y *Pectis ritlandii*.

Una de nuestras tareas es también generar informes a las administraciones

de áreas de la provincia. Como ejemplo para el lugar eco turístico de Guajimico se trataron las especies *Acalypha hutchinsonii*, *Dendrocereus nudiflorus* y *Hebestigma cubensis*. Este documento se entregó impreso y se realizan monitoreos sistemáticos al menos una vez al año para verificar el estado de las poblaciones y hacer sustentable nuestra tarea, los resultados del informe son siempre dados al Gerente del área.

SUMMARY

Cienfuegos Botanic Garden in Cuba is a leader in environmental education. Its education programme aims to be as participative as possible. The garden regularly visits schools and offers talks to garden visitors with the principle objectives of raising awareness of the value of plants and encouraging people to contribute actively to conservation. Cienfuegos is the smallest province in Cuba yet, in 2000, it had the highest rate of deforestation. Despite this, the province contains around 38 restricted endemic species and 60 endemic Cuban species. The garden spreads its message through television and radio and offers talks to a whole range of audiences, including children in primary school and decision makers in local



Los padres admiran una demostración del arte de niños hecha de semillas (Jardín Botánico de Cienfuegos)

administration. Notably, the garden invites local leaders to join them on expeditions to encourage them to become directly involved in conservation.

RÉSUMÉ

Le Jardin Botanique Cienfuegos à Cuba est le premier en terme d'éducation environnementale. Son programme éducatif a pour but d'être le plus participatif que possible. Le jardin fait

régulièrement la visite des écoles et propose des conférences pour tous, ayant comme simple objectif de nous faire prendre conscience de la valeur des plantes et de nous encourager à contribuer activement à la conservation. Bien que Cienfuegos soit la plus petite province de Cuba, en 2000, il a subi la plus large déforestation. Malgré cela, la province contient environ 38 espèces endémiques restreintes et 60 espèces endémiques cubaines. Le jardin fait passer son message à la télévision et sur les radios et ouvre des dialogues avec

un public vaste passant des écoliers aux administrateurs locaux. Le jardin invite les leaders mondiaux à le rejoindre lors d'expéditions pour les encourager à s'impliquer directement dans la conservation.

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Resources

RESOURCES

Landscapes and Learning: Place Studies for a Global World



Landscapes and Learning uses the lens of place to explore how we can respond differently to some of the major questions of our time. Postcolonial global concerns such as increased displacement and migration, the loss of indigenous knowledges, and the imperatives of environmental

degradation and climate change, require critical educational responses. Place studies offers new languages and fresh metaphors to open up interdisciplinary conversations in the space between local and global, and indigenous and non-indigenous knowledges. Through its focus on the mutual constitution of bodies, identities, histories, spaces and places, place studies offers a conceptual tool for cultural and environmental transformations.

Margaret Somerville, Kerith Power and Phoenix de Carteret, Monash University, Australia (Eds.), 2009, Sense Publishers, Rotterdam, The Netherlands. 237pp. ISBN 978-94-6091-081-4 paperback. www.sensepublishers.com

Environmental Education in Context: An International Perspective on the Development of Environmental Education

This book presents an international perspective on environmental educational and specifically the influence that context has on this aspect of the curriculum. The focus is on environmental education both formal and non formal and the factors that impact upon its effectiveness, particularly in non-Western and non-English-speaking contexts (i.e., outside the UK, USA, Australia, NZ, etc.). An important feature of

RESSOURCES

Paysages et apprentissage : Etudes de lieux pour un monde global

L'ouvrage « Paysages et apprentissage » explore sous l'angle du lieu la façon dont nous pouvons aborder différemment quelques-unes des questions majeures de notre temps. Les préoccupations mondiales post-coloniales comme l'augmentation des déplacements et des migrations, la perte des savoirs indigènes, les impératifs issus de la dégradation de l'environnement et du changement climatique, appellent des réponses éducatives critiques. Les études de lieux offrent de nouveaux langages et des métaphores neuves pour engager des discussions interdisciplinaires dans l'espace situé entre le local et le global, et les savoirs indigènes et non indigènes. En se centrant sur la constitution mutuelle d'organismes, d'identités, d'histoires, d'espaces et de lieux, les études de lieux proposent un outil conceptuel de transformation culturelle et environnementale.

Margaret Somerville, Kerith Power and Phoenix de Carteret, Monash University, Australia (Eds.), 2009, Sense Publishers, Rotterdam, The Netherlands. 237pp. ISBN 978-94-6091-081-4 paperback. www.sensepublishers.com

L'éducation à l'environnement dans un contexte : Une perspective internationale sur le développement de l'éducation à l'environnement

Ce livre présente une perspective internationale sur l'éducation à l'environnement et spécifiquement l'influence du contexte sur cet aspect du programme scolaire. Il est axé sur l'éducation à l'environnement, aussi bien formelle qu'informelle, et sur les facteurs qui ont un impact sur son efficacité, notamment dans des contextes non-occidentaux et non-

RECURSOS

Paisajes y aprendizaje: Estudios de Sitio para un Mundo Global

Paisajes y Aprendizaje explora cómo podemos responder de diferentes maneras a algunas de las preguntas más importantes de nuestro tiempo. Las preocupaciones del mundo post colonial, tales como el incremento en los desplazamientos y la migración de personas, la pérdida de los conocimientos indígenas tradicionales y los imperativos derivados de la degradación ambiental y el cambio climático, exigen respuestas educativas críticas. Los estudios de sitio ofrecen nuevos idiomas y nuevas metáforas para iniciar conversaciones interdisciplinarias en el espacio entre lo local y lo global, y entre los conocimientos indígenas tradicionales y los conocimientos no-indígenas. Al centrarse en la constitución mutua de los cuerpos, las identidades, historias, espacios y lugares, los estudios de sitio brindan una herramienta conceptual para avanzar en las transformaciones culturales y ambientales.

Margaret Somerville, Kerith Power and Phoenix de Carteret, Monash University, Australia (Eds.), 2009, Sense Publishers, Rotterdam, The Netherlands. 237pp. ISBN 978-94-6091-081-4 paperback. www.sensepublishers.com

La Educación Ambiental en contexto: una perspectiva internacional sobre el Desarrollo de la Educación Ambiental

Este libro presenta una perspectiva internacional sobre la educación ambiental, específicamente la influencia que el contexto tiene sobre este aspecto en los planes de estudios. La atención se centra en la educación ambiental formal y no formal y en los factores que influyen en su eficacia, en particular contextos no occidentales y no anglo hablantes (por ejemplo, fuera del Reino Unido, los Estados Unidos, Australia,



the book is that it draws upon the experiences and research from local experts from an extremely diverse cohort across the world (25 countries and 2 regions in total). The book

addresses topics such as: the development of environmental education in different countries, its implementation, the influence of political, cultural, societal or religious mores; governmental or ministerial drives; economic or other pressures driving curriculum reform; the influence of external assessment regimes on environmental education, and so on.

Neil Taylor and Mike Littledeke, University of New England, Australia and Chris Eames and Richard K. Coll, University of Waikato, New Zealand (Eds.). Sense Publishers, Rotterdam, The Netherlands. 336pp. ISBN: 9789087909611 paperback. www.sensepublishers.com

Horticultural Therapy Methods: Making Connections in Health Care, Human Service, and Community Programs

Horticultural therapy has evolved from its use only by volunteer gardeners to become a recognized and respected therapeutic discipline conducted by trained professionals. This book details the basics of horticultural therapy through gardening. Experienced practitioners and educators discuss horticultural therapy theory, application, and the positive impact it has on clients. Beginners are educated on key issues and learn the skills needed to effectively treat clients.

Rebecca L. Haller and Christine L. Kramer, (Eds.), 2006, Haworth Press, New York, USA, 163 pp, ISBN 978-1560223269, paperback: www.HaworthPress.com

Interdisciplinarity and Climate Change: Transforming Knowledge and Practice for Our Global Future

Interdisciplinarity and Climate Change addresses one of the most challenging questions of our time. Its standpoint is based on the recognition that effective and coherent interdisciplinarity is necessary to deal with the issue of

anglophones (c'est à dire hors du Royaume-Uni, des Etats-Unis, de l'Australie, de la Nouvelle-Zélande, etc.). Un trait important du livre est qu'il décrit les expériences et les recherches d'un groupe extrêmement varié d'experts locaux à travers le monde (25 pays et 2 régions au total). Le livre aborde des thèmes comme : le développement de l'éducation à l'environnement dans différents pays, sa mise en oeuvre, l'influence des mœurs politiques, culturelles, sociétales ou religieuses ; les efforts gouvernementaux ou ministériels ; les pressions économiques ou autres menant à la réforme des programmes ; l'influence des régimes externes d'évaluation sur l'éducation à l'environnement, etc.

Neil Taylor and Mike Littledeke, University of New England, Australia and Chris Eames and Richard K. Coll, University of Waikato, New Zealand (Eds.). Sense Publishers, Rotterdam, The Netherlands. 336pp. ISBN: 9789087909611 paperback. www.sensepublishers.com

Les méthodes de thérapie par l'horticulture : mise en relation des soins de santé, des services à la personne et des programmes communautaires

La thérapie par l'horticulture, à l'origine utilisée seulement par des jardiniers volontaires, est maintenant une discipline thérapeutique reconnue et respectée délivrée par des professionnels confirmés. Ce livre détaille les bases de la thérapie par l'horticulture à travers le jardinage. Des praticiens expérimentés et des animateurs exposent la théorie de la thérapie par l'horticulture, son application, et ses impacts positifs sur les patients. Les néophytes sont formés sur des points clés et acquièrent les compétences nécessaires pour traiter efficacement les patients.

Rebecca L. Haller and Christine L. Kramer, (Eds.), 2006, Haworth Press, New York, USA, 163 pp, ISBN 978-1560223269, paperback: www.HaworthPress.com

Changement climatique et interdisciplinarité : transformation des connaissances et de la pratique pour notre avenir mondial

« Changement climatique et interdisciplinarité » aborde l'une des questions les plus cruciales de notre temps. Son point de vue s'appuie sur le principe qu'une interdisciplinarité efficace et

Nueva Zelanda, etc.). Una característica importante del libro es que se basa en las experiencias e investigaciones de expertos locales de una extremadamente diversa serie de ejemplos de todo el mundo (25 países y 2 regiones en total). El libro aborda temas tales como el desarrollo de la educación ambiental en diferentes países, su aplicación, la influencia de la política y las costumbres culturales, sociales o religiosas, las directrices gubernamentales o ministeriales, la influencia de las presiones económicas y de otro tipo sobre la reforma curricular; la influencia de los regímenes de evaluación externa en la educación ambiental, y así sucesivamente.

Neil Taylor and Mike Littledeke, University of New England, Australia and Chris Eames and Richard K. Coll, University of Waikato, New Zealand (Eds.). Sense Publishers, Rotterdam, The Netherlands. 336pp. ISBN: 9789087909611 paperback. www.sensepublishers.com

Métodos de Horticultura Terapéutica: Haciendo Conexiones entre los programas de cuidado de la salud, servicios humanitarios y de la comunidad

La horticultura terapéutica ha evolucionado desde su uso por únicamente jardineros voluntarios, para convertirse en una disciplina terapéutica reconocida y respetada dirigida por profesionales altamente capacitados. En este libro se detallan los aspectos básicos de la horticultura terapéutica a través de la jardinería. Educadores y profesionales con experiencia discuten la teoría, las aplicaciones e impactos positivos que tiene la horticultura terapéutica entre los usuarios. Los principiantes son educados en las cuestiones clave y el aprendizaje de las habilidades necesarias para brindar tratamientos eficaces a los usuarios.

Rebecca L. Haller and Christine L. Kramer, (Eds.), 2006, Haworth Press, New York, USA, 163 pp, ISBN 978-1560223269, paperback: www.HaworthPress.com

La interdisciplinarietà y el Cambio Climático: La transformación de conocimientos y práctica de nuestro Futuro Global

El libro *La interdisciplinarietà y el Cambio Climático* trata de una de las preguntas más desafiantes de nuestro tiempo. Su punto de vista se basa en el reconocimiento de que la

climate change and the multitude of linked phenomena which both constitute and connect to it. The wide range of issues discussed by activists and scholars include:

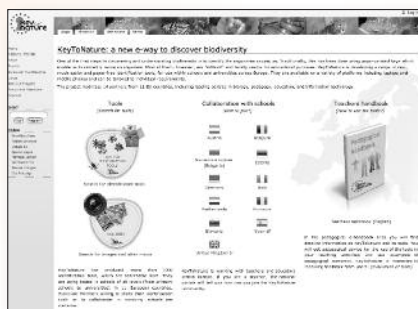
- The dangers of reducing all environmental, energy and climate gas issues to questions of carbon dioxide emissions
- The problems of integrating natural and social scientific work and the perils of monodisciplinary tunnel vision
- The consequences of the neglect of issues of consumption in climate policy
- The desirability of a care based ethics and of the integration of cultural considerations into climate policy
- The problem of relating theoretical knowledge to practical action in contemporary democratic societies.

Roy Bhaskar, Cheryl Frank, Karl Georg Høyer, Petter Næss, Jenneth Parker, 2010, Routledge, Taylor & Francis Group Ltd., Oxford, UK, 280pp, ISBN: 978-0-415-57388-7. www.routledge-philosophy.com

WEBSITES

<http://www.keytonature.eu/wiki/>

KeyToNature is a European Union funded project that has brought together 14 partners in 11 EU countries (including leading centres in biology, education and information technology) to produce more than 1,000 searchable identification tools. The website offers paper-free identification tools (tested in schools of all levels), a database of searchable images and other media, a teachers' handbook and an opportunity to get involved in testing identification tools.



cohérente est nécessaire pour traiter le problème du changement climatique et la multitude de phénomènes qui lui sont liés. Le panel des problèmes débattus par des personnes engagées et des spécialistes comprend :

- Le danger de réduire tous les problèmes liés à l'environnement, à l'énergie et aux gaz à effet de serre à la seule question des émissions de dioxyde de carbone.
- La difficulté d'intégrer des travaux scientifiques sur l'environnement et le social, ainsi que le danger d'une approche mono-disciplinaire.
- Les conséquences de ne pas tenir compte des problèmes de consommation dans les politiques sur le climat.
- La volonté d'une éthique de prévention et de l'intégration de problématiques culturelles dans les politiques sur le climat.
- La difficulté de transcrire le savoir théorique en action pratique dans les sociétés démocratiques contemporaines.

Roy Bhaskar, Cheryl Frank, Karl Georg Høyer, Petter Næss, Jenneth Parker, 2010, Routledge, Taylor & Francis Group Ltd., Oxford, UK, 280pp, ISBN: 978-0-415-57388-7. www.routledge-philosophy.com

SITES INTERNET

<http://www.keytonature.eu/wiki/>

KeyToNature est un projet financé par l'Union Européenne qui rassemble 14 partenaires de 11 pays de l'Union Européenne (dont des centres de pointe dans les domaines de la biologie, l'éducation et l'informatique) pour produire plus de 1 000 outils de détermination référencés. Le site Internet offre des outils de détermination sans support papier (testés par des écoles de tous niveaux), une banque d'images et d'autres médias référencés, un guide pour les enseignants et la possibilité de tester des outils de détermination.

<http://learningforsustainability.net>

Le site « Learning for Sustainability » fournit des ressources pour faciliter l'approche et la conduite des aspects sociaux et de renforcement des capacités dans la gestion de la biodiversité et d'autres problématiques de développement durable. Il s'agit d'un guide de ressources en ligne pour les chercheurs et les praticiens intéressés par la conduite de processus à intervenants

interdisciplinariedad efectiva y coherente es necesaria para abordar la cuestión del cambio climático y la multitud de fenómenos vinculados que lo constituyen y otros con los que se vincula. La amplia gama de temas tratados por los activistas y académicos incluyen:

- Los peligros de limitar las cuestiones del medio ambiente, energía y clima a sólo preguntas sobre las emisiones de dióxido de carbono,
- Los problemas de la integración del trabajo científicos natural y social y los peligros de una visión unidisciplinaria.
- Las consecuencias de negar los asuntos del consumo en las políticas climáticas
- La conveniencia de una atención basada en la ética y de la integración de consideraciones culturales dentro de la política climática
- El problema de relacionar el conocimiento teórico a la acción práctica en las sociedades democráticas contemporáneas.

Roy Bhaskar, Cheryl Frank, Karl Georg Høyer, Petter Næss, Jenneth Parker, 2010, Routledge, Taylor & Francis Group Ltd., Oxford, UK, 280pp, ISBN: 978-0-415-57388-7. www.routledge-philosophy.com

SITIOS EN INTERNET

<http://www.keytonature.eu/wiki/>

KeyToNature es un proyecto financiado por la Unión Europea que ha reunido a 14 socios en 11 países de la UE (incluidos los centros líderes en biología, educación y tecnología de la información) para producir más de 1000 claves de identificación localizables. El sitio web ofrece dichas claves de identificación en formato electrónico (probadas en escuelas de todos los niveles), una base de datos de imágenes y otros medios de comunicación, un manual del maestro y la oportunidad de participar en la prueba de estas claves de identificación.

<http://learningforsustainability.net>

El sitio Learning for Sustainability (Aprendizaje para la sostenibilidad) reúne los recursos para ayudar a abordar y gestionar los aspectos sociales y de capacidad de gestión de la biodiversidad y otros asuntos de la sostenibilidad. Se trata de una guía de recursos en línea para investigadores y profesionales interesados en la gestión de

<http://learningforsustainability.net>

The Learning for Sustainability site brings together resources to help address and manage the social and capacity building aspects of biodiversity management and other sustainability issues. It is a guide to on-line resources for researchers and practitioners interested in managing multi-stakeholder processes that support social learning and collective action. Several hundred on-line resources are available.

http://www.fao.org/schoolgarden/web1_en.htm

The UN Food and Agricultural Organisation (FAO) believes that school gardens are powerful tools for improving child nutrition and education and have the potential to increase food security and human nutrition. This website encourages the setting up of school gardens by providing a range of on-line resources for teachers and children, case studies and links to relevant organizations. Also included is a series of lesson plans for integrating horticulture into the elementary school curriculum.

www.bgen.org.uk

Botanic Gardens Education Network has launched an accreditation scheme for sites to become a Growing Schools Garden. Achieving GSGs accreditation is evidence that the site is delivering high quality teaching and learning experiences and managing risk effectively. The process of accreditation and the scheme's system of monitoring and evaluation also provide a framework for sites to regularly examine and develop their practice. The scheme is supported by the UK Department for Children, Schools and Families.

www.cbd.int/2010/welcome

The International Year of Biodiversity provides us with a unique opportunity to increase understanding of the vital role that biodiversity plays in sustaining life on Earth. This website contains information and downloadable resources about The International Year of Biodiversity (IYB). The IYB logo is available for use on resources and there is an interactive map displaying where and how people are celebrating the IYB.

multiples appuyant l'apprentissage social et les actions collectives. Plusieurs centaines de ressources sont disponibles en ligne.

http://www.fao.org/schoolgarden/web1_en.htm

L'Organisation des Nations Unies pour l'alimentation et l'agriculture (FAO) considère que le jardinage à l'école est un outil puissant pour améliorer l'éducation et la nutrition des enfants et peut permettre d'augmenter la sécurité alimentaire et la nutrition humaine. Ce site Internet encourage la réalisation de jardins d'école en fournissant une palette de ressources en ligne pour les enseignants et les scolaires, des études de cas et des liens vers des organismes compétents. Une série de leçons est également incluse en vue d'intégrer l'horticulture dans les programmes de l'école primaire.

www.bgen.org.uk

Le réseau « Education » des Jardins botaniques a lancé un projet d'accréditation pour que certains lieux deviennent des « jardins d'école en culture » (Growing Schools Garden). L'obtention d'un label GSG certifie qu'un site apporte un enseignement et des expériences d'apprentissage de grande qualité et qu'il est capable de gérer les risques de manière efficace. Le processus d'accréditation et le système de suivi et d'évaluation fournissent aussi une trame pour permettre à ces lieux de contrôler régulièrement leurs pratiques et de les améliorer. Le projet est soutenu par le Département pour l'enfance, l'école et la famille du Royaume-Uni.

www.cbd.int/2010/welcome

L'Année internationale de la biodiversité est une remarquable opportunité pour sensibiliser les gens au rôle fondamental que joue la biodiversité pour assurer une vie durable sur Terre. Ce site Internet contient des informations et des ressources téléchargeables sur l'Année Internationale de la biodiversité (AIB).

Le logo AIB est disponible pour être utilisé sur des documents de référence et une carte interactive indique où et de quelle manière est célébrée l'AIB.

procesos con múltiples partes interesadas, que apoyan el aprendizaje social y la acción colectiva. Cientos de recursos en línea están disponibles.

http://www.fao.org/schoolgarden/web1_en.htm

La Organización de las Naciones Unidas para la Agricultura y la Alimentación (FAO) considera que los huertos escolares son herramientas poderosas para mejorar la nutrición infantil y la educación, y que tienen el potencial de aumentar la seguridad alimentaria y mejorar la nutrición humana. Este sitio promueve la creación de huertos escolares, proporcionando una gama de recursos en línea para profesores y niños, estudios de casos y vínculos con las organizaciones pertinentes. También se incluye una serie de planes de clases para la integración de la horticultura en el currículo de la educación primaria.

www.bgen.org.uk

La Red de Educación en Jardines Botánicos ha puesto en marcha un sistema de acreditación de los sitios para convertirse en un Jardín Escolar de Crecimiento. Lograr dicha acreditación es evidencia de que el sitio ofrece experiencias de enseñanza – aprendizaje de alta calidad y un eficiente manejo de riesgos. El proceso de acreditación y los esquemas de los regímenes de seguimiento y evaluación también proporcionan un marco para que los sitios examinen y desarrollen regularmente su práctica. Este esquema tiene el apoyo del Departamento Británico para la Infancia, Escuelas y Familias.

www.cbd.int/2010/welcome

El Año Internacional de la Biodiversidad nos proporciona una oportunidad única para incrementar la comprensión de la función vital que la biodiversidad cumple en el mantenimiento de la vida en la Tierra. Este sitio web contiene información y recursos descargables sobre el Año Internacional de la Biodiversidad (IYB). El logotipo de IYB está disponible para uso de los recursos y medios, y hay un mapa interactivo que muestra dónde y cómo la gente está celebrando el Año Internacional de la Biodiversidad.

International Diploma in Botanic Garden Education



The next *International Diploma in Botanic Garden Education* is being run from 20 September to 22 October 2010. Organized by BGCI and the Royal Botanic Gardens, Kew, this five week course aims to equip participants with the skills and strategies needed to communicate effectively with their varied audiences. By the end of the course, participants will have an understanding of all the aspects required to create an education master plan for their site.

The emphasis of the course is on interactive learning and the application of skills to the participants' working context, with lectures, workshops, seminars, practical activities and field visits. Topics covered include: theory and development of environmental education, identification of target audiences, project planning, interpretation principles and practices, lifelong learning strategies, fundraising, marketing, networking and evaluation.

For more information visit:

RBG Kew's website
www.kew.org/education/bge.html

BGCI's website
<http://www.bgci.org/education/diploma-courseoutline/>

There are a limited number of scholarships available for delegates.

To download an application form please visit BGCI's website.

Priority for scholarships will be given to participants coming from Commonwealth countries.

The deadline for applications is Friday 28 May 2010

Testimonials

"I loved the variety, energy, and pace of the International Diploma in Botanic Garden Education Course. Participating in the course improved my knowledge relating significance of education in botanic gardens in relation to plant conservation and sustainability. Also, the course made it possible to develop contacts and communication channels with other professionals working in related areas and also to build friendships. It was a very well organised course with fantastic tutors."

Dilan Bayindir, Nezahat Gokyigit Botanic Garden, Istanbul, Turkey. International Diploma 2008.

"This course is a MUST for anybody out there who is conducting environmental education in botanical gardensyour conservation site will definitely echo out conservation messages clearly and effectively if you know how to get messages out. This course is that tool."

Endo Guav, Forestry Research Institute, Papua New Guinea. International Diploma 2006.

The Diploma Course is superb! It encompasses an engaging mixture of theoretical and experiential programmes and provides you with a huge opportunity to obtain knowledge and skills from botanic gardens and different educational centres in the UK. Your garden can quickly embrace what you learn.

Orlik Gómez García, Jardín Botánico Francisco Javier Clavijero, Mexico. International Diploma 2008.

How to join Botanic Gardens Conservation International and help us to save plants from extinction

Established in 1987, BGCi links more than 500 botanic gardens and conservation organizations in 115 countries, working together to save PLANTS FOR THE PLANET.

BGCi's INSTITUTION members receive numerous benefits:

- Opportunities for involvement in joint conservation and education projects
- Tools and opportunities to influence global conservation policy and action
- Botanic Garden Management Resource Pack (upon joining)*
- Regular publications:
 - Cuttings – newsletter on botanic gardens and plant conservation (2 per year)
 - BGjournal – an international journal for botanic gardens (2 per year)
 - Roots - Environmental Education Review (2 per year)
 - A wide range of publications and special reports
- Invitations to BGCi congresses and discounts on registration fees
- BGCi technical support and advisory services

Institution Membership		£ Stg	US \$	€ Euros
A	BGCi Patron Institution	5000	8000	7500
B	Institution member (budget more than US\$2,250,000)	750	1200	1000
C	Institution member (budget US\$ 1,500,000 - 2,250,000)	500	800	650
D	Institution member (budget US\$ 750,000 - 1,500,000)	350	550	450
E	Institution member (budget US\$ 100,000 - 750,000)	185	300	250
F	Institution member (budget below US\$100,000)*	85	130	115
*Generally applies to institutions in less developed countries				

INDIVIDUAL members and donors

support BGCi's global network for plant conservation, and are connected to it through our publications and events. Membership categories include:

- Regular publications:
 - Cuttings – newsletter on botanic gardens and plant conservation (2 per year)
 - BGjournal - an international journal for botanic gardens (2 per year)
 - Roots - Environmental Education Review (2 per year)
- Invitations to BGCi congresses and discounts on registration fees

Individual Membership		£ Stg	US \$	€ Euros
J	Conservation donor (<i>BGjournal</i> , <i>Roots</i> and <i>Cuttings</i> reports and more)	250	400	350
K	Associate member (<i>Cuttings</i> and <i>BGjournal</i>)	40	65	50
L	Associate member (<i>Cuttings</i> and <i>Roots</i>)	40	65	50
M	Friend (<i>Cuttings</i>) available through online subscription only (www.bgci.org)	10	15	15

Corporate Membership is available; please contact BGCi at info@bgci.org for further details.

**Contents of the Botanic Garden Management Resource Pack include: Darwin Technical Manual for Botanic Gardens, A Handbook for Botanic Gardens on the Reintroduction of Plants to the Wild, BGjournal - an international journal for botanic gardens (2 past issues), Roots - Environmental Education Review (2 past issues), The International Agenda for Botanic Gardens in Conservation, Global Strategy for Plant Conservation, Environmental Education in Botanic Gardens, additional recent BGCi reports and manuals. BG-Recorder (a computer software package for plant records) available on request.*

Payment may be made online at www.bgci.org/worldwide/members/, or by cheque (payable to Botanic Gardens Conservation International) or VISA/MasterCard sent to BGCi, Descanso House, 199 Kew Road, Richmond, Surrey, TW9 3BW, U.K or Fax: +44 (0) 20 8332 5956.

I wish to apply for BGCi's INSTITUTION / INDIVIDUAL membership (circle one).

Institution Name (if applicable)

Contact Name

Address

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Website

Membership category (A-M) Annual rate

VISA/Mastercard number

Credit card expiry date Security code/CSV number (last 3 digits)

Signature Print name

I would like to make a donation to BGCi. Amount

Please clearly state your name (or the name of your institution) on all documentation. Please contact info@bgci.org for further information. Individuals in the U.S. can make tax-deductible contributions online at www.justgive.org or by contacting usa@bgci.org. BGCi is a registered charity and company, limited by guarantee, in England and Wales, and in the U.S. as a 501(c)(3) non-profit organization.



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