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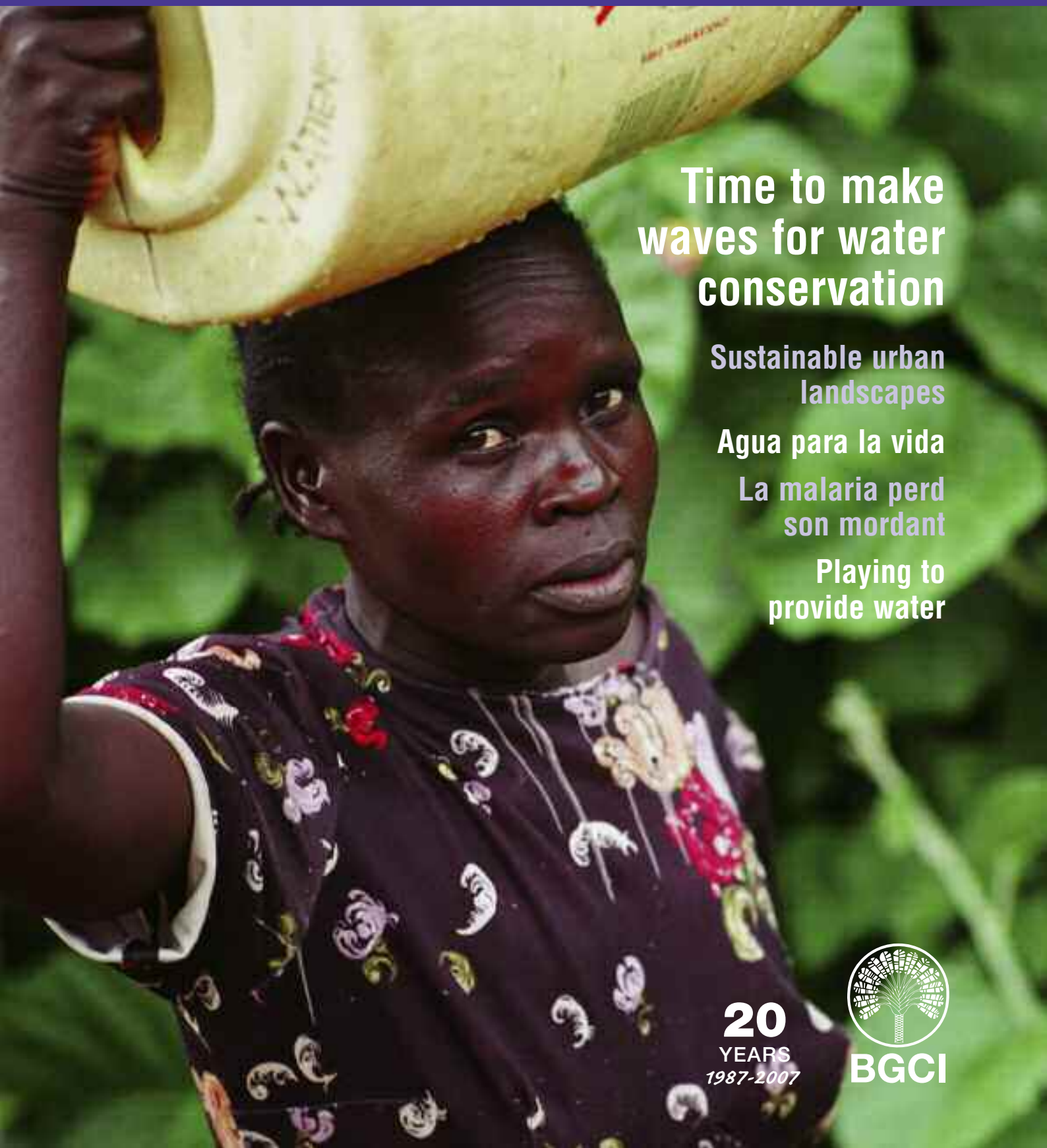
roots

Botanic Gardens Conservation International Education Review

October 2007



Time to make waves for water conservation

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Agua para la vida

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20 YEARS 1987-2007

BGCI

Education E-update
monthly resource for botanic garden educators

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Each month's issue includes news updates from BGCI and botanic gardens around the world; links to education resources and materials; educator interviews and ideas and feedback from our readers.

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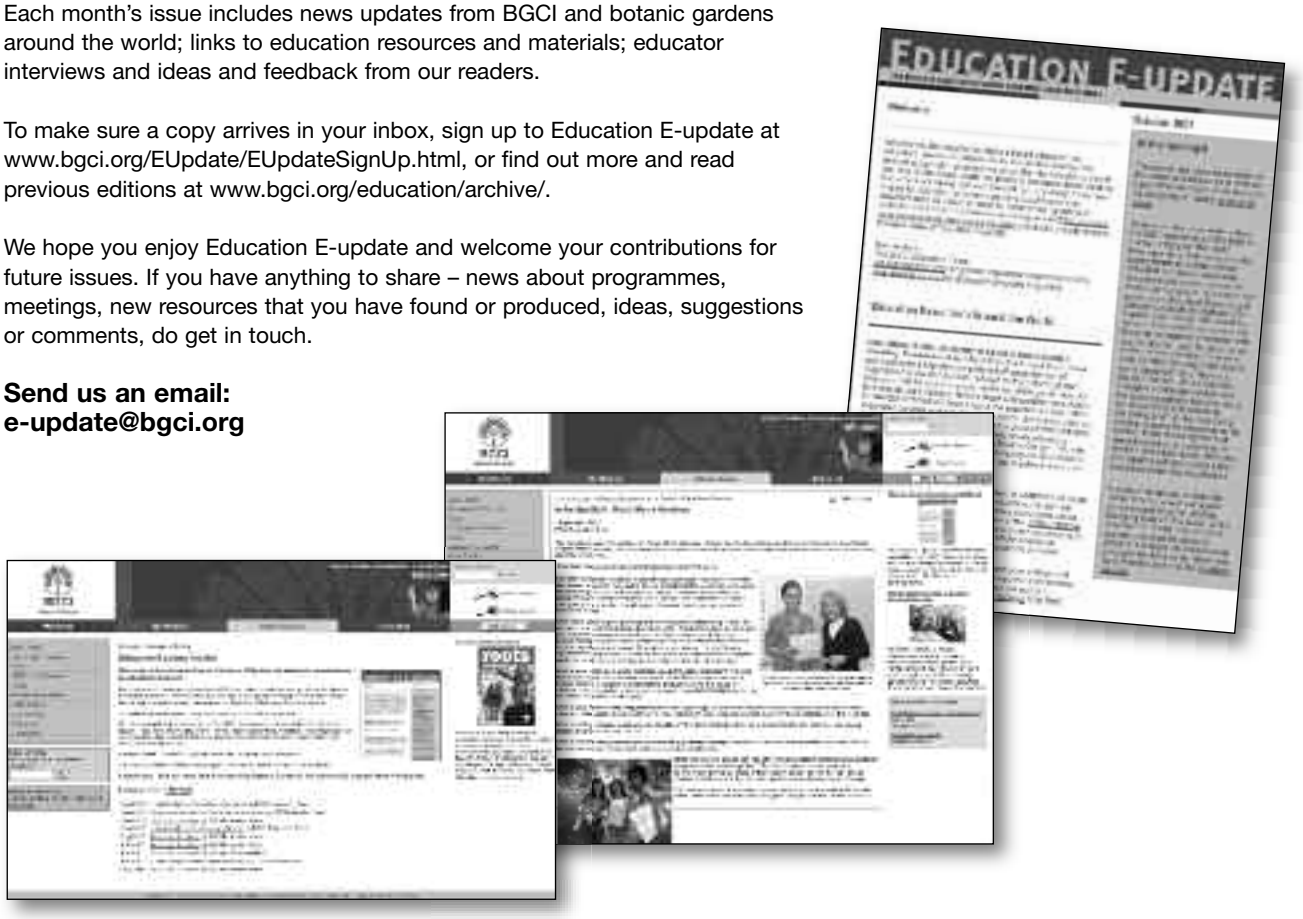

Flower Power –
botanic garden education blog

While you are surfing the web, have a look at the BGCI education blog. Written by the education department at BGCI, it contains musings, events, ideas and suggestions, and provides a great place for discussion and feedback.

Get online, get involved and get heard!
http://bgcieducation.blogspot.com/

Editors: Julia Willison, Sarah Kneebone

Cover Photo: Women and girls are mainly responsible for fetching water. This often involves hauling water containers for several hours every day. Heather Arney, WaterPartners International. www.water.org

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Forthcoming Issues
Volume 5 Number 1 – New horizons – tackling climate change – Last submission date January 20 2007

Volume 5 Number 2 – A natural selection – exploring evolution in botanic gardens – Last submission date July 20 2008

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BGCI is a worldwide membership organization established in 1987. Its mission is to mobilise botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet. BGCI is an independent organization registered in the United Kingdom as a charity (Charity Reg No 1098834) and a company limited by guarantee, No 4673175. BGCI is a tax-exempt (501(c)(3) non-profit organization in the USA and in Russia.

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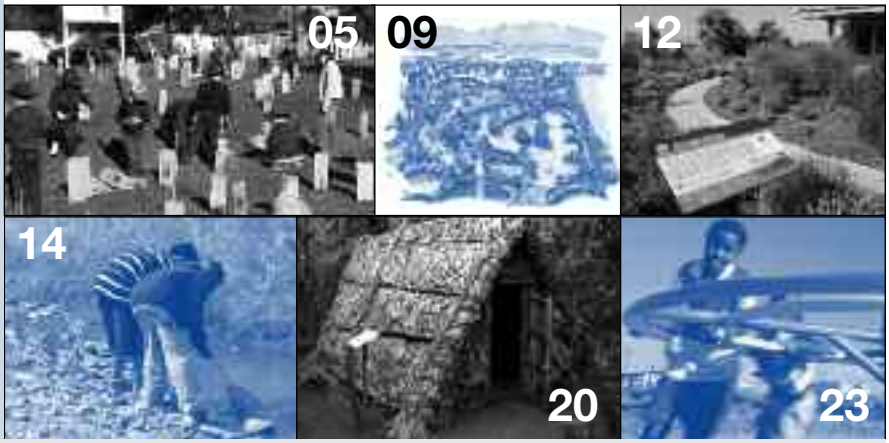

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John Cortez – Gibraltar Botanic Gardens, Gibraltar

Faire des vages pour l'eau

Haciendo olas para agua

Julia Willison

Making waves for water

Editorial - English

When we started to plan this water-themed issue of Roots, we were blissfully unaware that the summer of 2007 would emerge as the wettest since UK records began. And yet what happened here is nothing compared with what was going on in other regions of the world. As the rains came down and rivers burst their banks throughout Africa, Latin America and Asia, millions of people were left homeless and without safe drinking water. Elsewhere, millions of other people were and are facing serious and potentially catastrophic drought conditions.

The relationship between plants and water is intimate and complex. Healthy and diverse plant cover is essential in maintaining viable watersheds, streams and lakes. They hold soil in place, control stream flows and filter sediments from water. Wetlands, among the most productive ecosystems on Earth, provide habitats for a very wide range of plants and animals and are important breeding and nursery areas for fish, birds and invertebrates. They also act as a buffer zone between landscapes. Yet the destruction of wetlands and forests is an all too familiar story and a major cause of increased flooding and lack of fresh water. Global climate change is likely to amplify the range and impact of both flooding and drought.

Botanic gardens are ideally placed to raise awareness about these issues and in this issue of Roots we highlight some of the valuable work they are doing. From Australia, Sheryn Pitman of the Sustainable Landscape Project

Editorial - Français

Quand nous avons commencé à travailler sur le thème de l'eau pour ce numéro de Roots, nous ne savions pas encore que cet été se révèlerait le plus pluvieux que le Royaume-Uni ait connu depuis qu'on enregistre les données météo. Et pourtant, ce qui est arrivé ici n'est rien en comparaison de ce qui s'est passé ailleurs dans le monde. Alors que la pluie gonflait les rivières et les faisait déborder de leur lit en Afrique, en Amérique latine et en Asie, des millions de gens se sont retrouvés sans abris et sans eau potable. Au même moment, ailleurs sur la planète, des millions d'autres gens devaient faire face à des conditions de sécheresse graves, voire catastrophiques.

Les relations entre les plantes et l'eau sont intimes et complexes. Une couverture végétale diversifiée et en bonne santé est essentielle pour maintenir vivants les cours d'eau, les lacs et les bassins hydrauliques. Elle maintient le sol en place, contrôle le flux des eaux et filtre les sédiments en suspension. Les zones humides, parmi les écosystèmes les plus productifs sur Terre, sont l'habitat d'une très grande variété de plantes et d'animaux, et sont des lieux privilégiés pour la reproduction de nombreux poissons, oiseaux et invertébrés. Elles jouent un rôle de tampon entre les différents paysages. Pourtant la destruction des zones humides et des forêts est une histoire malheureusement trop connue et qui est la cause de l'augmentation des inondations et de la pénurie d'eau douce. Et le changement climatique va probablement encore amplifier

Editorial - Español

Cuando comenzamos a planificar el presente número de Roots, éramos felizmente inconscientes de que el verano de 2007 destacaría como el más lluvioso desde que comenzaron los registros escritos en el Reino Unido. Sin embargo, lo que ha sucedido aquí no es casi nada comparado con lo que sucede en el resto del mundo. A medida que caen las lluvias, y los ríos invaden sus riberas en África, Latinoamérica y Asia, millones de personas se quedan sin hogar y sin agua potable. Al mismo tiempo, en otras partes del mundo millones de personas se enfrentan con una seria y potencialmente catastrófica sequía.

Las relaciones de las plantas con el agua son profundas y complejas. Una cobertura vegetal completa y diversa es esencial para mantener la función de las cuencas, los arroyos y los lagos. Esta cobertura estabiliza el suelo, controla el flujo y retiene el sedimento del medio acuático. Los humedales, uno de los ecosistemas más productivos del Planeta, proporcionan los hábitats para una gran diversidad de plantas y animales, a su vez importantes para la reproducción y cría de peces, aves e invertebrados. Actúan también como lugares de refugio entre los paisajes circundantes. Aun así, la destrucción de humedales y bosques nos es familiar y, por demasiado frecuente, causa del aumento de inundaciones y de falta de agua dulce. El cambio climático global es probable que amplíe los efectos del impacto, tanto de las inundaciones como de la sequía.

hosted by Adelaide Botanic Garden outlines a powerful model developed to enable communities to make informed and ethical choices about the creation of gardens and resource use.

We know that many people who visit botanic gardens leave without any idea of how to replicate what they see in their own gardens. Yet this need not be the case, as Jeri Deneen, of Deneen Powell Atelier, Inc., points out. She describes a garden re-design at Utah's Conservation Garden Park that successfully shows visitors how to create their own drought-tolerant gardens. Also in the USA, Shawn Olsen and colleagues at Utah Botanical Center describe their range of educational activities and profile the Utah House, a sustainable building demonstration house which uses 50% less water than standard housing. Likewise, a new Visitor Center at Bernheim Arboretum and Research Forest, USA, is a wonderful example of sustainability. Education Director, Claude Stephens, explains that the Center's aim is to connect people directly with their watersheds. By example, he introduces us to a restoration project that returned a channeled stream to its natural meandering course.

Water resource issues affecting the lives of the people living in the Caribbean and tropical countries are as diverse as their culture, history and politics. Sonia Benítez and colleagues at Cuba's National Botanic Garden describe the activities organised for World Water Day (www.worldwaterday.org), in collaboration with other national institutions, to ensure a comprehensive public message about water conservation. Held on March 22 every year, World Water Day grew out of the 1992 UNCED conference in Rio de Janeiro. Next year's theme is sanitation, which ties in very well with a programme currently run at the National Botanical Conservatory, Reunion Island. In 2005, Reunion was engulfed by a health and economic crisis when 25% of the island's population contracted a rare form of viral fever called chikungunya, spread by mosquitos. Monique Paternoster and Olivier Riviere show how the garden is leading the fight to eradicate the mosquitos and inform visitors about the dangers of leaving stagnant water in their own back gardens.

l'étendue et l'impact à la fois des inondations et des sécheresses.

Les jardins botaniques sont idéalement placés pour faire prendre conscience de ces problèmes, et ce numéro de Roots met en valeur leur intéressant travail sur ce sujet. Sheryn Pitman du Jardin Botanique d'Adelaide en Australie, décrit un puissant modèle développé pour permettre aux communautés de faire des choix éthiques et pertinents concernant la création de jardins et l'utilisation de leurs ressources en eau.

Nous savons que nombreux sont les visiteurs qui quittent les jardins botaniques sans savoir reproduire dans leur propre jardin ce qu'ils y ont vu. Mais il n'est pas nécessaire qu'il en soit ainsi, comme le montre Jeri Deneen de la Société Deneen Powell Ateleir, Inc. Elle décrit une méthode de restauration de jardin qui montre avec succès aux visiteurs du Conservation Garden Park de l'Utah comment créer leur propre jardin tolérant à la sécheresse. Egalement aux USA, Shawn Olsen et ses collègues du Centre Botanique de l'Utah décrivent leur champ d'activités éducatives et présentent leur maison de démonstration, « Utah House », un bâtiment construit écologiquement qui utilise 50% moins d'eau que les maisons standard. De même un nouveau Visitor Center à Bernhiem Forest aux USA est un merveilleux exemple pour le développement durable. Le Directeur de l'Education, Claude Stephens, explique que l'objectif du centre est de sensibiliser les gens à l'hydrogéographie de leur région. En exemple il nous présente un projet de restauration où un cours d'eau canalisé est remis dans son lit naturel et sinueux.

Les problèmes de ressource en eau qui affectent les populations des Caraïbes et des pays tropicaux sont aussi divers que leurs cultures, leur histoire et leurs politiques. Sonia Benitez et ses collègues du Jardin Botanique National de Cuba décrivent leurs activités pour la Journée Mondiale de l'Eau (www.worldwaterday.org), en collaboration avec d'autres institutions nationales, permettant d'apporter un message complet au sujet de la conservation des ressources en eau.

Los jardines botánicos están privilegiados para poder concienciar sobre estos retos, y en éste número destacamos una parte del valioso trabajo que están haciendo. Desde Australia, Sheryn Pitman, del Jardín Botánico de Adelaide, perfila un poderoso modelo desarrollado para capacitar a las comunidades mediante una elección informada y ética a la hora de crear jardines y en el uso sostenible de los recursos.

Para los visitantes de los jardines botánicos es difícil aplicar en sus jardines la estrategias para un uso eficiente del agua, pero no debería ser así, como dice Jeri Deneen de la empresa Deneen Powell Atelier Inc. Jeri describe un jardín rediseñado en Conservation Garden Park de Utah, que muestra a sus visitantes cómo crear su propio jardín tolerante a la sequía. También en los EEUU, Shawn Olsen y colaboradores describen, desde el Utah Botanical Center, un conjunto de actividades educativas, y perfilan la Utah House, que es un edificio demostrativo de cómo se puede ahorrar el 50% del uso del agua. De la misma manera, un nuevo Centro de Visitantes, en el Bernheim Forest de EEUU, es un maravilloso ejemplo de sostenibilidad. El Director de Educación, Claude Stephens, explica que la meta del centro es implicar al público en la conservación de las cuencas hídricas y, como ejemplo, nos introduce en el proyecto de restauración que devuelve un curso de agua canalizado a su serpenteante fluir natural.

La gestión de los recursos hídricos, que afecta la vida de los caribeños y de los habitantes de los países tropicales, es tan variopinta como su cultura, historia y política. Sonia Benítez y colaboradores del Jardín Botánico Nacional de Cuba describen las actividades organizadas con motivo del Día Mundial del Agua (www.worldwaterday.org), en colaboración con otras instituciones nacionales, para asegurar un coherente mensaje público de conservación del agua. Celebrado el 22 de marzo de cada año, este Día Mundial del Agua se desarrolló como consecuencia de la Conferencia UNCED en Rio de Janeiro 1992.

Above: Girl with watering can at Conner Prairie Living History Museum, USA (Photo: Gary Brockman)

In our final article, Geoff Hopkins, of PlayPumps International describes a water system that is offering hope to millions of people living across sub-Saharan Africa. Merry-go-rounds are attached to water pumps and storage tanks, providing clean water to rural communities and schools. While there are serious questions about the sustainability of groundwater extraction, it is undeniable that access to clean water improves sanitation and hygiene. It also frees villagers' time to plant community gardens and this has to be good for the environment.

In his seminal book, *Silenced Rivers: The Ecology and Politics of Large Dams* (see resources p32), Patrick McCully writes that 'part of the answer to the water problems experienced in many parts of the world lies in protecting forests and wetlands and regenerating wetlands which have been degraded. If this is not done then no amount of new dams or other technologies will be able to prevent droughts and floods'. This issue of Roots demonstrates that botanic gardens are part of the answer. They can and are playing a major role in educating people about the critical association between plants and water and empowering them to changes their behaviour and attitudes towards a wiser use of water.

Depuis la conférence de Rio de Janeiro en 1992 (UNCED), la Journée Mondiale de l'Eau a lieu chaque année, le 22 mars. Le thème de l'année prochaine est la salubrité de l'eau ce qui s'accorde très bien au programme actuellement en cours au Conservatoire Botanique National de l'île de la Réunion. En 2005 la Réunion a été victime d'une crise sanitaire et économique à cause d'une fièvre virale rare, le chikungunya, qui a touché 25% de la population de l'île. Ce virus est propagé par des moustiques. Monique Paternoster et Olivier Rivière montrent comment le jardin botanique mène le combat pour éradiquer les moustiques en informant les visiteurs du danger de laisser des eaux stagnantes dans leurs jardins.

Dans notre article final, Geoff Hopkins, de la société PlayPumps International, présente un système de pompe à eau qui constitue un espoir pour des millions de gens vivant dans l'Afrique sub-saharienne. Des manèges sont attachés à des pompes à eau et des réservoirs, fournissant de l'eau salubre aux communautés rurales et aux écoles. Même s'il y a de sérieuses questions à propos de la durabilité des extractions des eaux souterraines, il est certain que l'accès à une eau propre améliore les conditions sanitaires et l'hygiène. Ceci libère aussi du temps aux villageois pour planter des jardins communautaires, ce qui est bénéfique pour l'environnement.

Dans son livre «Les rivières sous silence» (voir les disponible p32), Patrick McCully écrit : « Une partie de la réponse aux problèmes de l'eau rencontrés dans de nombreuses régions du monde, réside en la protection des forêts et la régénération des zones humides qui ont été dégradées. Si cela n'est pas fait, alors aucun nouveau barrage ni aucune technologie ne pourra empêcher les inondations et les sécheresses. » Ce numéro de Roots démontre que les jardins botaniques participent à la réponse. Ils peuvent jouer un rôle majeur, et ils le font, en matière d'éducation sur la relation entre les plantes et l'eau, et en promouvant des changements de comportement et d'attitude pour une utilisation plus sage de l'eau.

El tema del año próximo es la salubridad, lo que enlaza muy bien con el programa actualmente en ejecución del National Botanical Conservatory de Isla de Reunión. En 2005 la Isla de Reunión estuvo atrapada por una crisis económica y sanitaria, cuando un 25% de la población de la isla contrajo una rara fiebre llamada chikungunya, transmitida por mosquitos. Monique Paternoster y Olivier Riviere demuestran cómo el jardín está liderando la lucha para la erradicación de los mosquitos, informándose a los visitantes de la peligrosidad de las aguas estancadas en sus jardines

Para finalizar, Geoff Hopkins, de la compañía PlayPumps International, describe un sistema de agua que ofrece esperanza a millones de personas del África subsahariana. Las bombas de agua y los depósitos se conectan en forma de tiovivo, lo que proporciona agua limpia a las comunidades rurales y las escuelas. A pesar de que la extracción de aguas del subsuelo plantea serias cuestiones de sostenibilidad, es innegable que disponer de agua limpia es imprescindible en la higiene sanitaria. Además libera a los campesinos un tiempo que pueden dedicar a los huertos colectivos, lo que mejora el medio ambiente.

En su importante libro *Ríos Silenciados: Ecología y Política de las Grandes Represas* (ver recursos p32) Patrick McCully escribe que 'parte de la solución a los problemas del agua que sufren muchos lugares del mundo se encuentra en la protección de los bosques y humedales o en su regeneración. Si esto no se lleva a término, ni los embalses ni las nuevas tecnologías podrán prevenir las sequías y las inundaciones'. Este número de Roots demuestra que los jardines botánicos son parte de la solución: pueden y de hecho juegan un papel importante en la educación del público acerca de la íntima relación de las plantas con el agua, y capacitan para cambios en su conducta y valores en pro de un uso más sabio y responsable del agua.

Education pour un paysage urbain durable

La educación hacia los paisajes urbanos sostenibles

Sheryn Pitman

Educating for sustainable urban landscapes

Summary Wherever we live in the world today we are, or soon will be, affected by the changing climate. Our urban landscapes, including parks and gardens, are not immune and must no longer be resource-intensive oases in which we hide. Urban landscapes are rapidly growing environments with the potential to make enormous positive impacts on resource use and sustainability.

The Sustainable Landscapes Project is a collaborative partnership between private and public enterprise, hosted by the Botanic Gardens of Adelaide. The project educates and assists the South Australian community to design, build and manage urban landscapes in more sustainable ways. It demonstrates and promotes appropriate park and garden design, plant species selections and sustainable horticultural practices including effective, efficient and appropriate water use.

Many communities in the world today are affected, to some extent, by the changing climate and increasing environmental costs of natural resources. Cities and towns, countryside and coastlines, deserts, forests and oceans are all facing change. And our urban landscapes, including parks and gardens, are not immune and should no longer be unsustainable resource-intensive oases. Urban landscapes are rapidly growing environments where we can and must make an enormous positive impact on resource use and ecological sustainability.

The Sustainable Landscapes (SL) project is a timely recognition of the need for urban landscapes, including all gardens and parks, to cease generating such a significant ecological footprint, and to become more responsive to the environmental challenges of the 21st century. The project is an acknowledgement of the high demand for and consumption of resources in urban landscapes. Far from being environmentally friendly, parks and gardens, both public and private, are all too often consumers and contaminators.

The SL project is a collaborative partnership between private and public enterprise, hosted by the Botanic Gardens of Adelaide (Department of Environment and Heritage) in partnership with the Land Management Corporation, Innovation and Economic Opportunities Group (through the Mawson Lakes Economic Development Project), Adelaide and Mount Lofty Ranges Natural Resources Management Board and SA Water Corporation.

Left: Hundreds of students from Loxton High School assisted with the planting of over 7000 local indigenous tubestock throughout winter 2007 (Photo: Sheryn Pitman)

The work of the project is to educate and assist the community to design, build and manage urban landscapes in more sustainable ways.
It demonstrates and promotes appropriate park and garden design, plant species selections and sustainable horticultural practices to suit South Australian environments including effective, efficient and appropriate water use.

Above: The Windsor Street Linear Trail is a suburban footpath with a difference - alive, full of birds and butterflies, and enjoyed enormously by the community (Photo: Sheryn Pitman)

In South Australia, accessing enough fresh water to sustain the population is a big issue. The ailing River Murray and our unreliable and possibly diminishing rainfall, combined with biodiversity decline, invasive species increase and the fact that our gardening practices are rarely harmonious with our natural environmental conditions or landscape character, result in urban landscapes taking a lot more than they give.

A significant aspect of this innovative project is that it brings together the diverse elements of urban landscape sustainability into a user-friendly set of eight principles for designing and creating parks and gardens of all types. The project defines a sustainable landscape as *a* healthy and resilient landscape that will endure over the long term without the need for high input of scarce resources such as wate*r*. A sustainable landscape is in harmony with local environmental conditions, including climate, topography, soil and water.

The eight sustainability principles applicable to all urban landscapes, public and private, include:

1. Design for local environmental conditions
2. Plant selections that require little supplementary water
3. Non-invasive plant selections
4. Minimal chemical use
5. Provision of habitat for local native fauna
6. Water conservation measures
7. Minimal non-renewable energy consumption
8. Use of sustainably and locally sourced products and materials.

Simple to understand, to incorporate in planning and to act upon, these criteria are packaged and promoted in different ways for different audiences, with the ultimate goal of improving the ecological awareness, literacy and behaviours of urban communities.

The major areas of activity of the SL project are demonstration, research, education and communication.

Through these focus areas the project strives to effectively engage with many sectors of the community.

Demonstration

The SL project identifies and develops demonstration sites that showcase a wide range of landscape types and styles. They range from public parks, gardens and community spaces, reserves and roundabouts, median strips (dividing areas between opposing lanes of traffic), road verges and home gardens. This work is undertaken in close association with landowners or managers of sites, and is supported by interpretive signage.

An example is the Loxton Mill Corner sustainable landscape project. During 2006 a major road redevelopment resulted in 14 large traffic islands and verges extending for over a kilometre along the major highway through the Riverland town of Loxton. Some verges are almost 200 metres long and 15 metres wide.

During 2007 the SL project has worked closely with local government to design a rather unique landscape treatment that involves the wider community. Almost 9000 local indigenous plants from 50 species have been selected for their low water use and aesthetic

Right: Young students at an Adelaide primary school planted their sustainable garden in winter 2006 (Photo: Sheryn Pitman)

values. Most are shallow rooted and low growing which was necessary because of the extensive services infrastructure below the surface. Subsurface drip irrigation using water sourced from the nearby stormwater detention pond provides water to the plants in dry weather. All areas are mulched with street tree prunings while a variety of water retention products, composts and fertilisers are trialed, in various combinations, in each of the islands and verges. Local surplus rock salvaged from development excavations is designed into feature areas for interest and variety and each island and verge forms a microhabitat environment for local fauna such as small birds, lizards, insects and bats.

Students from the local high school are in the process of planting the project. They will also help to monitor and maintain the landscape. Attractive interpretive signage that tells the landscape story, outlines sustainable landscaping principles and encourages residents and business to use a similar landscaping approach, is in the process of being designed.

At the other end of the spectrum a different approach involves working with the state's major land developer, the Land Management Corporation (LMC), to embed the 'sustainable landscapes' principles in the landscaping guidelines for both builders and residents. Lochiel Park, a new LMC residential land development in Adelaide, promotes and provides appropriate guidelines to all builders and residents.

Above: Local government and the local high school worked together with the Sustainable Landscapes Project to prepare and plant the new traffic islands and verges of Loxton town (Photo: Sheryn Pitman)

Research

The SL project has recently secured a grant from the Local Government Association Research and Development Scheme to research, collate and publish recommended plant species lists for the many biophysical zones of the greater Adelaide metropolitan region. One of the key needs of both local government and the community is easy access to recommended non-invasive and low water use plant lists for each local area. This information will be available on the internet in January 2008 and will enable councils and residents to more effectively and efficiently develop sustainably landscaped parks and gardens that will not pose an invasive plant threat to waterways, bushland, dunes, farmland or other vulnerable environments or ecosystems. The lists will include local indigenous, Australian native and exotic plants and incorporate diverse data fields containing useful plant information including habitat values, cautions and special features.

Education

Education for community, business and industry, government and schools is a critical part of the project. An example of an achievement in this area is the successful incorporation of Sustainable Landscapes into the Year 11 and 12 (final secondary school years) curriculum through the Senior Secondary Assessment Board of South Australia (SSABSA). *Sustainable Futures* is a new senior secondary schools subject and we have worked closely with the Education Department of South Australia to successfully include Sustainable Landscapes within the course.

The SL project contributes to many courses, seminars and conferences throughout the city, state and country itself. Schools, universities and adult learning centres, and industry professionals are all targeted as critical audiences for the sustainable landscapes messages.

Communication

A wide selection of written and visual communication materials has been designed to raise awareness and understanding of 'sustainable landscapes'. Seminars, lectures, workshops, conference presentations, brochures, fact sheets, posters, website, electronic and print media and, very importantly, well-interpreted demonstration landscapes all contribute to comprehensive education and communication activities throughout the community.

One example is the *Pocket Guide to Environmentally Friendly Gardens* produced by the SL project and partner SA Water, currently in distribution via water rate notices to all residents of

Right: With the South Australian Riverland in the grip of drought, water retention products, composts and mulches are trialled in the Loxton project (Photo: Sheryn Pitman)

Adelaide city and beyond. While it has a focus on low water use and water conservation methods, the pocket guide deals with all eight sustainable landscaping principles and hints.

The SL Project acknowledges that we are all managers of our landscapes. Everyone including developers, architects, designers, builders, businesses, industries, government agencies, horticulturalists, families and home gardeners, manage landscapes. To make urban areas sustainable every phase including planning, design, construction and maintenance needs to be informed and guided by sustainability principles and practices.

The challenges that people face with change, here in South Australia, may not be so different from the challenges in other places. They include the power of European influences on a landscape with very different biophysical characteristics, the power of fashion, media and the market, the often-insufficient levels of ecological understanding and respect for land and water within the community, and the lack of availability of appropriate plants and materials. It seems though that the greatest reassurance people need is that more sustainable landscapes can still be beautiful.

This partnership work being undertaken in South Australia is leading a gradual cultural shift towards more sustainable attitudes, practices and behaviours. It demonstrates a powerful model for engaging, educating and assisting the community to make more informed and ethical choices about resource use, develop sustainability knowledge and skills, and work in greater harmony with natural environmental conditions.

Résumé

Partout où nous nous trouvons dans le monde aujourd'hui, nous sommes, ou nous serons bientôt, affectés par le changement climatique. Nos paysages urbains, y compris parcs et jardins, ne sont pas à l'abri et ne doivent plus être considérés comme des oasis aux ressources abondantes dans lesquelles nous nous réfugions. Les paysages urbains sont des environnements à croissance rapide ayant le potentiel d'avoir d'énormes impacts positifs sur l'utilisation et la viabilité des ressources. Le projet de "paysages durables" est un partenariat collectif entre les entreprises privées et publiques animé par le Jardin Botanique d'Adélaïde. Le projet informe et assiste la région d'Australie du Sud à prévoir, aménager et gérer le paysage urbain dans une voie plus durable. Il fait la démonstration et la promotion d'un aménagement de parcs et de jardins adapté, d'une sélection de plantes et de pratiques horticoles durables intégrant une utilisation de l'eau efficace, économe et appropriée.

Resumen

Donde quiera que nos encontremos hoy en el mundo, estamos afectados por el cambio climático, o pronto lo estaremos. Nuestros paisajes urbanos, incluyendo los parques y jardines, no están inmunes a esto, y ya no deben ser oases de recursos intensivos donde nos escondemos. Los paisajes urbanos son medios de rápido crecimiento con el potencial de tener impactos enormemente positivos sobre el uso de recursos y la sostenibilidad.

El Sustainable Landscapes Project – proyecto de paisajes sostenibles – es una colaboración de iniciativas privadas y públicas, con el jardín botánico de Adelaide como amfitrión. El proyecto instruye y ayuda a la comudidad sur-australiana a diseñar, construir y gestionar los paisajes urbanos de manera mas sostenible. Demuestra y promueve los diseños aporopiados de parques, la selección de especies, y las prácticas horticulturales sostenibles que incluyen el uso efectivo, eficiente, y apropiado del agua.

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Concevoir des jardins d'instruction à la conservation de l'eau

El diseño de jardines para la enseñanza sobre la conservación del agua

Jeri Deenen

Designing water conservation tutorial gardens

Summary Periods of drought are being experienced all over the world and increasingly people are concerned with water conservation. As a consequence, an eight acre tutorial garden has been designed to teach visitors how to achieve their own drought tolerant garden. The overall messages are organised into a four step 'how to' process, focusing on how water conservation can be achieved through design, planting, maintenance and irrigation. The process begins with a site analysis which leads on to how to choose healthy plants, the importance of mulching, through to understanding irrigation techniques and making compost. The final area contains a life size chess game which reinforces the message that by following the steps you will be rewarded with time to play!

Open the paper, listen to the news, engage in a conversation—global warming and drought are **the** topics and rightly so. Populations increase, cities grow, urban sprawl amasses but the amount of available water remains at existing supply levels. Mother Nature may give us a yearly bonus, but much to our dismay she isn't being as generous as she has in previous years. Periods of drought are being experienced all over the world.
In semi-arid climates, landscape water use can be 50-70% of our total consumption. So, as as many of us know, conserving water in our landscape will make a huge difference. The question becomes, *how* do we achieve this?

Along a linear strip across the top of a beautiful piece of property, at the base of the Wasatch Mountains in Utah, exists a small water conservation garden. Sponsored by the Jordan Valley Water Conservancy District, this beautiful example of climatically adapted plantings, although stunning, doesn't teach visitors *how* to achieve their own regionally specific drought tolerant gardens. Instead, it teases them with gorgeous masses of plants, tailored walkways and trellises. Visitors appreciate the beauty but they don't learn *how* to successfully achieve what they see.

Deneen Powell Atelier, Inc. (DPA) was hired to expand the current garden into a teaching garden. As designers of educational water conservations gardens we were tasked initially with developing the master plan for a surrounding eight-acre tutorial garden expansion. We planned and looked at the overall messages to be taught and organized them into a four step 'how-to' process, focusing on how water conservation can be achieved through design, planting, maintenance, and irrigation. This organisation not only helps us, it helps visitors learn. The same principle applies to the way that text books are organised—by topics into chapters.
So we teach not to jump ahead—don't start designing your home gardens from the middle of the book. Gardens should never begin by first going to the nursery or dragging a shovel around the property to designate planting beds. I cringe at the thought. Knowledge and planning will create a wonderful drought tolerant garden, and that's where these demonstration gardens come into play. Visitors are led step-by-step through all the basic principles of good design, planning and planting.

Following the completion of our master plan, we phased this project. All aspects of drought tolerant gardens

Right: Master plan showing two entrances. The new visitor centre is a working greenhouse, classroom facility, conference center, garden staff offices, gift shop and bookstore as well as volunteer facilities (Photo: Deneen Powell Atelier, Inc)

Below: The amphitheater located within the **How-To Plant Area** offers an outdoor classroom space. (Photo: Deneen Powell Atelier, Inc)

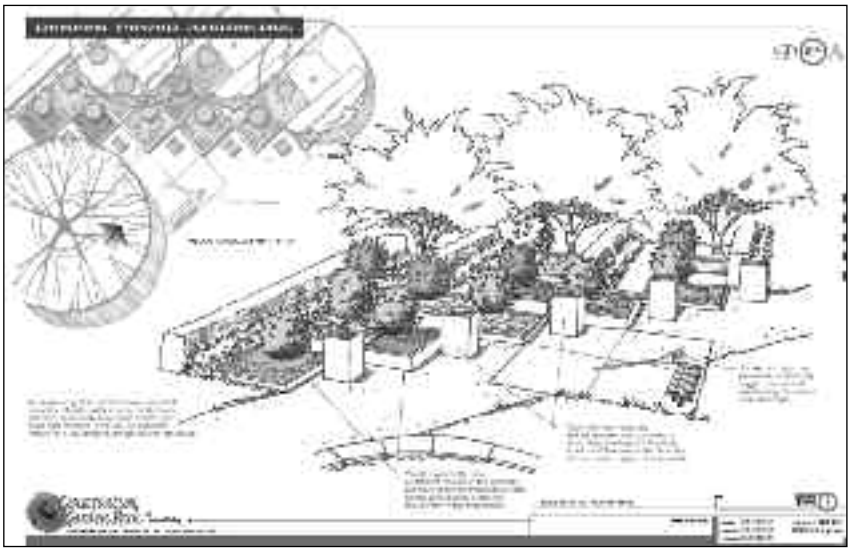
will be covered when the garden is fully developed, but for the initial phase we selected the most critical subjects to be included. Working drawings were completed in the spring and the first phase of the tutorial gardens broke ground on August 6 2007.

As a whole, this garden follows the same 'How-To' steps from our own planning process—beginning with a thorough analysis of your site, through placement of the exhibits, to mulches and irrigation techniques, etc. The planting schemes become the prime example of what each exhibit area or room demonstrates, reinforcing the educational messages. We then further reinforce with site-specific sculptural elements and artistic interpretation. A little bit of whimsy makes these lessons easier to understand and more enjoyable to learn. Signage is designed so the entire system looks botanical and fits into the landscape, we also use it as landmarks to identify the exhibit. Sign panels with small illustrations and captions capture the main message of the exhibit, and a more detailed explanation sits adjacent so those interested in knowing more

have the information at hand.
Visitors begin their garden experience in the **'How–To' Design Area** at Surveying your Landscape. This exhibit captures attention with a life-size grid of aluminum that transects the walkway and continues into the planting beds, showing how simple it is to measure your landscape and record on grid paper what you have, to begin planning what you want. As you move down the garden path the next encounter is *Site Analysis* where sculptural arrows and larger than life picture frames get visitors thinking about sun angles, wind direction, framing views, etc.
Within the **'How-to' Plant Area** of the garden, visitors are taught about nursery stock, what's a healthy plant and that picking up the biggest and brightest plant might not be the best option as smaller plant root systems adapt better and tend to grow faster. Also, children are encouraged to plant sculptural plants, learning how to properly space them. At the *Soils and Amendments* Exhibit buckets tip precariously off a wall and are filled with different types of soil and suitable amendments encouraging visitors to dig in with their hands. This exhibit explains their differences and how to adjust for the best soil type. The *Mulch* Exhibit utilizes galvanized steel square bins that kaleidoscope up out of the landscape, encouraging visitors to scoop up handfuls of mulch to feel and smell their differences and learn about their vital importance in slowing moisture evaporation. Each type of mulch is repeated in the adjacent landscape showcasing how the different mulches will look.

The **'How-To' Irrigation Area** begins with a giant drip emitter standing ready over a cut-a-way wall that demonstrates how different soils accept irrigation. With sand it goes almost directly down, while with clay the water spreads more horizontally.

Within the **'How-To' Maintenance Area***, a Composting Exhibit* exists with a whimsical slant. A giant salad bowl with huge utensils stands ready for a compost salad. Ringing the outer edge



Right: The *Mulch Exhibit* encourages visitors to feel and smell different types of mulches (Photo: Deneen Powell Atelier, Inc)

Left: The composting exhibit encourages visitors to mix their own compost (Photo: Deneen Powell Atelier, Inc)

of this exhibit are the “condiments”—smaller bowls containing a selection of trimmings from the garden. Visitors are encouraged to mix their own salad and toss. Finishing off the Maintenance Area is a life size chess game with garden characters representing the King, Queen, etc. The message being that following the steps within this garden—proper design, planting, irrigating and maintenance techniques will reward you with a beautiful, lush drought tolerant garden and allow you time to play.

It all starts with a beautiful walk through a garden, where important lessons are learned, attitudes are changed and at home landscapes are adjusted. The end result is the substantial saving of water.

Résumé

Des périodes de sécheresse sont éprouvées partout dans le monde et les gens sont de plus en plus concernés par le thème de la conservation de l’eau. Par conséquent, un jardin d’instruction de huit acres a été conçu pour enseigner aux visiteurs comment réaliser leur propre jardin tolérant la sécheresse. Les messages principaux sont organisés selon un processus ‘comment-faire’ en quatre étapes, se concentrant sur la façon dont une économie d’eau peut être réalisée par la conception, la plantation, l’entretien et l’irrigation. Le processus commence par une analyse de l’emplacement, poursuit par la façon de choisir des plantes saines, l’importance du paillage, jusqu’aux techniques d’irrigation et de fabrication de compost. La partie finale comporte un jeu d’échecs grandeur nature, qui renforce le message qu’en suivant bien les étapes on sera récompensé avec du temps de jeu!

Resumen

Las sequías se están conociendo en todo el mundo y la gente se preocupa más y más por la conservación del agua. Por consecuencia, un jardín de enseñanza de unas tres hactáreas de superficie ha sido diseñado para enseñar a los visitantes como pueden conseguir su propio jardín tolerante de sequía. Los mensajes se dividen en cuatro etapas, concentrandose en como la conservación del agua se puede conseguir a través del diseño, la plantación, el mantenimiento, y el riego. El proceso comienza con un análisis sobre el lugar, que lleva a como escoger plantas saludables, a la importancia del uso de mantillo, hasta llegar a las técnicas de riego y de hacer el abono. La zona donde se encuentra la etapa final contiene un juego de ajedrez con piezas de tamaño real, el cual reforza el mensaje que indica que si se superan todas las etapas, ¡habrá tiempo para jugar!

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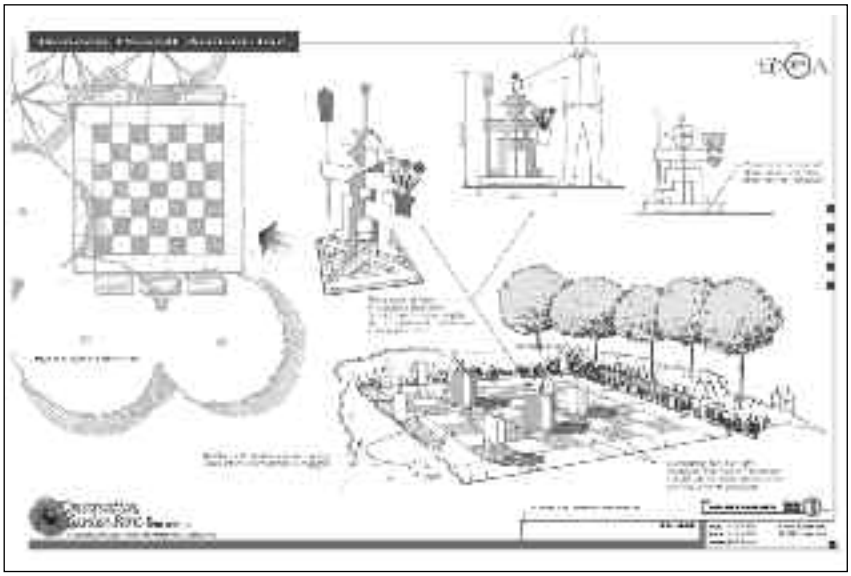

Left: A life size chess set has been designed for visitors to engage in a friendly game. It gives visitors a place to enjoy the gardens for a longer period of time and hopefully meet others to play along with. The message being, if you plant a drought tolerant/plant appropriate garden, maintenance of the gardens should be easier allowing you free time to play (Photo: Deneen Powell Atelier, Inc.)

Shawn Olsen, JayDee Gunnell, and David Anderson

Water conservation
educational programmes

Summary The Utah Botanical Center is striving to increase awareness and adoption of water conservation practices through classes, demonstrations, actual water conserving buildings and landscaping, and new practices from research projects. Successful projects include the annual Garden Fair, the Utah House demonstration house, publications, and research on landscape irrigation and native plant propagation.

Through research, demonstration, education and recreation, Utah Botanical Center (UBC) works to guide conservation and the wise use of plant, water and energy resources. It also provides a welcoming green space in the midst of rapid urban development. Located in a high mountain desert environment with a frost free growing season of 160 days, UBC is especially focused on water conservation and creating sustainable urban landscapes. It encompasses 100 acres and includes four ponds that cover 23 acres.

Right: Water-wise landscape at the Utah House, located in the Utah Botanical Center. The variety of plants provide year round interest (Photo: Gary Neuenswander)

Located at UBC is Utah House (UH), a sustainable building demonstration house that showcases ways to save energy, water, and money in the home and landscape. The house has a rainwater collection system and water-efficient appliances that use 50% less water than their standard counterparts. UH employs passive solar design and photovoltaic power, energy-efficient lighting and appliances, and a variety of sustainable construction materials. A wide range of classes are hosted at and near the Utah House, including a very successful environmental education programme that brings thousands of children to the UBC annually for field trips, boy and girl scout merit badge classes, summer adventure camps and a youth fishing camp.

UBC also runs a range of classes that help people consider and implement water-wise landscaping options and ways to reduce water use in the landscape. Physical demonstrations of water conservation are an important tool. In the case of water-wise landscapes, it is vital that the landscape looks good so people are willing to try the concepts. The one-acre landscaping around UH is grouped into low, moderate, and high water use zones. It was carefully designed to demonstrate a number of landscape design principles and to provide year-round colour. A plant list publication identifies the major plants within each zone, their recommended sun exposure and wildlife value. Plants are labeled with their common and scientific names and include cultural information symbols detailed in the plant list. The UH plant list is a very popular publication because people

Left: Young people getting ready to fish during a fishing camp at the Utah Botanical Center (Photo: Jolene Christian)

feel they can implement water conservation practices in the landscape more easily than remodeling their home.

As well as the plant list, UBC has helped to develop a 220-page book called *Water Wise Native Plants for Intermountain Landscapes*, which discusses selection and maintenance of plants appropriate for the region and the native plant communities in the area. The main part of the book has over 200 plant species data sheets with a colour photographs and information on appearance, natural habitat, landscape use, and comments. Since proper design is such an important component of water-wise landscaping, a companion book focused on water-wise design principles is due to be released soon.

In August, UBC holds its annual Garden Fair, which has become a major event in the past few years. The fair includes classes, tours, and a sale of native plants as well as plants adapted to the climate. Classes have included instruction in water-wise landscape design, adding water-wise plants to traditional landscapes and parking strip design (areas in front of buildings between the pavement and the street).

Left: Ice Blocking Activity during a youth summer camp – children sit on blocks of ice and slide down a grassy hill. The activity was carried out following a discussion on the physics of what happens when water freezes. (Photo: Jayne Mulford)

In addition, staff provide individual garden design assistance to visitors. The plant list mentioned earlier includes a list of 25 outstanding water-wise plants that are adapted for local landscapes. These plants are widely used in landscaping around UBC facilities, are grown in the nursery, and are featured in plant sales. The Garden Fair has become a very popular community event and prompted the development of a similar spring celebration, scheduled in conjunction with Earth Day and Arbor Day.

Finally, there are several research projects associated with UBC. Dr. Kelly Kopp, Extension Water Conservation and Turfgrass Specialist at Utah State University, is conducting a full scale landscape comparison study with three different landscapes (7m X 10m) that all use the same design but include different plant materials representing low, moderate, and high water use requirements. The study includes an assessment of hydrologic properties and public preferences of the different landscapes under well-watered and imposed drought conditions. A pot-in-pot study is looking at different soil mixtures and fertilizer treatments to grow native woody plants. Results of this study will be communicated to the local nursery industry to help make water-wise plants more available. Pot-in-pot refers to a system where plants are planted in pots that will accommodate their point-of-sale size, and those pots are placed into slightly larger pots and planted in a field. These pots are usually planted in long rows in large fields. The larger pots are usually connected to a central irrigation system, and often fertilized through this system as well. When the plants have grown to their point-of-sale size, they can be removed in their pots and sold immediately. The larger pots remain in the field to be reused. Another research project will soon introduce cultivated varieties of big tooth maple (*Acer grandidentatum*), a popular native water-wise plant.

Résumé

Le Centre Botanique d'Utah s'efforce de développer la sensibilisation et l'adoption de pratiques de conservation de l'eau par le biais de cours, de démonstrations, d'exemples concrets de constructions et de paysages aménagés pour la conservation de l'eau et de nouvelles pratiques provenant de projets de recherche. Les projets porteurs comprennent notamment une foire annuelle sur les jardins, la maison de démonstration "Utah House", des publications, et des recherches sur l'aménagement paysager en termes d'irrigation et sur la multiplication des plantes indigènes.

Resumen

El Centro Botanique de Utah esta luchando por incrementar la conciencia pública y la adopción de costumbres para la conservación del agua a traves de clases, demonstraciones, ejemplos de construcciones y paisaje, y por adaptaciones por nuevos de resultados de proyectos de investigación. Los proyectos exitosos incluyen una Feria de Jardines cada año, la casa de demonstración 'Utah House', las publicaciones, y la investigación sobre el riego del paisaje y la propagación de las plantas nativas.

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Du toit au ruisseau : l'éducation sur l'eau avec débit

Del tejado al arroyo: fluidas lecciones sobre el agua

Claude Stephens

From roof to stream
water education with flow

Summary Hydrologic health is in part determined by the systems we design. What we build and how we behave influences the quality and quantity of water available in an ecosystem. Effective water education programmes connect people directly with their watershed. This article explores a water programme connecting the built environment to a stream in central Kentucky, USA. The programme connects parking area runoff cleaned by mycoremediation (the process of using mushrooms to return soil contaminated by pollutants to a less contaminated state), an environmentally intelligent building with a green roof and raw water storage, the creation of a cypress-tupelo swamp to replace wood used in construction, and a 1,300 metre stream restoration project which has returned a once channelled stream to a now meandering course.

Right: Bernheim's Visitor Center has a living roof and multiple strategies that protect water (Photo: Bernheim)

Two things characterise the majority of human design. We are incredibly efficient at moving carbon out of reserve and into the atmosphere and we are biologically unprecedented in our ability to use and foul water. Most of our daily activities have some effect on both the carbon cycle and the hydrologic cycle. Even as I sit creating this article I am linked to both cycles; especially since I live in a region where my computer is powered by burning the locally abundant fossil coal. Water is also locally abundant. Kentucky has more kilometers of blue-line streams than all but two other states in the USA. Why is it that we don't focus attention on the preservation of finite resources until they become a limit to economic growth? Only by increasing knowledge of and care for our direct and immediate connections to natural resources can we expect to foster positive environmental behaviours.

Bernheim Arboretum and Research Forest is a nature park, arboretum and arts center in central Kentucky that owns and protects more than 60 square kilometers of land including several entire watersheds. It is a private not-for-profit organisation that in recent years has focused on sustainable design practices in both the built environment and in land management. In 2003 Bernheim restored 1,300 metres of a stream that had been channelled through historic agricultural practices to a more natural meandering path with pools and riffles (shallow water where the flow ripples over gravel deposits). During the past 200 years, this channel had been realigned along one side of a valley to follow a straightened course, probably to allow more efficient farming in the lower valley. The project also repaired

adjoining riparian ecosystems (communities along the river margins) and reconnected the stream to its floodplain.

In 2004 Bernheim opened a new Visitor Center built to LEED platinum standards, a nationally accepted benchmark for the design, construction, and operation of high performance eco-friendly buildings. The building has a living roof, raw water collection systems for toilet flushing and a parking area designed to use mycoremediation to deal with run-off containing hydrocarbons. It also incorporates a peat filtration water treatment strategy that allows waste water to be used for nursery operations.

Much of the wood used to build the Visitor Center had previously been used in other projects. A nearby pickle company decommissioned large cypress-wood pickle vats that Bernheim was able to disassemble and mill into the wood used for the majority of the structure. An unused bourbon whiskey warehouse was deconstructed to provide much of the remaining timber needs of the project. This makes a good story, but good sustainable design requires tracing as far back up the supply stream as possible. Bernheim was never involved in commissioning the destruction of cypress swamp habitat to create the pickle vats but we decided to take responsibility for repaying that historic debt by creating a 2.5 hectare cypress-tupelo swamp adjoined to a nearby lake. When that created ecosystem eventually matures it will repay the carbon loss of the original wood harvest. That's an even better story. Additionally, the Visitor Center was designed for disassembly. From the outset the architects planned for the eventual disposal of the building. When it has outlived its useful life as a Visitor Center it can easily be taken apart and the embedded energy (total amount of the energy used to produce the center-from the raw material extraction, to transport, manufacturing and assembly) isn't just tossed aside as waste. It can be used again. The materials are cherished through many uses. Pull all of this together and you have a great story. Great stories are the foundation of meaningful education.

Left: Students investigating the Wilson Creek Stream Restoration project at Bernheim (Photo: Bernheim)

Educators and interpreters at Bernheim weave these stories together with experiences and the metaphorical connection between real streams and supply streams to connect people to nature. This is Bernheim's mission.

If Bernheim's efforts to help people cherish water as a valuable resource are successful it may primarily be because we cherish water as an institution. Even a casual visitor understands this. In passing them you can overhear comments such as, "I guess they did that to hold onto the water." The design signals the intention. I think that is an important first step for environmental organizations in general. It is incumbent upon us to focus first on our own designs and our own behaviours before we begin to encourage changes or understanding in others. Our programmatic efforts then become a natural outgrowth of our work. It is much easier to provide effective programmes when the examples and experiences are authentic and apparent.

Bernheim's water programmes are available to a broad set of audiences. Essentially they are all variations of the same programme set up differently to meet specific needs, objectives and time frames. Programmes are appropriate for school groups, families, architects, home owners, youth groups, planners, land managers and others. We use signage, technology and brochures to reach people that aren't directly involved in a programme. Regardless of audience the programmes are designed around four objectives:

- Establish direct, meaningful and personal connections between human behaviour and water use.
- Provide authentic, understandable and inspiring examples of good design and positive behaviour as it relates to the protection of water.
- Create experiences that illuminate the spiritual, biological and economic advantages of cherishing water.
- Inspire personal responsibility and empower action.

Bernheim's water programme is built as a story that unfolds to address the four objectives mostly in the order presented. We try to meet groups that have scheduled the programme when they arrive in the parking area, as this is where the story begins. The group is gathered around a small pile of powdered cocoa on the edge of the parking area. After a brief introduction setting up the story, the leader uses a watering can to cause it to 'rain' on the cocoa, which represents the hydrocarbons (gasoline, oils and tars) that end up on all parking areas. The dark water runs off the parking area and into a zone of mulch and straw mold inoculated with oyster mushrooms.

Right: The Wilson Creek project site map (Photo: Bernheim)

Through mycoremediation the complex hydrocarbon chains are broken down into less or non-toxic molecules. Participants are encouraged to handle the rich smelling mulch where the fungal hyphae are readily apparent.

After a break we then gather outside the Visitor Center where we investigate the dark water system that uses microorganisms living in a peat matrix to turn wastewater into water usable for irrigation. As the group has just contributed fluids to that system the connections are easy. We talk about green roofs and demonstrate how they are used to slow the release of water falling on the site. Rain gardens are explored, as are the cisterns that capture raw water for use in flushing toilets. Depending on the audience we explore embedded energy and water use and discuss how the production of building materials are connected to water pollution. The design story unfolds as we explore different aspects of the Visitor Center building. Topographic relief maps, geology specimens, a stream aquarium, photographs, maps and other hands-on objects flesh out the water story.

There are man-made ponds adjacent to the Visitor Center where we use secchi disks to measure water clarity, plankton nets, and other tools to explore aquatic systems. For groups that can afford the time we take them to the stream restoration project. This is where we get their feet wet, seining for fish and turning over rocks looking at aquatic insects, crayfish and algae. The stream restoration field experience allows us the opportunity to demonstrate the differences between the channelled stream and the restored channel. The restored channel and riparian plantings hold onto soil, remove pollutants from the water, promote connections with the flood plain and support a greater diversity of plants and animals. The project provides an experimental model that will be monitored over time in order to help us learn how to better protect our valuable water resources. Property owners and ecology students learn about specific management strategies. Children have a great time catching crayfish and dragonflies and getting wet and muddy.

If we have crafted the day well and presented a compelling story these people will go home and think about reducing water consumption or building a rain garden or about what amazing creatures might be living in the drainage ditch behind their house. Some of them return to participate in the programme again. When we point that out they sometimes say, “We know that. We just want to do it again.” When they bring us photos of their newly installed rain barrels we go home smiling.

Résumé

La santé hydrologique est en partie déterminée par les systèmes que nous concevons. La façon dont nous construisons et dont nous nous comportons influence la qualité et la quantité d’eau disponible dans un écosystème. Un programme éducatif efficace sur l’eau relie directement les gens à leur bassin hydrographique. Cet article présente un programme sur l’eau faisant le lien entre l’environnement bâti et un ruisseau dans le centre du Kentucky. Le programme fait la liaison entre des eaux de ruissellement de parkings qui sont épurées par des traitements à base de champignons, une construction environnementale intelligente ayant un toit couvert de verdure et un réservoir d’eau brute, la création d’un marais à cyprès chauve permettant de remplacer le bois utilisé en construction et un projet de restauration de 1300 mètres de ruisseau permettant de redonner un cours sinueux à une partie canalisée.

Resumen

La salud hydrológica se determina en parte por los sistemas que diseñamos. Lo que construímos y como nos comprtamos influye sobre la calidad y la cantidad de agua a disposición del ecosistema. Un programa de educación efectivo conecta a la gente directamente a su cuenca. Este artículo analiza el programa hydrológico que conecta el medio ambiente urbano a un arroyo en el centro de Kentucky.

El programa conecta el agua procediente de un aparcamiento, una vez limpiada mycologicamente por el sistema de mycoremediation, un edificio ecologicamente inteligente con tejado verde y almacenamiento de agua, la creación de un pantano de cipreses y tupelo que va re-emplazando madera para la construcción, y un proyecto de restauración de un arroyo de 1.300 metros el cual convertirá el cuace canalizado a su estado serpenteante natural.

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Sonia Benítez, Rosa Älvarez y Carmen Beltrán

Agua para la vida

Summary Cuba es un sistema insular que no tiene grandes recursos hídricos, al igual que otros países caribeños. Por ello reviste especial importancia la educación en torno al uso y protección del agua. El grupo de educadores ambientales del JBN desarrolla acciones educativas con niños, jóvenes y otros grupos de la población, en cuanto al cuidado y conservación de ese importante recurso natural. Se realizan exposiciones, concursos de plástica y narrativa que se enmarcan en el "Día Mundial del Agua" el 22 de marzo, así, se contribuye a la concienciación de la población sobre la importancia del ahorro del agua.

El agua es un recurso natural finito y su disponibilidad por habitantes es cada vez menor. Este es ya un producto escaso en muchas partes del mundo; se estima que más de 1 200 millones de personas pobres sufren de su escasez y las demandas de agua se han multiplicado por cinco durante el siglo XX.

La falta de agua potable es uno de los principales factores que entorpecen el desarrollo de muchos países y que puede convertirse en el futuro en una gran limitación para la producción de alimentos y por ende, de la vida.

Cuba es un sistema insular que no tiene grandes recursos hídricos al igual que otros países caribeños; por ello reviste especial importancia la educación en torno al uso y protección de este recurso. Alrededor de cada 22 de marzo el Jardín Botánico Nacional de Cuba celebra el Día Mundial del Agua, y el grupo de educadores ambientales del centro desarrollan diversas acciones educativas con niños, jóvenes y otros grupos de la población en general, teniendo como objetivo principal contribuir al cuidado y uso racional de este elemento imprescindible para la vida.

Sobre la base de esta temática, se convoca a un concurso de plástica en el que participan niños de las escuelas primarias y secundarias básicas que pertenecen a los proyectos comunitarios "Salvemos el Globo" y "Comunidad Alerta" de la Ciudad de la Habana, atendidos por el Jardín Botánico Nacional, así como niños y jóvenes de todo el país, que son premiados en esta jornada por el Día Mundial del Agua.

También se presentan obras de teatro, poesía, cantos y bailes relacionados todos con el agua.

Diversas charlas educativas e interactivas se realizan entre el público y especialistas del Instituto Nacional de Recursos Hidráulicos y de otras instituciones afines del país. Su principal propósito es dar a los visitantes una visión global de los problemas más importantes que afronta la humanidad con este recurso y sobre todo qué se está haciendo en Cuba, donde se presta una atención particular al uso y ahorro del agua.

En saludo al Día Mundial del Agua también se han realizado diversas exposiciones donde se muestra: la importancia del agua para la vida de las plantas y los animales, la situación de la disponibilidad del agua a nivel

mundial, en Cuba, en la ciudad de la Habana y en el Jardín Botánico Nacional. En la inauguración de estas exposiciones han participado diferentes autoridades del Ministerio de Ciencia, Tecnología y Medio Ambiente (CITMA), de la Universidad de la Habana y del Instituto Nacional de Recursos Hidráulicos. Las exposiciones permanecen abiertas durante un mes en nuestro centro y después son expuestas de manera itinerante en escuelas de los diferentes niveles de enseñanza, grupos de la comunidad y centros de trabajo de la capital.

Se han organizado exhibiciones de fotos, videos y/o películas relacionadas con el medio ambiente y el recurso agua, debatiéndose con el público que nos visita acerca del conocimiento, protección y uso de este recurso.

En los recorridos guiados los visitantes pueden apreciar la relación de las plantas con el agua: las que habitan en zonas áridas y semiáridas del planeta, también aquellas que habitan en el interior de los bosques húmedos tropicales y las plantas acuáticas que se desarrollan en ríos y lagos, teniendo una muestra de la diversidad de las mismas y sus adaptaciones morfológicas a los distintos ambientes con diferente disponibilidad de agua.

Promover la educación ambiental es hoy en día una de las principales tareas de los Jardines Botánicos. El desarrollo de diversas acciones educativas con niños, jóvenes y público en general contribuye a la concienciación de la población acerca de la importancia del uso y conservación de los recursos naturales. La vida depende del agua: resulta imprescindible que hagamos un uso racional de la misma y aprendamos a ahorrarla.

Summary

Cuba is an island system that has limited water resources, similar to other Caribbean countries. Environmental educators at the National Botanic Garden of Cuba developed educational activities with children, young people and other groups of the population to focus on the careful use and conservation of this important natural resource. Educators developed exhibitions, modelling competitions, and storytelling to mark World Water Day on the 22 March. Through such activities they contributed to raising awareness among the population about the importance of saving water.

Résumé

Cuba est un système insulaire qui, de même que les autres pays des Caraïbes, comporte peu de ressources hydriques. Par conséquent, les programmes éducatifs liés à l'utilisation et la préservation de l'eau revêtent une importance toute particulière. Le groupe d'éducateurs à l'environnement du JBN développe des activités pédagogiques sur la protection et la conservation de cette ressource naturelle capitale, avec les enfants, les jeunes, ainsi que d'autres fractions de la population. Expositions, concours d'arts plastiques et littéraires sont organisés dans le cadre de la « Journée Mondiale de l'Eau » du 22 mars, contribuant ainsi à la conscientisation du public quant au rôle primordial des économies d'eau.

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La malaria perd son mordant

Resumé Notre objectif est ici d'échanger l'expérience que nous avons été amenés à développer face aux problèmes de développement de moustiques dans les jardins, en particulier en pays tropical. Il s'agissait, dans un premier temps, d'améliorer la qualité d'accueil des visiteurs, par une stratégie de prévention, en traitant régulièrement certaines collections sensibles, avec un produit adulticide.

Puis une épidémie de Chikungunya a provoqué un important problème sanitaire à la Réunion et sur les îles voisines, occasionnant d'importantes retombées économiques. Des traitements violents ont été préconisés par les autorités pour enrayer la crise. Parallèlement, le Conservatoire Botanique a procédé à des traitements mécaniques en ramassant et traitant tous les déchets verts pouvant servir de gîtes larvaires. Les petits points d'eau stagnante ont été traités avec des produits biologiques larvicides et les bassins ont été empoissonnés avec des guppies (*Poecilia reticulata*).

Enfin nous avons cherché à informer et responsabiliser les visiteurs qu'ils soient adultes ou enfants par des supports de communication adaptés. Conjointement le Conservatoire Botanique a participé avec un groupe de scientifiques à mener des observations pour mieux connaître et comprendre l'impact des traitements dans les milieux naturels, sur la faune et la flore, ce qui n'avait jamais été fait auparavant.

Le Conservatoire Botanique National de Mascarin est implanté dans les Hauts de St Leu, sur la côte ouest de l'île de la Réunion, à plus de 600 km à l'est de Madagascar. Situé à 500 m d'altitude, le jardin est soumis à un climat tropical, caractérisé par l'alternance d'une saison des pluies s'étendant de Décembre à Avril, avec parfois des records de pluviométrie (1m en quelques heures), et une saison sèche et fraîche pouvant présenter de longs mois de sécheresse. Ce climat, le contexte volcanique et l'isolement de l'île ont d'ailleurs favorisé le développement d'une riche flore endémique, aujourd'hui menacée de disparition, notamment à basse et moyenne altitude du fait de l'impact humain. Le Conservatoire Botanique accueille plus de 35. 000 visiteurs par an, dont une majorité de touristes en vacances et quelques 9.000 enfants, dans le cadre de la scolarité ou des temps de loisirs. Le jardin offre aux visiteurs différentes collections végétales illustrant soit des thèmes particuliers (comme le verger, la collection de palmiers ou celle des succulentes), soit des milieux (forêt originelle semi-sèche, les milieux ombrophiles et humides, la mare) dont les taux d'hygrométrie sont très différents.

Ces différents facteurs conjugués expliquent que nous soyons particulièrement attentifs à la gestion de l'eau (en saison sèche) et au bien-être des visiteurs, quand en période chaude et humide prolifèrent les moustiques dont les larves profitent des flaques d'eau résiduelles pour se développer.

Gauche: Divers jeux ont permis aux enfants de devenir de véritables ambassadeurs de l'écocitoyenneté auprès de leurs parents (Photo: M.Paternoster / CBN-CPIE Mascarin)

La gestion de l'eau au quotidien

L'alimentation en eau des collections est assurée à partir d'une retenue collinaire de 6. 000 m^3 qui permet, à partir d'un réseau informatisé, d'irriguer chaque collection selon les besoins des plantes (par aspersion pour les Palmiers, par goutte à goutte pour les fruitiers, ou rien, pour les Succulentes).

La retenue est alimentée par l'eau de pluie en période cyclonique et par le réseau agricole, en période sèche. Quand nous la remplissons nous-mêmes nous limitons la hauteur d'eau à ⅓ de sa capacité pour éviter une trop forte évaporation. Par contre la bâche d'imperméabilisation de la retenue est exposée plus longtemps aux rayons ultraviolets et s'en trouve fragilisée, dans sa partie émergée. Pour éviter le développement d'algues et de larves de moustiques, ce bassin artificiel est peuplé de diverses espèces de poissons qui permettent une autorégulation de la turbidité de l'eau.

Le réseau des caniveaux permet de collecter l'eau de pluie et de ruissellement des pentes ainsi que l'eau qui s'écoule des fontaines d'eau potable (bornes équipées d'un bouton pressoir). Le tout est collecté dans la retenue d'orage qui permet aussi de stocker le trop plein de la retenue colinaire, en saisons des pluies.

Une pompe permet de réinjecter cette eau dans le circuit d'irrigation, après filtration.

Par ailleurs en période sèche, nous favorisons le paillage autour du pied des arbres pour limiter l'arrosage.

La gestion de la population de moustiques

Douze espèces de moustiques, appartenant à 4 genres, sont présentes à la Réunion, et l'une d'entre elles est même endémique de la Réunion. Plusieurs sont connues pour être des vecteurs potentiels de maladies, comme la dengue ou le paludisme. Le cycle de vie d'un moustique dure de 6 à 10 jours. Il dépend de la présence d'eau. Le moustique mâle adulte se nourrit de nectar et de fruit. Il se déplace peu autour de son gîte qui le plus souvent est une zone ombrée humide naturelle (fourrés denses, grandes herbes, verger, …) ou artificielle (soucoupes de vase, vieux pneus, ..). Seule la femelle pique pour se nourrir de sang dont elle a besoin pour pondre ses œufs dans l'eau douce et stagnante, à l'ombre.

La prévention

Les jardins sont donc des gîtes potentiels très favorables au développement de moustiques, notamment dans les secteurs naturellement humides et ombragés, dans les enrochements ou au pied d'arbres à grandes feuilles qui, une fois tombées peuvent constituer des coupelles d'eau stagnante, tout particulièrement en période des pluies.

Le Conservatoire Botanique de Mascarin s'est donc engagé, depuis plusieurs années, dans une stratégie préventive avec un traitement régulier et mensuel, dans les zones les plus sensibles. Seuls certains jardiniers, protégés et formés à l'usage de produits toxiques sont chargés de traiter les collections. Cette pratique a permis de réduire de façon significative la population résidente de moustiques.

La période d'épidémie

Mais en 2005, une épidémie de Chikungunya s'est brusquement développée à la Réunion. Cette maladie véhiculée par l'un des moustiques présents sur l'île, l'*Aedes albopictus*, a touché plus de 250 000 personnes, soit près de 25 % de la population, causant une grave crise économique. Devant ce fléau et pour enrayer la maladie, les collectivités ont engagé une lutte acharnée, à base de produits chimiques puissants[2]. Paluthion cet insecticide aérien, à base de fénitrothion agissant sur les moustiques adultes, a été employé faute de connaissances suffisantes sur les impacts de ce produit en milieu naturel! Parallèlement une « chasse » aux gîtes larvaires a été vivement conseillée à toute la population. Les jardins et forêts ont été désertés par les touristes et randonneurs.

Appliquer une lutte intégrée

Au jardin botanique, pendant cette phase de virulence, nous avons dû traiter de manière hebdomadaire avec les produits recommandés, bien que nous ayons un rucher pédagogique en bordure des collections végétales. Toutefois, nous avons décidé de nous impliquer dans une lutte intégrée afin d'avoir une action plus efficace à long terme sur la population de moustiques et de minimiser l'impact sur l'environnement.

Droit: Seuls certains jardiniers, munis de vêtements protecteurs et formés à l'usage de produits toxiques, sont chargés de traiter les collections (Photo: M.Paternoster / CBN-CPIE Mascarin)

La lutte chimique

Les traitements ont été faits le jour de fermeture aux visiteurs, de façon à ce que la pulvérisation des produits n'incommode pas les visiteurs et puisse agir. Ils étaient appliqués de manière directionnelle vers les végétaux pour limiter une trop large propagation aérienne et un impact méconnu sur les oiseaux. Nous avons également transféré, autant que possible, les caméléons des zones traitées vers les zones non traitées, pour essayer de les préserver des effets néfastes des produits insecticides. Toutefois, en cas de pluie le produit est rapidement entraîné par ruissellement. Il perd alors de son efficacité. De plus cette disparition représente un coût financier important et une menace écologique pour le milieu naturel.

Une lutte mécanique et biologique

Parallèlement au traitement chimique, nous avons développé une stratégie permettant de lutter contre les larves. « Il est plus facile de détruire 300 larves regroupées dans un gîte que 300 adultes volants!»

- Un inventaire des gîtes larvaires a été réalisé sur tout le site du Conservatoire, aussi bien dans les collections, que dans les pépinières ou la zone d'entretien technique.
- Tous les déchets verts ont été récoltés, puis traités par compostage pour les plus petits ou évacués vers la déchetterie municipale pour les plus gros éléments, ceci afin de limiter les zones d'accumulation d'eau « sauvages » ou temporaires.
- Les points d'eau «organisés»: bassins, retenue collinaire, ont été empoissonnés à l'aide de guppies (*Poecilia reticulata*).

Impliquer tout le personnel
L'ensemble des employés du Conservatoire Botanique était régulièrement informé de la situation et des choix posés. Pour éviter tout problème de santé, avant tout traitement, une note d'information a été communiquée à tous les services. Mais c'est surtout grâce à la mobilisation de chacun que tous les nouveaux gîtes larvaires ont pu être rapidement identifiés et éliminés, au fur et à mesure de leur apparition. Par ailleurs, grâce à la présence au quotidien des jardiniers, en particulier, et des médiateurs culturels, toute prolifération momentanée de moustiques pouvait être décelée et traitée, occasionnant pour le public la fermeture ponctuelle d'une zone sensible.

Le jardin emploie des techniques de communication diverses pour montrer aux visiteurs comment se protéger contre des piqures de moustiques (Photo: M.Paternoster / CBN-CPIE Mascarin)

Le suivi de crise

Après quelques semaines, la lutte régionale a été mieux organisée. Les autorités de la région ont décidé d'utiliser des produits moins nocifs. La K-Othrine à base de deltaméthrine (contre les moustiques adultes) et le Vecto Bac, larvicide à base de Bti (*Bacillus thuringiensis* serovar *israelensis*). Nous avons donc procédé à un repérage de zones pouvant stocker de l'eau pour les traiter de façon écologique avec le Bti. Nous avons par ailleurs participé à des études mises en place pour mieux comprendre le cycle du moustique et les effets des traitements sur l'eau douce et l'aquafaune ainsi que sur l'avifaune et certains animaux.

Informer et impliquer les visiteurs

Vis-à-vis des visiteurs potentiels, nous avons cherché à les informer par voie de presse. Il fallait permettre aux personnes de comprendre le phénomène tout en le dédramatisant, et les inviter à sortir de chez eux. Les informations concernaient les traitements faits et invitaient les personnes à adopter une attitude responsable et non pas de peur, en prenant un minimum de précautions (manches longues, pantalon, crèmes protectrices, …).

Sur le site, nous avons fourni ces mêmes informations aux visiteurs. La boutique du Conservatoire proposait également des produits individuels répulsifs à base d'essences naturelles (comme le géranium qui est cultivé et distillé à la Réunion, ou la citronnelle).

Quant aux enfants, nous nous sommes investis dans la production de supports d'éducation. Ceux-ci avaient pour objectif de parler rationnellement aux enfants du phénomène dont tout le monde discutait en termes

Droit: Le Conservatoire a introduit dans ses étangs des guppies (*Poecilia reticulata*), espérant ainsi contrôler les moustiques (Photo: M.Paternoster / CBN-CPIE Mascarin)

scientifiques ou maléfiques, d'intégrer cette approche dans une meilleure compréhension de l'écosystème d'une mare, de comprendre la place du moustique et de chercher des gestes simples et écologiques pour participer, chacun à son niveau à la lutte contre ce fléau. Divers jeux (maquettes, théâtre, …) ont permis aux enfants de devenir de véritables ambassadeurs de l'écocitoyenneté auprès de leurs parents.

Conclusion

L'île de la Réunion, bien que située en climat tropical avait oublié la menace sanitaire représentée par la fluctuation des populations de moustiques. Les jardins peuvent vite être considérés comme des lieux à bannir dans des circonstances d'épidémies. Des techniques préventives croisant méthodes mécaniques et écologiques et l'information du public constituent certainement la meilleure des stratégies dans laquelle peuvent s'inscrire les jardins botaniques, au regard d'une volonté de participer au développement durable de sa région.

Summary

This article highlights our experiences in dealing with the problems arising from the proliferation of mosquitoes in the National Botanical Conservatory of Mascarin, situated in the tropics. Initially we established a prevention strategy to improve the quality of visiting conditions for our guests. This involved applying a regular pesticide treatment to several sensitive collections. Then a Chikungunya epidemic caused serious health problems on Reunion Island and the neighbouring isles, leading to major economic consequences. The authorities advocated drastic treatments to stem the crisis. Immediately the Conservatory provided mechanical treatment by collecting and treating all organic waste considered as a potential habitat for mosquito larvae. Small stagnant water holes were treated with organic larvicides and the surface waters of pools were stocked with fish. Finally, we aimed to give visitors a sense of responsibility, be they adults or children, by informing them about the mosquitoes through various communication means. Jointly, the Conservatory took part in conducting observations with a group of scientists in order to improve knowledge and understanding of treatment impacts on fauna and flora in natural environments - a study which had never been carried out before.

Resumen

Nuestra meta es intercambiar la experiencia que tuvimos que desarrollar frente a los problemas de proliferación de mosquitos en los jardines, especialmente en los países tropicales. Consistió primero en mejorar la calidad de acogida a los visitantes por una estrategia de prevención, tratando regularmente ciertas colecciones sensibles con un producto adulticida. Luego una epidemia de Chikungunya causó un importante problema sanitario en la Isla de la Reunión y en las islas vecinas, ocasionando fuertes repercusiones económicas. Drásticos tratamientos fueron preconizados por las autoridades para detener la crisis. En paralelo, el Conservatorio Botánico emprendió tratamientos mecánicos, recogiendo y tratando todos los residuos orgánicos considerados como potenciales refugios larvales. Se trataron los pequeños aguaderos de agua estancada con larvicidas ecológicos y se poblaron de peces las superficies de las cuencas. Finalmente, intentamos informar y responsabilizar a los visitantes, sean adultos o niños, por medios de comunicación adaptados. Conjuntamente, el Conservatorio Botánico participó en llevar observaciones con un grupo de científicos para conocer y entender mejor el impacto de los tratamientos en los medios naturales respecto a la fauna y la flora, lo que nunca se había hecho antes.

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Fournir de l'eau en **jouant**

Un juego para el agua

Geoff Hopkins

Playing
to provide water

Summary A PlayPump™ water system is a merry-go-round attached to a water pump that draws clean water from an underground source and delivers it to an attached storage tank. Billboards on the storage tank display advertisements and public education messages, and sales from the advertising space cover the cost of maintenance. One PlayPump™ system serves up to 2,500 people.

PlayPumps International is a not-for-profit collaborative that is bringing the PlayPump™ water system to 10 million people across sub-Saharan Africa by 2010 with a $60 million campaign. The organisation partners with individuals, governments, foundations, and companies to donate PlayPump™ water systems to rural and peri-urban African communities.

The idea for the PlayPump™ water system was born the day South African advertising executive Trevor Field saw an ingenious invention at an agricultural fair outside Johannesburg. The merry go round attached to a water pump drew clean water from beneath the ground. Field saw the opportunity to bring a sustainable water access solution to the region's peri-urban and rural communities in need of clean water and playground equipment. He pictured adding a high-capacity water storage tank that could also hold four billboard spaces for advertising and public education messages.

With his longtime business colleagues, Paolo Ristic and Sarel Nienaber, Field licensed the concept and launched a company called Roundabout Outdoor to install the new product, named the PlayPump™ water system. New features were added, connecting the merry-go-round pump head and borehole to a sealed water storage tank, water tap stand and concrete water spillage runoff.

By 1997, Field and Roundabout Outdoor had installed 20 PlayPump™ systems in South Africa, with plans to install 50 more. In late 1999, President Nelson Mandela attended the ceremonial opening of a new school with a PlayPump™ system. When the story was picked up by the media, Roundabout Outdoor picked up speed and went on to win the prestigious World Bank Development Marketplace Award in 2000 for the ability to deliver both water and powerful HIV/AIDS prevention messages. With interest in the PlayPump™ system growing, a South African NGO was created to enable individuals, governments, foundations, and companies to donate PlayPump™ water systems to rural African communities and schools.

PlayPumps International is now registered both as a U.S. 501(c) 3 organisation and a South African NGO, and maintains offices in both countries. PlayPumps International, together with the Roundabout team, is now expanding its reach. To date, more than 900 PlayPump™ systems have been installed in South Africa, Mozambique, Swaziland, and Zambia as part of a $60 million expansion campaign. The goal is to bring 4,000 PlayPump™ water systems to a total of ten sub-Saharan African countries: Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Swaziland, South Africa, Tanzania, Uganda and Zambia.

Above: A PlayPump water system brings a host of benefits to communities, providing clean drinking water and helping to improve sanitation and hygiene (Photo: PlayPumps International)

Right: To date more than 900 PlayPumpTM systems have been installed in South Africa, Mozambique, Swaziland and Zambia (Photo: PlayPumps International)

When introducing the PlayPump™ system in each new country, PlayPumps International applies a pilot programme involving 100 sites in a 150 km radius. Each potential PlayPump™ system site is analysed using several factors. The first is the existence of a primary school in a location that is central to all villagers, for easy access to the water source. Next, an existing borehole of the appropriate size and depth for a PlayPump™ system must be identified.

PlayPumps International does not drill boreholes; it partners with host country governments and other organizations that currently have drilling programmes or can identify abandoned boreholes previously used for other water technologies like handpumps. Each identified borehole undergoes a series of geo-hydrological tests as well as water chemical tests to ensure that the water source is suitable for human consumption.

Working with community leaders and local partners, the PlayPump™ system is introduced to communities to ensure community involvement and ownership from the beginning. Once a community has agreed that it wants a pump, a community liaison person is appointed. Roundabout Outdoor then trains a local crew to install and maintain the pump, giving jobs to local workers. The close proximity of the sites, in relation to one another, enables easier travel to various sites when maintenance crew members and materials are needed.

The PlayPump™ water system brings a host of benefits to the communities it serves. Increased access to clean drinking water improves sanitation and hygiene by reducing exposure to preventable water-related illnesses that currently claim the life of one child every 15 seconds. The PlayPump™ system also reduces the impact of HIV/AIDS with powerful educational messages and clean water for administering medications. Barriers to education are reduced when latrines and hand-washing facilities are introduced to schools for the first time, again due to the availability of clean water. Lastly, the PlayPump™ system spurs economic development by freeing up the villagers' time who were previously tasked with collecting water, and allowing for the planting of community gardens.

Sponsorship of one PlayPump™ water system costs US$14,000, which covers the costs of installation, set up and operations. Advertising revenue provides a dedicated source of income that covers maintenance for each PlayPump™ system for 10 years. This means that there is no cost to the communities.

Unsafe water and lack of sanitation is the single largest cause of illness worldwide and a barrier to progress in developing countries. For the 10 million people across sup-Saharan Africa whose lives will be positively impacted by this simple and innovative technology, better health and education are just a few turns of the merry-go-round away.

Résumé

Le système de fourniture d'eau « PlayPump™ » est un tourniquet (le jeu pour enfants) associé à une pompe à eau qui extrait de l'eau pure d'une source souterraine afin de remplir un réservoir connecté. Le réservoir sert de panneau d'affichage pour diffuser de la publicité et des messages éducatifs pour le public et les ventes de ces espaces d'annonce couvrent les coûts de maintenance. Chaque tourniquet « PlayPump™ » alimente jusqu'à 2500 personnes.

« PlayPump International » est une association non lucrative qui prévoit de mettre en place ces systèmes de fourniture d'eau pour desservir 10 millions de personnes à travers l'Afrique subsaharienne d'ici 2010, par le biais de campagnes s'élevant à $60 million.

Cette organisation collabore avec des individus, des gouvernements, des fondations et des sociétés pour offrir des systèmes de fourniture d'eau « PlayPump™ » aux communautés rurales et périurbaines d'Afrique.

Resumen

El sistema de agua PlayPump™ es un tiovivo conectado a una bomba de agua que extrae agua limpia de origen subterráneo y lo dirige a un depósito de reserva.

La venta de espacio publicitario sobre erstos depósitos cubre el coste de mantenimiento, y los carteles llevan también mensajes educativos.
El sistema PlayPump™ proviene de cagua a unas 2,500 personas.

PlayPumps International es una cooperativa sin ánimo de lucro que le llevará el sistema PlayPump™ a 10 millones de personas en el África sub-sahariano antes del 2010 a través de una campaña valorada en $60 millones. La organisación trabaja con ciudadanos, gobiernos, fundaciones, y empresas para donar sistemas PlayPump™ a comunidades rurales y peri-urbanas en África.
Para mas informacion, visite www.playpumps.org.

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Une approche globale de la conservation **de l'eau** dans les jardins

Un sistema general para conservar **el agua** en el jardín

Roslyn Semler

Worth our weight in water

Summary With Australia being the driest inhabited continent on earth, it is not surprising that Royal Botanic Gardens, Melbourne is committed to raising public awareness about the need to conserve water. Importantly, the garden leads through example. In 10 years, it has reduced its water consumption by a staggering 60%. Several displays are devoted to water conservation and indigenous plants, demonstrating how easy it is for people to grow such plants and adopt water saving techniques in their own gardens. The education programmes at the garden are multi-faceted and provide for teachers, students, pre-school children and adults. RBG Melbourne is involved in various collaborative research projects with two universities and has received a number of awards for its conservation achievements. It has recently developed the RBG Melbourne Strategic Water Plan which sets out six water management goals and makes water a major corporate priority.

Australia is considered the driest inhabited continent on earth despite some regions receiving more than 1200 millimeters of rainfall annually. The climate varies considerably across the country, as well as from year-to-year. However, for the last 10 years much of Australia has experienced major drought conditions, and in Victoria (Southern Australia), the last decade has been the driest on record. River flows and reservoir levels are at an all-time low.

Drought conditions affect everyone. However, for landholders, from farmers to individual gardeners, drought has brought the need for water conservation sharply into focus. At Royal Botanic Gardens, Melbourne, and Royal Botanic Gardens, Cranbourne (a division of RBG Melbourne), inspiring visitors to contribute to water conservation at home and school, and communicating the institutions' water conservation achievements is a high priority.

For more than 10 years, Royal Botanic Gardens, Melbourne has been promoting the wise choice of plants and the conservative use of water in home gardens. As an organisation we have achieved significant reductions in water use: between 1995 and 2005 our water consumption was down by 60% across the site. Staff training, regular

Below: Permanent signs installed in 2005 communicate the organisation's key messages about water conservation (Photo: RBG Melbourne)

Right: Native and exotic drought tolerant plants are displayed in the Water Conservation Garden (Photo: RBG Melbourne)

testing of irrigation equipment and using up-to-date technology are critical to this success. Royal Botanic Gardens, Cranbourne, which hosts an indigenous bushland area and the recently opened Australian Garden, also uses a range of techniques to engage visitors in water-wise gardening practices focusing on Australian plants.

Above: Temporary signs, regularly changed and updated, are displayed at strategic points around the Gardens. They convey how RBG is reducing water consumption, and what visitors can do to save water in their home garden (Photo: RBG Melbourne)

At both RBG Melbourne and RBG Cranbourne, our public programmes take a multi-faceted approach to educating, communicating and raising public awareness about water conservation issues. What follows is an overview of our programmes at Royal Botanic Gardens, Melbourne.

Interpretation

Within RBG Melbourne a number of plant collections display a range of indigenous and exotic plants suited to dry environments. These collections provide opportunities to inform and inspire our visitors. Guided walks are conducted by volunteer guides and are a means to field visitors' queries and interpret the attributes of water-efficient plants and plant collections. Guides are kept up-to-date via their monthly meetings.

The Water Conservation Garden, developed in 1999, displays water efficient plants that can easily be bought or acquired by home gardeners. Signage provides water conservation tips – from simple practices such as mulching, to more involved considerations such as irrigation systems. This garden is supported by our water retailer, South East Water Ltd. The Long Island display area, which represents a collection of indigenous plant communities, provides opportunities for guides to discuss the merits of 'planting local' and highlights the inherent water savings that can be made. Collections of plants suited to dry environments from the Mediterranean and parts of North and South America can be found in the Grey Garden, Arid Garden and Californian Garden. Interpretive signs are used to encourage closer observation of plant adaptations and reinforce the relevance of these collections to home gardeners.
In The Ian Potter Foundation Children's Garden, which opened in 2004, children are invited to discover and explore the characteristics of water-efficient plants such as the impressive Queensland Bottle Trees, *Brachychiton rupestris*, with their swollen trunks. Lavender mounds and a variety of indigenous plants from grasses to eucalypts also feature throughout the site.

Permanent signs were installed in RBG Melbourne in 2005 to communicate the organisation's key messages about water conservation. Temporary signs are also displayed at strategic points around the Gardens. They convey how RBG Melbourne is reducing water consumption, how these achievements are being recognised by industry, and what visitors can do to save water in their home garden. The beauty of temporary signage is that it can be updated and changed regularly.

Website and Customer Service

RBG Melbourne website (www.rbg.vic.gov.au) has a major section devoted to water conservation with links to further information. At the Visitor Centre, customer service staff can direct visitors to specific plants or collections within RBG Melbourne and provide them with a home-garden water conservation factsheet. When on site, customer service rangers direct visitors and field queries.

Education Service

The Education Service offers a range of programmes focusing on sustainable water use and water conservation gardening. These include:

School children

- The '*Wonderful Water*' programme offers pre-school children the opportunity to explore the precious nature of water and connections between water and living things. Central to this programme are sensory experiences such as gardening, pond dipping and water-based play, all of which aim to foster and develop young children's love for the natural world.

- Graeme Base's beautifully illustrated book '*The Waterhole*' (see resources section p33 for more details) provides the basis for a primary level programme where children can experience first hand, life in and around Long Island, the Gardens' billabong (river backwater). Children can explore the vital connections between water and all life by taking a journey through the Gardens. They meet plants from around the world that feature in '*The Waterhole*' and learn how to propagate a water conservation plant for their home or school garden.
- Water conservation is a significant component of the popular and hands-on '*Sustainable Gardening*' programme. Primary and secondary students extend their experience at RBG Melbourne by considering designs for their own sustainable garden at home or at school.
- In '*Water 4 Life*' upper secondary students study the role of water in natural environments such as billabongs and wetlands. They also examine how plants are adapted to arid environments. This is linked to water conservation gardening and the measures that RBG Melbourne has taken to conserve water.
- '*Habitat and Ecology of Long Island*' is a unique opportunity for upper secondary students to experience the rich diversity of plant and animal life in and around the Long Island billabong. Students examine life-cycles, food chains and the complex interrelationships between plants, animals and water.

Teachers

- The Education Service offers full day teacher professional development on water conservation topics. Curriculum-linked information is available on the website along with water-saving tips. Feedback from teachers regarding teacher and student programmes has been very positive with many schools reporting on their success applying water practices at school. Bookings for student water programmes have doubled in the last 12 months reflecting a growing interest in and need for support on this topic. During the last three full-day workshops approximately 100 teachers participated in every session.

Pre-school children

- Gardening-based visitor programmes for young children, such as *Potato People* and *Budding Greenthumbs*, promote sustainable gardening practices including composting, worm-farming and mulching. Based in The Ian Potter Foundation Children's Garden, children enthusiastically take part in these activities and share them with their accompanying adults. Feedback indicates that these programmes are inspiring and enable families to take on these practices or activities at home. Rainwater tanks will soon be installed in the Children's Kitchen Garden. These will enable children to water the garden directly from tank water and offer an opportunity for children and adults to converse about water-wise gardening.

Adult education

- Off site, RBG Melbourne's horticultural staff regularly contribute to an education unit on low water-use gardens as part of a series of adult education programmes run by Victoria's leading horticultural college (the University of Melbourne, Burnley campus).
- This spring two new visitor programmes will be offered. *'Sustainable Gardening for Beginners'*, which covers the basic skills of good gardening practice including water conservation. It will also encourage participants to develop ideas for designing or developing their own gardens. Free water-wise garden tours will feature on Spring Open Day, now a major annual event held in November.

Partnerships and Awards

A number of industry partnerships have evolved out of RBG Melbourne's efforts to reduce water consumption. Our water provider, South East Water Ltd supports the maintenance of the Water Conservation Garden and also aspects of the Australian Garden at Cranbourne. South East Water Ltd also works closely with us to achieve workable exemptions from some water restrictions. RBG Melbourne provides the Irrigation Association of Australia with a major training site and is represented on the State committee. We also provide technical advice, direction and assistance for a number of local government groups and regional botanic gardens.

RBG Melbourne is involved in collaborative research projects with both the University of Melbourne and Monash University, Victoria. At Monash University, the Water Study Centre is investigating relationships between chemicals, physical properties and algae in an effort to minimize algal blooms in the Ornamental Lake. At the Burnley campus of Melbourne University, studies around optimal water use in the landscape are being undertaken.

In the past four years RBG Melbourne has received a number of Victorian Savewater Awards recognizing our water conservation achievements. The Long Island area won the Design/Construction category in 2004. In 2003 the Water Conservation Garden won the Sustainable Garden, Garden Design category and in 2007 both of these gardens were finalists in the Garden Management category.

Below: Gardening-based visitor programmes promote sustainable gardening. Practices include composting, worm-farming and mulching. Watering is a favourite activity with young children (Photo: Janusz Molinski)

Where to from here?

Global climate change predictions indicate that Melbourne will continue to receive lower than average rainfall and increased evaporation into the future. Water restrictions, which are already in force, are likely to continue for an extended time. The Victorian Government now also requires that government agencies develop water management plans and it has initiated new reporting requirements on water usage.

RBG Melbourne has developed the 'RBG Strategic Water Plan (2007-2011)' which sets out six major water management goals. These goals aim to ensure that we use water as efficiently and effectively as possible as well as securing a water supply that will protect the cultural and biological assets of this organisation into the future. It makes water conservation a major corporate priority. As part of this plan, public programmes will continue to seek the most effective ways to inform our community about water conservation issues and inspire visitors to take action in their homes, schools and workplaces.

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Résumé

L'Australie est considérée comme le continent habité le plus sec, même si quelques zones reçoivent plus de 1200 millimètres de pluie par an. Le climat est généralement très variable d'un bout à l'autre du continent, ainsi que d'une année sur l'autre. Cependant, ces 10 dernières années, la plupart de l'Australie a connu des sécheresses terribles et, dans le Victoria, la dernière décennie a été la plus sèche jamais enregistrée. Les débits des rivières et le niveau des réservoirs ont toujours été bas.

Depuis 1995, le Jardin Botanique Royal de Melbourne est en pointe dans la conservation de l'eau pour les grands espaces. Nous avons mis en œuvre des stratégies pour conserver l'eau dans le site, ce qui a eu pour effet de réduire de 60 % notre consommation d'eau entre 1995 et 2005. La formation du personnel et les tests réguliers des équipements d'irrigation ainsi que l'utilisation des technologies les plus appropriées et les plus récentes ont été les raisons principales de cette réussite. Notre réalisation nous a permis de remporter le prix de préservation de l'eau de l'Etat du Victoria, Savewater Awards, pour la conservation de l'eau, les projets à grande efficacité d'irrigation et l'aménagement de jardins favorable à l'économie d'eau.

Notre priorité est d'inciter nos visiteurs à contribuer à la conservation de l'eau chez eux et à l'école, et de communiquer sur notre réalisation de conservation de l'eau. Pour cela nous développons des approches diversifiées dans nos programmes publics par l'intermédiaire de panneaux d'interprétation, de programmes scolaires et d'ateliers de développement professionnel pour enseignants. Le plan stratégiques de conservation de l'eau du Jardin Botanique Royal de Melbourne (2007 / 2011) fait ressortir 6 objectifs majeurs pour la gestion de l'eau, la conservation de l'eau étant désignée comme la priorité de la structure. Cela nous incite à poursuivre nos efforts dans l'économie de l'eau et à renforcer les messages que nous communiquons auprès de nos visiteurs.

Resumen

El continente australiano es considerado como el mas árido habitado por el hombre, a pesar de que en algunas zonas caen mas de 1200 milimetros de lluvia al año. El clima es muy variable a través de todo el continente, y también varía mucho de año en año. A pesar de esto, durante los últimos 10 años el país a padecido una gran sequía, y en Victoria la pasada década fue la mas seca jamás conocida. Los caudales de los ríos y los niveles de los embalses son en estos momentos los mas reducidos que se han conocido.

Desde 1995, el Real Jardín Botánico de Melbourne está a la vanguardia de los temas de conservación de agua en grandes paisajes. Hemos implementado estrategias para conservar el agua en todo el jardín, las cuales han reducido el consumo de agua en un 60% entre 1995 y 2005. El desarrollo del personal, pruebas regulares a los sistemas de riego, y el uso de las tecnologías mas apropriadas y mas recientes han sido la clave de este éxito, el cual nos ha ganado el premio Victorian Savewater Awards para la conservación del agua, eficiencia en riego y el diseño de jardines para la conservación del agua.

Se le da gran prioridad a la transmisión a los visitantes del mensaje de conservación del agua en hogares y colegios, así como a promocionar nuestros éxitos. Nuestro departamento de programas públicos se dedica a esto a través carteles interpretativos, programas en los colegios, y talleres para el desarrollo professional del profesoriado. El RBG Melbourne Strategic Water Plan (2007-2011) se propone seis objetivos principlaes de gestión del agua, y convierte la conservación de ésta en una prioridad corporativa. Esto nos permitirá continuar mejorando nuesta eficiencia en el uso del agua y reforzará el mensaje que transmitimos a los que nos visitan.

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International Decade for Action – Water for Life, 2005-2015

Facts on water and sanitation

1.1 billion people,18% of the world's population, lack access to safe drinking water. About 2.6 billion people, or 42% of the total, lack access to basic sanitation.

Above: Women and girls are mainly responsible for fetching the water that their families need for drinking, bathing, cooking and other household uses (Photo: UNICEF/ Giacomo Pirozzi)

Meeting global targets for water and sanitation

- The Millennium Development Goals (MDGs) call for halving 'by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.' The MDG for safe drinking water on a global scale appears likely to be reached, in most regions, with the exception of sub-Saharan Africa.
- 1.1 billion people gained access to safe drinking water between 1990-2002. The greatest access gains were achieved in South Asia, where water access increased from 71% in 1990 to 84% in 2002. In sub-Saharan Africa, access grew minimally, from 49% in 1990 to 58% in 2002.
- It is estimated that an additional investment of US$11.3 billion per year would be needed to achieve the MDGs for drinking water and sanitation at the most basic levels.

Key water and sanitation statistics

- The world's population, 6.2 billion people in 2002, is expected to increase to approximately 7.2 billion people by 2015. Almost 95% of the increase is expected to be in developing regions.
- Water withdrawals for irrigation have increased by over 60% since 1960. About 70% of all available freshwater is used for irrigation in agriculture. Yet because of inefficient irrigation systems, particularly in developing countries, 60% of this water is lost to evaporation or is returned to rivers and groundwater aquifers.

Only 1% of the total water resources on earth is available for human use. While 70% of the world's surface is covered by water, 97.5% of that is salt water. Of the remaining 2.5% that is freshwater, almost 68.7% is frozen in ice caps and glaciers

Right: 1.1 billion people gained access to safe drinking water between 1990-2002. The greatest gains were achieved in South Asia (Photo: Heather Arney, WaterPartnership International)

- Water use increased six-fold during the 20th century, more than twice the rate of population growth. While water consumption in industrialized countries runs as high as 380 litres/capita/day in the United States and 129 litres/capita/day in Germany in developing countries 20-30 litres/capita/day are considered enough to meet basic human needs.

- In parts of the United States, China and India, groundwater is being consumed faster than it is being replenished, and groundwater tables are steadily falling. Some rivers, such as the Colorado River in the western United States and the Yellow River in China, often run dry before they reach the sea.

Freshwater ecosystems have been severely degraded: it is estimated that about half the world's wetlands have been lost, and more than 20% of the world's 10,000 known freshwater species have become extinct, threatened or endangered.

The global water supply situation

- Water scarcity: it was estimated that in 1995 about 1.76 billion people (out of approx. 5.7 billion world population) were living under severe water stress.

- By 2025, it is estimated that about two thirds of the world's population - about 5.5 billion people - will live in areas facing moderate to severe water stress.

- The areas most affected by water shortages are in North Africa and Western and South Asia. For 25% of Africa's population, chronic water stress is high: 13% of the population experience drought-related water stress once each generation, and 17% are without a renewable supply of water.

- 83% of the world's population used improved drinking water sources in 2002, up from an estimated 79% in 1990. Approximately 42% of the people with access to water have a household connection or yard tap. However, approximately 1.1 billion people still do not have access to improved drinking water.

- People in slum areas have very limited access to safe water for household uses. A slum dweller may only have 5 to 10 litres per day at his or her disposal, while a middle or high-income person in the same city may use some 50 to 150 litres per day, if not more.

- Up to 30% of fresh water supplies are lost due to leakage in developed countries, and in some major cities, losses can run as high as 40 to 70%.

The global sanitation situation

- If increases in sanitation coverage stay as low as between 1990 and 2002, the world will fall short of its MDG target by over half a billion people by 2015.

- In developing countries rural communities have less than half the sanitation coverage (37%) of urban areas (81%).

- Sanitation coverage levels are lowest in the Sub-Saharan Africa (36%) and South Asia (37%) regions

About 90% of sewage and 70% of industrial wastes in developing countries are discharged into water courses without treatment, often polluting the usable water supply.

Water, sanitation and health

- More than 2.2. million people, mostly in developing countries, die each year from diseases associated with poor water and sanitary conditions.

- Every week an estimated 42,000 people die from diseases related to low quality drinking water and lack of sanitation. Over 90% of them occur to children under the age of 5.

- Two of the water-related diseases, diarrhoea and malaria, ranked 3rd and 4th place in the cause of death among children under 5 years old, accounting for 17% and 8% respectively of all deaths.

Left: Poor health resulting from inadequate water and sanitation robs children of schooling. US$11.3 billion per year is needed to achieve the Millennium Development Goals for drinking water and sanitation at the most basic levels (Photo: Heather Arney, WaterPartnership International)

At any one time, half of the world's hospital beds are occupied by patients suffering from water-borne diseases.

- In sub-Saharan Africa, a baby's chance of dying from diarrhoea is almost 520 times the chance of that in Europe or the United States.
- Improvements in drinking-water quality through household water treatment, such as chlorination at point of use and adequate domestic storage, can lead to a reduction of diarrhoea episodes by between 35 and 39%, while hygiene interventions, such as hygiene education and promotion of hand washing, can lead to a reduction of diarrhoeal cases by up to 45%

Gender, water and sanitation

- For a family of six, collecting enough water for drinking, cooking and basic hygiene may mean hauling heavy water containers from a distant source for an average of three hours a day. Women and girls are mainly responsible for fetching the water that their families need for drinking, bathing, cooking and other household uses.
- Poor health resulting from inadequate water and sanitation robs the children of schooling and the adults of earning power, a situation aggravated for the women and girls by the daily chore of collecting water.
- For pregnant women, access to enough good quality water is vitally important to protect them from serious diseases such as hepatitis.
- Women face the challenge of maintaining basic household hygiene and keeping their own and their infants' hands and bodies clean with limited water supplies, and at the same time avoiding contamination of water stored for drinking and cooking.
- Currently, in sub-Saharan Africa, a larger proportion of women are infected with HIV than men. When women are living with HIV/AIDS, their suffering has a double impact on their families' water problems.
- Adoption of sustainable hygiene behaviours is strongly linked to the educational level of women. Better-educated women are more likely to adopt long-term hygiene behaviours.

The economics of investments in water and sanitation

- The economic benefits of household water treatment – such as the application of chlorination, solar disinfection, filters or combined flocculation and chlorination powders - can yield benefits of US$ 5 to 140 per US$ 1 invested.

A WHO Cost-Benefit Analysis showed that every US$1 invested in improved drinking water and sanitation services can yield economic benefits of US$4 to US$34 depending on the region

- The economic payback from investing US$11.3 billion per year to reach the Millennium targets for drinking water and sanitation by 2015 is estimated to be US$ 84 billion.

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BGCI is grateful to the United Nations for permission to reproduce these facts.

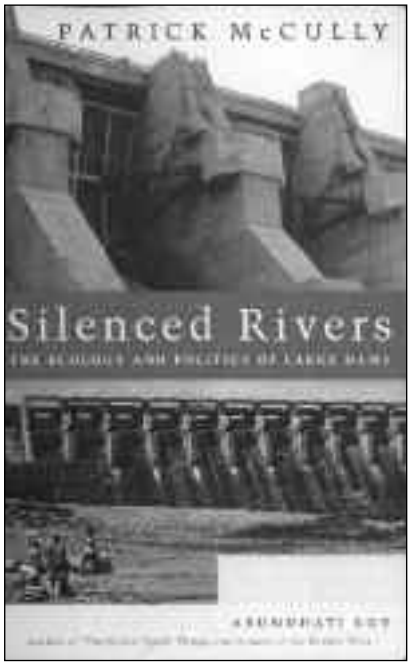
For more information visit http://www.un.org/waterforlifedecade/factsheet.html

Resources

Resources

Silenced Rivers: The Ecology and Politics of Large Dams

This illuminating book provides a clear and disturbing breakdown of the impacts of large dams, on the environment, people and the planet. McCully presents the stark facts directly: more than 400,000 square kilometres – the area of California – have been inundated behind the world's 40,000 large dams. Dams are the main reason why one–fifth of the world's freshwater fish is now either



Disponible

Rivières Sous Silence : l'Écologie et la Politique des Grands Barrages

Ce livre éclairant fournit une image précise et dérangeante de l'impact des grands barrages sur l'environnement, les populations et la planète. McCully présente les faits de manière directe : plus de 400 000 km² – la surface de la Californie - ont été inondés derrière 40 000 grand barrages à travers le monde. Un cinquième des poissons d'eau douce a disparu ou est en voie d'extinction et les grands barrages en sont la cause principale. Des dizaines de millions de personnes ont été déplacées de leurs terres – 30 million au bas mot, plus probablement 60 millions. McCully explore les raisons pour lesquelles ces barrages sont construits, leurs effets sur les écosystèmes et le développement de mouvements contre ces grands barrages.

Ce livre est une lecture essentielle pour toute personne intéressée par les écosystèmes d'eau douce et l'utilisation de l'eau. McCully est directeur de campagne pour le Réseau International Rivières (International Rivers Network) qui possède également un site Internet utile avec d'autres informations sur les risques pour nos rivières, www.irn.org.

Patrick McCully, 2001, Zed Books (London) en association avec International Rivers Network et The Ecologist

Recursos

Ríos Silenciados: Ecología y Política de las Grandes Represas

Este libro da un panorama claro y perturbante, de los impactos de las grandes presas, sobre el medio ambiente, gente y el planeta. McCully presenta las evidencias directamente: Mas de 400,000 kilometros cuadrados – el area de California - han sido inundados debido a las 40,000 presas mas grandes del mundo. Las presas son la mayor razón del porqué, un quinto de los peces de agua fresca del mundo esta ahora en peligro o extintos. El número de personas con tierras inundadas debido a las presas esta con certeza dentro de las decenas de millones - 30 millones podria ser un numero conservador, 60 millones un número mas probable. McCully explora las razones de porque las presas son construidas, los impactos que ellas tienen sobre los sistemas ecológicos que ellos invaden y el crecimiento y desarrollo del movimiento antipresa.

Este libro constituye una lectura esencial para cualquiera interesado en un sistema de agua fresca y como nosotros usamos el agua. McCully es director de campañas para la red international de rios, la cual tambien tine un sitio web con mas datos e informacion acerca de las amenazas a nuestros rios, www.irn.org.

endangered or extinct. The number of people flooded off their lands because of dams is certainly in the tens of millions – 30 million would be a conservative estimate, 60 million more likely. McCully explores the reasons why dams are built, the impacts they have on the ecological systems they invade and the growth and development of the anti-dam movement.

This is essential reading for anyone interested in freshwater systems and how we use water. McCully is Campaigns Director for the International Rivers Network, which also has a useful website with more facts and information about the threats to our rivers, www.irn.org.

Patrick McCully, 2001, Zed Books (London) in association with the International Rivers Network and The Ecologist, 416pp
ISBN-10: 1856499022
ISBN-13: 978 1856499026

Also in Spanish: Ríos Silenciados: Ecología y Política de las Grandes Represas

The Waterhole

The Waterhole is a delightful combination of a story, art, puzzle and counting book. Beautifully illustrated, it tells the story of a water hole that is drying up and the effects this is having on the animals and plants. Although more attention is given to the animals in this crisis, there are many visual cues about its effect on plants. Throughout the book, Base explores plant and animal life across the continents and each page provides a different opportunity to look at plant collections from various parts of the world. For example, pandas chewing on bamboo forests in China, moose wandering in the sequoia forests of North America and kangaroos sheltering from the sun beneath Australian eucalypts. For those children who love finding hidden pictures, the borders of the pages contain silhouettes of creatures indigenous to each country, with those same animals hidden in the illustrations.

This book depicts water as a precious element that is the key to all life on earth. It can be used to engage early primary children in exploring water

Le point d'eau

"Le point d'eau" est à la fois une histoire, un puzzle et un livre de contes. Magnifiquement illustré, cet album raconte l'histoire d'un point d'eau qui s'assèche et des effets sur les plantes et les animaux. Bien que les animaux soient les principaux acteurs, les images montrent également l'impact sur les plantes. Tout au long du livre, Base explore la vie animale et végétale à travers les continents et chaque page permet de voir les plantes de différentes parties du monde. Par exemple, des pandas qui s'alimentent dans une forêt de bambous en Chine, des élans marchant dans une forêt de séquoias en Amérique du Nord, des kangourous qui s'abritent du soleil sous des eucalyptus australiens. Pour les enfants qui aiment chercher des images cachées, des animaux indigènes sont cachés dans l'illustration, leurs silhouettes étant représentées dans la marges de chaque page.

Ce livre présente l'eau comme un élément précieux qui est la source de toute vie sur terre. Il peut être utilisé pour amener des élèves du primaire à explorer la question de l'eau, son utilisation rationnelle dans le jardin, la vie autour et dans les étangs et les zones humides, ainsi que comme outil pour étudier les plantes du monde entier.

Article de Christine Joy, Royal Botanic Gardens, Melbourne, Australie

Graeme Base, 2001
Harry N. Abrams
ISBN-10: 0810945681
ISBN-13: 978-0810945685

Vous trouverez des pistes pour l'exploitation pédagogique du livre sur le site suivant : www.penguin.com.au/PUFFin/NOTES/pdf/0670889288.pdf

Atlas de L'eau: Cartographie de la Crise Mondiale en Chiffres et Figures

L'atlas de l'eau est un nouveau volume de la collection à succès d'Earthscan 'Atlas de l'état du monde'. En fournissant un aperçu clair des principaux aspects de la situation mondiale de l'eau, ces cartes colorées

Patrick McCully, 2001, Zed Books (London) en asociacion con la Red Internacional de Rios y el Ecologista. ISBN 987-21 886-0-2

El hoyo de agua

El hoyo de agua es una exquisita combinación de historia, arte, rompecabezas y un libro para contar. Bellamente ilustrado, en él se habla la historia del hoyo de agua que se esta secando y los efectos que esto esta teniendo sobre los animales y plantas.

A pesar de que más atención es dada a los animales en esta historia, hay muchas pistas visuales acerca de su efecto en las plantas. A traves el libro, Base explora la vida de los animales a traves del continente, cada página provee una oportunidad diferente para mirar una colección de plantas de varias partes del mundo.

Por ejemplo, pandas masticando en los bosques de bamboo en China, alces alrededor de los bosques de sequoia de America del Norte y canguros protegiéndose del sol bajo los eucaliptos Australianos. Para aquellos niños que aman encontrar las pinturas australianas, los bordes de las páginas contienen siluetas de creaturas indigenas de cada pais, con aquellos mismos animales ocultos en las ilustraciones.

Este libro describe al agua como un elemento precioso que es la clave de toda vida sobre la tierra. Esto puede ser usado para comprometer niños de primaria en explorar la conservación del agua y jardineria, explorar la vida en o alrededor de estanques y humedales, y también como una herramienta para explorar colecciones de plantas alrededor del mundo. Comentado por Christine Joy, Royal Botanic Gardens Melbourne, Australia

conservation plants and gardening, exploring life in or around ponds and wetlands and as a tool for exploring plant collections from around the word.

Review by Christine Joy, Royal Botanic Gardens Melbourne, Australia

Graeme Base, 2001
Harry N. Abrams
ISBN-10: 0810945681
ISBN-13: 978-0810945685

Teaching notes to accompany the book are available at www.penguin.com.au/PUFFin/NOTES/pdf/0670889288.pdf

The Atlas of Water: Mapping the Global Crisis in Graphic Facts and Figures

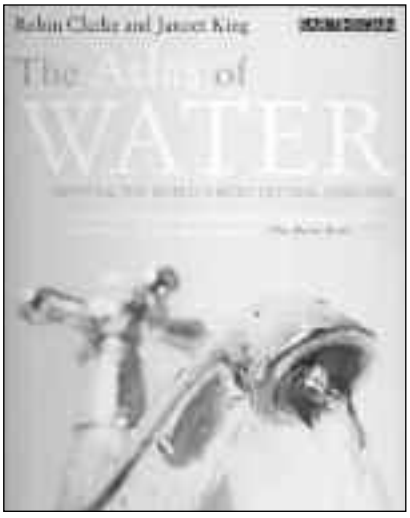
The Atlas of Water is an additional volume in Earthscan's successful and useful series 'State of the World Atlases'. By providing a clear overview of the key aspects of the global water situation, the colourful and easy to understand maps, dotted with fascinating sound bites, create an invaluable reference and source material for any educator designing a programme on water. The authoritative text is detailed enough to provide a good level of understanding, with full references, additional source materials and tables of facts and figures. The content examines uses and abuses of water in the home, industry, agriculture, power, water and health, droughts and floods, environmental issues, water and conflict and how we can conserve supplies for the future.

Robin Clarke and Jannet King, 2004
Myriad Editions Ltd
Earthscan, London
www.earthscan.co.uk
ISBN-10: 1844071332
ISBN-13: 978-1844071333

Websites

Discussing global issues: Water - a right or a commodity?
www.unicef.org.uk/tz/resources/resource_item.asp?id=81

Under its children's programme, UNICEF provides various teaching and education materials. 'Discussing global issues: Water - a right or a commodity?' is one of a series of



et faciles à comprendre, parsemées de petites phrases clés, sont une référence essentielle pour tout éducateur qui prépare un projet sur l'eau. Le texte est assez détaillé pour permettre une bonne compréhension de la question avec des références complètes, d'autres outils ressources et des tableaux de chiffres et figures. Les questions examinées sont la consommation et la surconsommation d'eau dans la maison, l'industrie, l'agriculture et la production d'énergie, l'eau et la santé, les sécheresses et inondations, les conflits liés à l'eau, et comment préserver l'eau pour l'avenir.

Robin Clarke and Jannet King, 2004
Myriad Editions Ltd
Earthscan, London
www.earthscan.co.uk
ISBN-10: 1844071332
ISBN-13: 978-1844071333

Sites Internet

Parler des enjeux dans le monde: L'eau – un droit ou une marchandise ?
www.unicef.org.uk/tz/resources/resource_item.asp?id=81

Avec son programme pour les enfants, l'UNICEF fournit différents outils d'éducation et d'enseignement. « Parler des questions mondiales : l'eau – un droit ou une marchandise ? » fait partie d'une série d'outils simples permettant aux éducateurs de sensibiliser les jeunes et leur faire acquérir des connaissances et compétences sur différents enjeux locaux et mondiaux. Le kit peut être

Graeme Base, 2001
Harry N. Abrams
ISBN-10: 0810945681
ISBN-13: 978-0810945685

Notas didacticas para acompañar el libro estan disponibles en www.penguin.com.au/PUFFin/NOTES/pdf/0670889288.pdf

El Atlas del Agua: Mapeando la Crisis Global en Gráficas de Datos y Figuras

El Atlas del Agua es un volumen adicional en Earthscan, dentro de la exitosa y util serie 'Los Atlases sobre el Estado del Mundo'. Este da un clara idea de los aspectos de la situación global de la tierra, el colorido y facilidad para entender los mapas, complementado con pequeños sonidos fascinantes, crea una referencia invaluable y fuente material para cualquier educador diseñando un programa sobre agua.

Este texto esta suficientemente detallado para proveer un buen nivel de entendimiento con referencias totales, fuentes adicionales de materiales y tablas de datos y figuras. El contexto examina usos y abusos del agua en la casa, industria, agricultura, poder, agua y salud, sequias e inundaciones, temas ambientales, agua y conflictos y como podemos conservar reservas para el futuro.

Robin Clarke and Jannet King, 2004
Myriad Editions Ltd
Earthscan, London
www.earthscan.co.uk
ISBN-10: 1844071332
ISBN-13: 978-1844071333

Paginas Web

Discutiendo sobre asuntos globales: ¿Es el agua un derecho o una comodidad?
www.unicef.org.uk/tz/resources/resource_item.asp?id=81

El programa de apoyo a la infancia UNICEF, entre varios materiales educativos presenta 'Discutiendo sobre asuntos globales: ¿es el agua un derecho o una comodidad? se trata de una serie de recursos concisos para educadores con la meta a crear conciencia, aptitudes y conocimiento

succinct resources for educators to build young people's awareness, knowledge and skills of a range of local and global issues. The pack is free to download or can be purchased from the UNICEF shop for £5.00 (www.unicef.org.uk/store/). It uses source material from Vietnam and Ghana, two countries that suffer from water polluted at source by fluoride. The booklet contains discussion material on how these countries can deal with the major challenges of access to clean water. Inside is a series of activities that could easily be incorporated into an education programme, to encourage discussion and explorations of some of the problems surrounding water use and water consumption.

Water for Life Decade: 2005-2015
www.un.org/waterforlifedecade/

In 2003, United Nations General Assembly declared 2005 to 2015 as the International Decade for Action 'Water for Life'. The primary goal of the decade is to promote efforts to fulfil international commitments made on water and water-related issues by 2015. Among the central themes are: scarcity, access to sanitation and health, water and gender, capacity-building, financing, valuation, Integrated Water Resources Management, trans-boundary water issues, environment and biodiversity, disaster prevention, food and agriculture, pollution and energy. The website includes information about the decade, factsheets, a booklet, reference material outlines and information about the issues connected with water. There are also two downloadable videos; 'Water, Drop

téléchargé gratuitement ou peut être acheté dans les boutiques UNICEF pour £5.00 (www.unicef.org.uk/store/). Les outils proviennent du Vietnam et du Ghana, deux pays qui souffrent de la pollution de l'eau à la source par le fluorure. Le livret contient des informations qui peuvent servir de base pour des discussions sur la manière dont ces pays peuvent traiter le défi de l'accès à l'eau potable. Vous y trouverez également une série d'activités qui peuvent facilement être intégrées à un projet pédagogique, pour stimuler la discussion autour des questions de l'utilisation et de la consommation de l'eau.

La Décennie de l'Eau pour la Vie: 2005-2015
www.un.org/waterforlifedecade/

En 2003, L'Assemblée Générale des Nations Unies a proclamé la période de 2005 à 2015 Décennie Internationale d'Action « De l'Eau pour la Vie ». L'objectif principal de cette décennie est d'encourager les efforts pour réaliser les engagements internationaux pris sur les questions d'eau avant 2015. On trouve parmi les thèmes centraux : la pénurie en eau, l'assainissement et la santé, l'eau et les femmes, la formation, les financements, l'évaluation, la gestion des ressources en eau, les questions liées aux eaux transfrontalières, l'environnement et la biodiversité, la prévention des catastrophes, l'alimentation et l'agriculture, la pollution et l'énergie. Le site Internet comprend des informations sur la décennie, des tableaux de données, un livret, de la documentation et des informations sur les questions qui touchent à l'eau. Il y a également deux vidéos téléchargeables à l'intention des enfants : « L'eau, goutte de vie » et « Splish et Splash » qui sont une bonne introduction sur ces questions.

Site-partage
http://www.wessa.org.za/sharenet.asp

L'équipe éducation du BGCI recommande vivement le site-partage et les outils de ce site. Nous les avons déjà mentionnés comme une ressource utile auparavant, mais juste après avoir visité leurs locaux à la réserve naturelle de Umgeni Valley, gérée par WESSA (Société pour la faune sauvage et

para acciones locales y globales. Este paquete es de acceso libre en la Internet. En forma de libro se puede adquirir por medio de la tienda de la UNICEF (www.unicef.org.uk/store/); con un costo de 5 libras esterlinas. Como ejemplos se usan Vietnam y Ghana; dos países que sufren con aguas contaminadas por fluor. En el texto se discute como esos países han afrontado retos mayores para tener acceso a agua no contaminada. En otra sección se proporciona una serie de actividades que pueden ser fácilmente incorporadas dentro de los programas educativos, útiles para motivar la discusión y exploración de algunos problemas relacionados al uso y consumo de agua.

Agua para la Vida Década: 2005-2015
www.un.org/waterforlifedecade

En 2003 la Asamblea General de las Naciones Unidas declaró el periodo de 2005 a 2015 como la Década Internacional para la acción de 'Agua para la vida'. La meta primaria de esta década es promover los esfuerzos que ayuden a cumplir los compromisos pendientes con asuntos en torno al agua durante este tiempo, por ejemplo: escasez, acceso a higiene y salud, agua y género, capacitación, financiamiento, evaluación, integración de recursos de agua y su manejo, agua mas allá de sus limites, medioambiente y biodiversidad, prevención de desastres, alimento y agricultura, contaminación y energía. La pagina web presenta información para realizar un plan de acción: hoja de datos, un libro pequeño, manual de referencia, lineamientos con todo lo relacionado al agua. Hay dos videos introductorios orientados a niños intitulados: 'Agua, gota de vida' y 'chorrito y chapuzón', estos se pueden descargar por medio de la pagina web.

Red Compartida
http://www.wessa.org.za/sharenet.asp

El equipo de educación de la BGCI es un gran entusiasta de 'Red Compartida' y participa con los materiales en la red. Ya antes, habíamos incluido y hecho públicos la existencia de ésta, sin embargo, una vez que visitamos las oficinas de la Reserva Natural del Valle de Umgeni,

of Life' and 'Splish and Splash'-aimed at children, which provide an introduction to the issues.

Share-net
http://www.wessa.org.za/sharenet.asp

BGCI education team is a big fan of Share-net and Share-net materials. We have included them as good resources before, but having just visited their offices at the Umgeni Valley Nature reserve, run by WESSA (Wildlife and Environment Society of South Africa), we thought we would remind you of their existence. Share-net is a networking group which develops, publishes and sells materials to support environmental education. All their materials are copyright-free for educational purposes and redevelopment for local use is encouraged. There is a wide range of materials available, from field guides to teachers guides on habitats, water, waste management issues, energy, trees and so on. On water they have a series of guides for freshwater and marine ecosystems, water quality guides and a wetland pack. Find out more from the website, or contact them at sharenet@wessa.co.za

3rd and 4th World Environmental Education Congress Proceedings

Proceedings from the 3rd World Environmental Education Congress, Torino, Italy, 2005
www.3weec.org/gate_weec.asp
Proceedings from the 4th World Environmental Education Congress, Durban, South Africa, 2007
www.weec2007.com/papers/index.php?mode=browse./

Proceedings from the 3rd and 4th World Environmental Education congresses are now available to download. They cover a wide range of topics, focused on the ways in which environmental educators can contribute to the Decade of Education for Sustainable Development. Key articles from practitioners, researchers and major thinkers in the field provide the latest from pedagogical theory to practical activities and case studies. For more information about the 4th WEEC, have a look at BGCI's reports from the conference, www.bgci.org/education/news/

l'environnement d'Afrique du Sud), nous voulions vous rappeler leur existence. Le site-partage est un réseau qui développe, publie et vend des outils d'éducation à l'environnement. Tous les outils sont libres de droits pour l'éducation, et l'adaptation de ces outils pour une utilisation locale est encouragée. Il y a une vaste sélection d'outils, des guides de terrain aux guides pédagogiques sur les habitats, l'eau, le traitement des déchets, l'énergie, les arbres… Sur l'eau, ils ont une série de guides sur les écosystèmes marins et d'eau douce, sur la qualité de l'eau et un kit sur les zones humides. Vous trouverez plus d'informations sur leur site Internet ou en les contactant : sharenet@wessa.co.za

Minutes des 3ème et 4ème Congrès de l'Education à l'Environnement

Minutes du 3ème Congrès Mondial l'Education à l'Environnement, Turin, Italie, 2005
www.3weec.org/gate_weec.asp
Minutes du 4ème Congrès Mondial l'Education à l'Environnement, Durban, Afrique du Sud, 2007
www.weec2007.com/papers/index.php?mode=browse./

Les minutes des 3ème et 4ème Congrès Mondiaux de l'Education à l'Environnement sont maintenant disponibles pour être téléchargées. Elles couvrent un large éventail de sujets et se concentrent sur la manière dont les éducateurs à l'environnement peuvent contribuer à la Décennie de l'Education au Développement Durable. Des articles d'éducateurs, de chercheurs et de théoriciens donnent des informations sur les dernières avancées en pédagogie, des activités pratiques et des cas d'études. Pour plus d'information sur le 4ème Congrès Mondial de l'Education à l'Environnement, consultez les rapports du BGCI sur la conférence, www.bgci.org/education/news/

bajo la dirección de WESSA (Wildlife and Environment Society of South Africa); pensamos que podríamos, una vez mas, recordar de la existencia de que es Red Compartida; se trata de un grupo que desarrolla, publica y vende materiales que apoyan la educación medioambiental. Los materiales tienen derecho libre de autor, siempre y cuando sean usados para educación y desarrollo local. Existe un rango muy amplio de materiales que van de guías para profesores, de campo, hábitats, agua, manejo de desperdicios, energía, árboles, etc. etc. En relación al tema de el 'agua', se incluyen en guías para ecosistemas marinos, de agua dulce, pantanos y calidad del agua. Si desea información en este asunto, favor de consultar: sharenet@wessa.co.za

Memorias del 3er y 4o Congresos Mundiales de Educación del Medioambiente

Memorias del 3er Congreso Mundial de Educación del Medioambiente, Torino, Italia, 2005
www.3weec.org/gate_weec.asp
Memorias del 4o Congreso Mundial de Educación del Medioambiente, Durban, South Africa, 2007
www.weec2007.com/papers/index.php?mode=browse./

Las memorias del tercer y cuarto Congreso Mundial de Educación del Medioambiente están disponibles y se pueden descargar [obtener] de la Internet. Ellas cubre un rango amplio de temas orientados a los educadores medioambientales, aspectos a como contribuir a la Década de Educación del Desarrollo Sostenible. Los artículos clave de médicos, investigadores y conocedores [sesudos] en el campo, dan a conocer con ejemplos lo último en la teoría pedagógica y actividades prácticas. Para mas información acerca de la cuarta WEEC, favor de consultar los reportes de conferencia en la pagina Web de la BGCI www.bgci.org/education/news

How to join Botanic Gardens Conservation International

The mission of BGCI is to mobilise botanic gardens and engage partners in securing plant diversity for the well-being of people and the planet. It was founded in 1987 and now includes over 525 member institutions in 115 countries.

Institutions can join BGCI for the following benefits:

- Membership of the worldwide plant conservation network
- Botanic Garden Management Resource Pack (upon joining)*
- Regular publications:
  - the regular newsletter, *Cuttings*
  - *BGjournal* – an international journal for botanic gardens (2 per year)
  - *Roots* - environmental education review (2 per year)
  - A wide range of new publications
- Invitations to BGCI congresses and discounts on registration fees
- BGCI technical support and advisory services

	Institution Membership	£ Stlg	US $	€ Euros
A	BGCI Patron Institution	5000	8000	7500
B	Institution member (budget more than US$2,250,000)	600	1000	940
C	Institution member (budget US$ 1,500,000 - 2,250,000)	440	720	660
D	Institution member (budget US$ 750,000 - 1,500,000)	300	500	440
E	Institution member (budget US$ 100,000 - 750,000)	160	250	220
F	Institution member (budget below US$100,000)*	75	120	110
	**Generally applies to institutions in less developed countries*			

Other Membership Categories:

Membership benefits depend on category - see below. These can include:

- Regular publications:
  - the regular newsletter, *Cuttings*
  - *BGjournal* - an international journal for botanic gardens (2 per year)
  - *Roots* - Environmental Education Review (2 per year)
- Invitations to BGCI congress and discounts on registration fees

	Individual Membership	£ Stlg	US $	€ Euros
J	Conservation donor (*BGjournal*, *Roots* and *Cuttings* plus more)	250	450	420
K	Associate member (*Cuttings* and *BGjournal*)	35	60	50
L	Associate member (*Cuttings* and *Roots*)	35	60	50
M	Friend (*Cuttings*) available through online subscription only (www.bgci.org)	10	15	15

*Contents of the Botanic Garden Management Resource Pack: *The 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, BG-Recorder (a computer software package for plant records).*

Payment may be made by cheque payable to Botanic Gardens Conservation International, or online at www.bgci.org or by 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 membership of Botanic Gardens Conservation International.

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Address . . . . . .

. . . . . .

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E-mail . . . . . .

Internet site . . . . . .

Membership category . . . . . Annual rate . . . . . .

VISA/Mastercard number . . . . . Credit card expiry date . . . . . .

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.

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Training opportunity with BGCI and RBG Kew:

International Diploma in Botanic Garden Education 2008

Top: Participants on the 2006 diploma course came from all over the world
Above: Field trips are an integral part of the course
Left: Success! Robbie Cereno from Makiling Botanic Garden, Philippines, receiving a certificate of attendance from BGCI's Secretary General, Sara Oldfield

The next *International Diploma in Botanic Garden Education* is being held in September/October 2008. Organised 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 interpretation principles and practices, lifelong learning strategies, the history and development of education for sustainable development, an overview of learning in botanic gardens, fundraising, marketing, networking and evaluation.

Visit the RBG Kew website (www.kew.org/education/bge.html) or the BGCI website (http://www.bgci.org/education/diploma_course_outline) for more information and application details - deadline for submission of applications is 31st March 2008.

BGCI is also seeking funding to offer scholarships for the International Diploma course scholarship. Applicants must be from developing countries, have proficiency in conversational and written English, and be knowledgeable of appropriate technical terms. Contact BGCI's education department to receive a scholarship application form (education@bgci.org). The deadline for scholarship applications is 31st January 2008.

Testimonials

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

"The entire experience is "relevant, revealing, provoking" for me personally and professionally. The training programme has fulfilled my requirements beyond my expectations in terms of the content and exposure provided….the key attribute of the programme is interacting with committed, passionate experts from various disciplines, who shared their experience in an enjoyable manner."

"I do not doubt that my attendance on the course has widened my professional profile as well as understanding of concepts and application within the context of environmental education."