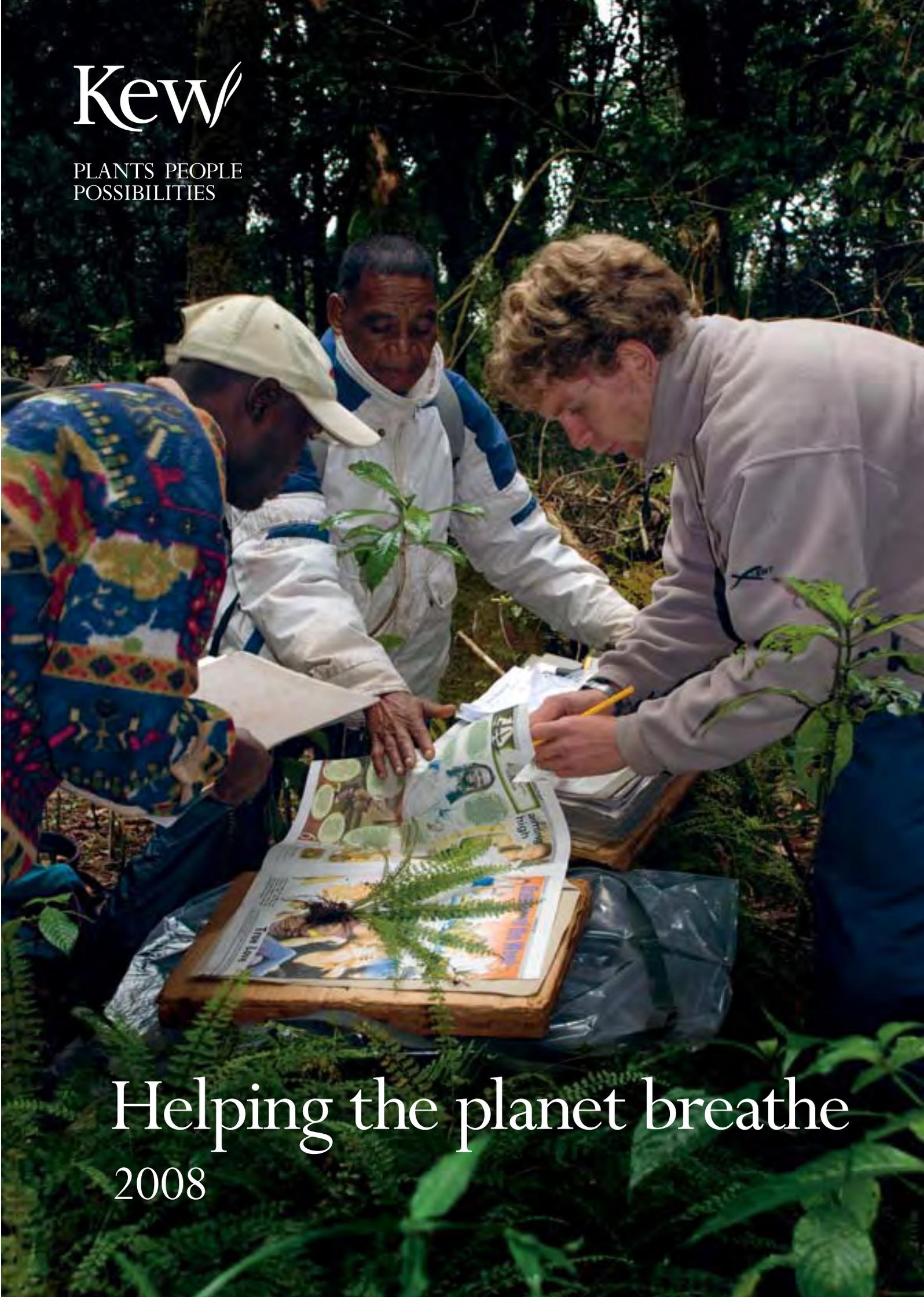


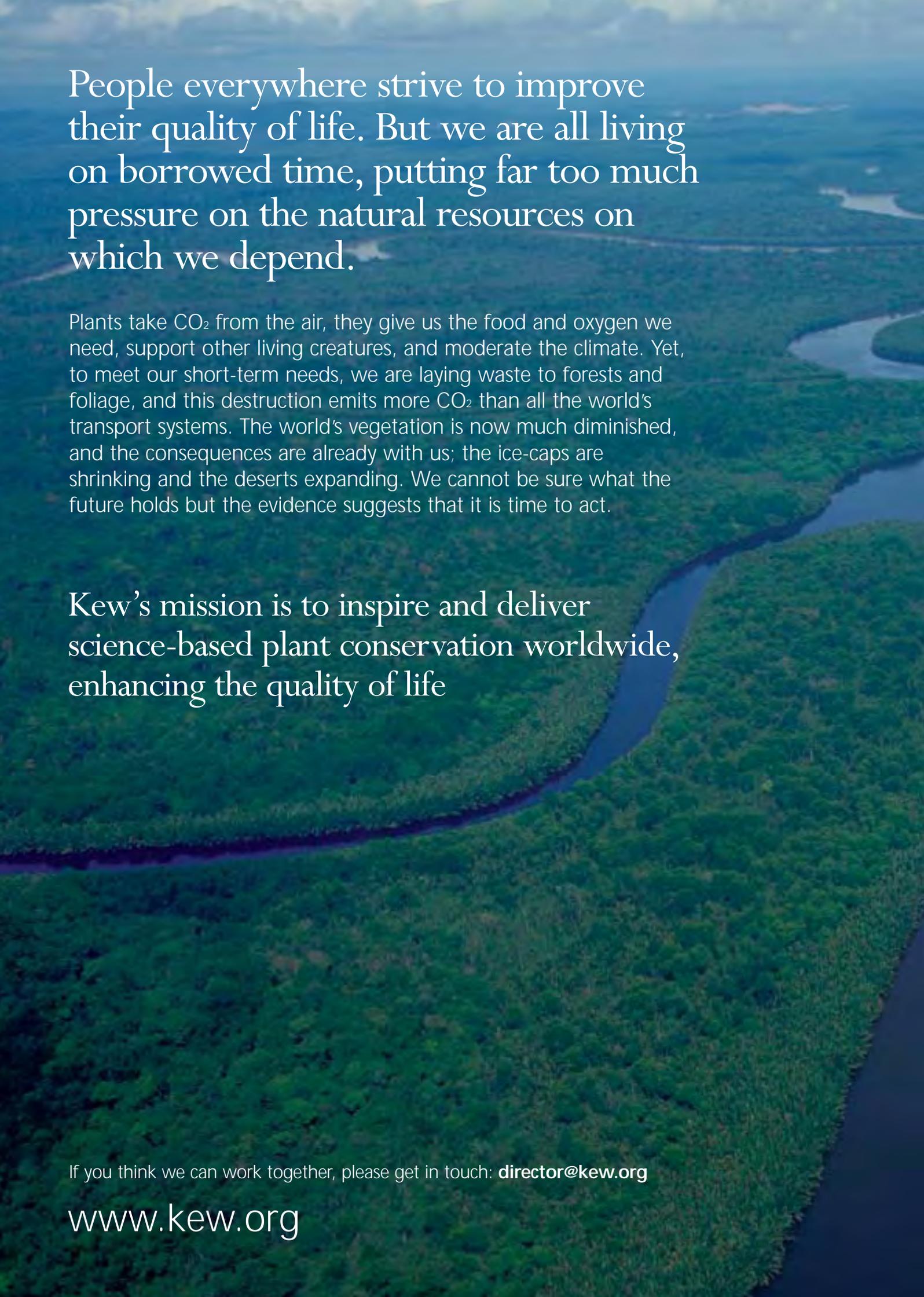
Kew

PLANTS PEOPLE
POSSIBILITIES



Helping the planet breathe

2008

An aerial photograph of a lush green forest with a winding river cutting through it. The river flows from the top right towards the bottom left, curving through the dense canopy. The sky is overcast and grey.

People everywhere strive to improve their quality of life. But we are all living on borrowed time, putting far too much pressure on the natural resources on which we depend.

Plants take CO₂ from the air, they give us the food and oxygen we need, support other living creatures, and moderate the climate. Yet, to meet our short-term needs, we are laying waste to forests and foliage, and this destruction emits more CO₂ than all the world's transport systems. The world's vegetation is now much diminished, and the consequences are already with us; the ice-caps are shrinking and the deserts expanding. We cannot be sure what the future holds but the evidence suggests that it is time to act.

Kew's mission is to inspire and deliver science-based plant conservation worldwide, enhancing the quality of life

If you think we can work together, please get in touch: director@kew.org

www.kew.org

Breathing Planet Programme

The 2006 Stern Review made the point that the cost of doing nothing about climate change is vastly greater than the 1% of GDP needed for effective action. The human cost is already undermining political and economic stability in the developing world. The UK Government, with Defra in the fore, has taken an important lead in pursuing global initiatives for a sustainable future.

Sustainability needs plant science. Kew holds the world's greatest concentration of knowledge about plants. We work globally with other botanic gardens and partners to help reduce the extent and impact of climate change, and to rescue species and habitats from destruction. The Breathing Planet Programme has seven key actions:

- 1 driving discovery and global access to essential information**
- 2 identifying highly threatened species and regions**
- 3 helping global conservation programmes on the ground**
- 4 safeguarding 25% of species through the Millennium Seed Bank partnership**
- 5 building a global network to restore damaged habitats**
- 6 growing locally appropriate species for a changing world**
- 7 using botanic gardens to inform and inspire**

In these pages we have drawn on Kew's recent work to show examples of the scope of our activity, resources and partnerships.

Understanding the diversity of life ...

Kew's work in conservation is grounded in fundamental research aimed at understanding the huge variety of plants and fungi on earth. This knowledge provides essential information for species identification and habitat assessments, and underpins research on sustainable uses, climate change and biodiversity.

www.kew.org/science

The evolution of flowers led to the vast diversity of plants that we know today, and which provides us with a wealth of food and medicinal resources. Comparative studies of flower structure are significant for identification and help us understand the relationships between plants, insects and their habitats.

Kew scientists are working with others to help shed light on one aspect of Darwin's "Abominable Mystery" – the origin of flowering plants.

Species of *Trithuria*, pictured in pond habitat and under the scanning electron microscope. These are members of the Hydatellaceae, long thought to be grouped with grasses and sedges, now known to belong with the waterlilies, a lineage lying close to the origins of flowering plants.



① driving discovery and global access to essential information

Discovering, collating and accelerating global access to essential information on the variety and distribution of the world's plant and fungal species through fundamental science, enhanced collection programmes, systematics, data capture, GIS science and novel identification tools such as web-based floras and DNA barcoding.

... and giving global access to essential information

Kew is unique in the global range and depth of its collections. Every year, thousands of overseas researchers come to Kew's Herbarium and Library. By putting these unique resources on the internet we are making them available where they are needed.

www.biodiversitylibrary.org

The Herbarium holds millions of specimens. Of these, at least 350,000 are of particular value to users for the classification of plants. Giving priority to these, we have now put high-resolution images of over 110,000 items on the web. Our digitisation programme also provides database access and online copies of major reference works, including the vast tropical African floras.

Kew is now working with the Natural History Museum and leading US institutions to make core biodiversity literature freely available from one online source – a vital resource, particularly for the developing world.



Knowing what matters

Specialist knowledge is vital but discovery often starts with good observation and the two came together in the recent highly publicised story of Madagascar's suicidal palm.

A family in Madagascar, out for a picnic, were astonished to see what looked like a Christmas Tree growing from the top of a large palm. They had seen the palm tree before and not noticed anything unusual so they made contact with local botanists and soon there were pictures on a specialist website. The tree died after flowering – hence the suicide headlines.

Kew's analysis identified the palm as new to science, forming a new genus, *Tahina*, with an affinity to the tribe Chuniophoeniceae found in a range from Arabia to Vietnam. As yet, there is no known lineage connecting it to Madagascar and only a hundred individuals have been identified – making it a conservation priority. The local community are protecting the trees and its seeds are a new source of income for them.

www.kew.org/conservation

2 identifying highly threatened species and regions

Identifying plant and fungal species and regions of the world most at risk of losing their wild diversity, by applying cutting-edge IT and GIS approaches to enable priority setting for conservation programmes targeted at saving the most vulnerable areas first

Conserving Cameroon's Forests

Kew's work has led to the creation of a new national park in Cameroon – protecting an area of exceptional conservation importance from logging

Cameroon's forests are part of a vast rainforest, second only in size to the Amazon. In 1995 Kew began working with partners in Cameroon on a comprehensive survey of plant life in the Bakossi range, one of the largest areas of cloud forest in Africa. We collected 9,000 specimens and discovered exceptional diversity, with about 2,500 species, 89 of which are found nowhere else. We built strong relationships with local people and, in 2007, the project was filmed in "Mists of Mwanenguba" and Cameroon's Prime Minister and Minister for Forests and the Environment created the Bakossi National Park.

We are now working to build a Red Data Book (a compilation of conservation assessments) for the whole country to help Cameroon manage the survival of its threatened plants.

Madagascar mapped

Madagascar is home to more than 10,000 plant species; 90% of its plants occur nowhere else and now only 18% of Madagascar's native vegetation remains intact. This year, Kew, Missouri Botanical Garden, Madagascar's government and Conservation International have published the first vegetation atlas of Madagascar – with maps produced using satellite imagery and other state of the art technologies. This pioneering atlas, the culmination of over 20 years of conservation work, will guide decisions about habitat and forest management in a country of extraordinary species – some of which are already known to have properties of great value to humanity.



3 helping global conservation programmes on the ground

Helping implement global plant and fungal conservation programmes such as creation of new sustainably managed areas through established and new partnerships in countries richest in diversity and geographical extent of remaining wild vegetation

Safeguarding Chile's desert plants

Kew's Millennium Seed Bank (MSB) holds more than a billion seeds, duplicated in local seed banks; it is on track to safeguard 24,000 species by 2010. Now our intention is to expand this global initiative as the basis for large-scale restoration programmes.

Based at Wakehurst Place, Kew's garden on the Sussex Weald, the MSB Partnership reaches every continent and includes 54 partner nations, many with significant drylands.

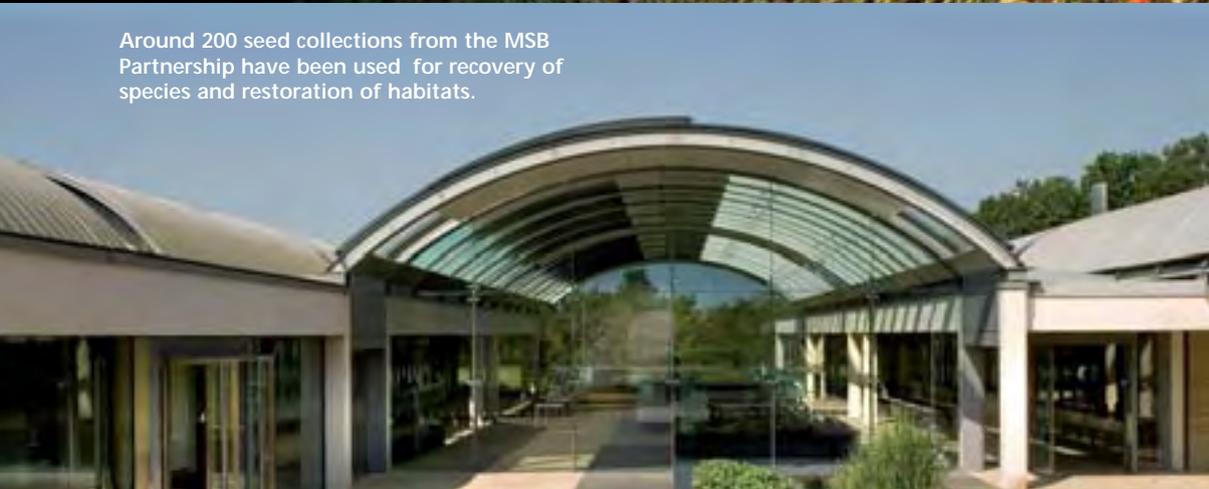
Working with local counterparts from Chile's Agricultural Research Institute (INIA), we have collected seed from the country's arid and mediterranean regions.

In this picture, *Ephedra andina* seeds are being collected. *Ephedra* species have medicinal interest as a known source of alkaloids. This shrub is in the mormon-tea family and lives at altitude along the Andes between Chile and Ecuador. Chile's seeds are stored at the MSB and at INIA's base. Seeds are dried and stored at -20°C, and can survive for many decades or even centuries.

www.kew.org/conservation



Around 200 seed collections from the MSB Partnership have been used for recovery of species and restoration of habitats.



4 safeguarding 25% of species through the Millennium Seed Bank partnership

Extending the Millennium Seed Bank's global partnership programmes to secure in safe storage 25% of the world's plants by 2020, targeting species and regions most at risk from climate change such as alpine endemics, coastal species and those endemic to desertifying lands

Finding a way to rebuild damaged habitats

Restoration ecology is a new science that aims to guide those who work with land so that they can successfully restore areas damaged by farming, industry or natural catastrophe.

Kew has a range of resources, including the Millennium Seed Bank, that can now play a much greater part in restoring habitats. Seed from the MSB Project, together with expertise in areas such as propagation and germination, is currently being used in re-introduction and restoration programmes worldwide. Examples include restoration of tall grass prairie in the USA, restoration and fire management of sand plain fynbos in South Africa, reintroduction of starfruit, *Damasonium alisma*, in the UK, and restoration of mined lands in Australia and Madagascar.

This orchid, *Epidendrum montserratense*, is being rescued from volcano damaged trees for eventual reintroduction.

Habitat restoration and species reintroductions will become increasingly important technologies as the effects of climate change become more marked. Botanic gardens are uniquely placed to enable these efforts. In June 2008, Kew held a restoration ecology workshop, attended by international leaders in the field. The objective is to develop a strategy for botanic gardens and a specific strategy to guide Kew in using its global resources to best effect.

www.kew.org/restoration-ecology

Montserrat, showing the vast area damaged by volcanic eruption

Source: MANSAT Arnaud, Kew, 2007



5 building a global network to restore damaged habitats

Establishing a global network of scientists and practitioners in restoration ecology to use seed banks for the urgent repair and re-establishment of damaged native vegetation

Sustaining the struggle against malaria

Changes in land use, population growth and climate change all threaten the ability of communities to harvest the plants they have traditionally relied on for food, shelter and medicine. Kew's sustainable use team are applying science to help them.

In Ghana, local scientists and communities work with Kew to survey plants used locally to treat malaria. In many areas, people rely on plants as their main form of medicine, with less than 10% having access to modern drugs. Changes in land use mean that many of the species found most effective are now scarce. These projects aim to evaluate the efficacy of the plants and work with communities so they can grow these plants sustainably.

In Kenya we are helping a number of communities to assess the nutritional value and prospects of sustainable horticulture for a range of wild food plants that are now in short supply. Similarly, in South Africa, we are helping a local charity supply sustainably grown medicinal plants to communities hit hard by HIV/AIDS.

Two major antimalarial breakthroughs came from plants. In the 19th century, quinine from *Cinchona* bark (shown here) and, much more recently, artemisinin from wormwood (*Artemisia*).

www.kew.org/plants/artemisia



6 growing locally appropriate species for a changing world

Expanding plant and fungal diversity knowledge and Kew's innovative science programmes to the identification and successful growth of locally-appropriate plant species under changing climatic regimes on agricultural, urban and suburban lands

Treasuring education

Education is a major priority for Kew because a well-informed public will care for the global environment. We offer education at every level and, looking to the future, put particular emphasis on schools.

Last year, Kew and Wakehurst Place provided access to over 300,000 under-17s, including 100,000 in school groups. Now we are taking our programmes into the classroom. In the 'Save Our Seeds' venture, we involved students in 30 schools in a school-lab project to identify species whose seeds age rapidly. These young people were engaged in real science, providing useful data to the Millennium Seed Bank so that we can monitor these species more closely.



In 2009, as part of Darwin's Children, the UK's largest science education project (in partnership with The Wellcome Trust), we will reach out to every maintained primary school in the UK through Kew's Great Plant Hunt. This venture will send a Treasure Chest containing all the required resources to each school; teachers are already responding enthusiastically to the web site.

www.kew.org/great-plant-hunt



7 using botanic gardens to inform and inspire

Using the high public visitation, web and media opportunities provided by Kew and partner botanic gardens to deliver enjoyable, inspiring experiences that inform people worldwide about plant-based mitigation and adaptation strategies to cope with climate change and other significant environmental challenges facing us all

Moore brings a wider audience to Kew

By offering the full range of pleasure and inspiration that gardens can provide, we can reach a much wider audience with Kew's conservation message.

Kew Gardens' World Heritage Site provided a unique opportunity for art lovers when we launched a landmark exhibition of Henry Moore's work in September 2007. The 28 monumental works attracted many new visitors to the gardens, helping to make 2007/08 a record year.



"Landscape has been for me one of the sources of my energy... I find that all natural forms are a source of unending interest – tree trunks... the texture and variety of grasses... The whole of Nature is an endless demonstration of shape and form."

HENRY MOORE; ENERGY IN SPACE, 1973

www.kew.org/henry-moore

The Shirley Sherwood Gallery of Botanical Art

Kew holds a superb collection of botanic art – a scientific record as well as an art form. Until now, we have had only limited scope to present any of the 200,000 items to the public. Dr Shirley Sherwood has been a champion of the genre for over 20 years, and now has a world-leading private collection. Together with Defra, Dr Sherwood and members of her family have kindly provided funds that made this spacious new gallery possible. The first exhibition opened in April 2008, featuring works from both Dr Sherwood's and Kew's collections.





www.kew.org/trees

The Rhizotron and Xstrata Treetop Walkway

In May 2008 we opened this stunning new attraction. The seven-storey high, 200m walkway gives hundreds of thousands of visitors the experience of life in the tree canopy. Far below, the Rhizotron, supported by the Hanson Environment Fund and Hanson, provides entertaining displays about the teeming life amongst the roots. Funds for the projects came from Defra and the private sector.



The way ahead . . .

Over the last 18 months we have reviewed and updated Kew's mission and set out our future strategy, of which the Breathing Planet Programme is a major part. Having also assessed the state of our infrastructure and assets, we set out a conceptual plan for the future development of both Wakehurst Place and Kew Gardens (which is a World Heritage Site). As the first step of a public consultation process we issued a leaflet that outlined the state of our thinking so far. Key extracts from the document are shown here.

The vision for Wakehurst Place 2008–2011 (subject to funding)

Wakehurst Place is an estate of 465 acres in West Sussex, incorporating a mansion, formal gardens, woodland, the Loder Valley Nature Reserve, plus the Millennium Seed Bank – described by Sir David Attenborough as one of the most ambitious plant conservation projects in the world. Our aim is to enhance the visitor experience and share access to the countryside and nature.

Living on One Planet

Wakehurst is pioneering new initiatives which demonstrate how to live more sustainably at home, on the land and in the garden. With growing concerns about the impact of climate change on our lives, we will introduce new displays for all age groups on important issues like housing, food and waste management.

Millennium Seed Bank

The MSB is one of the most important conservation projects in the world. It targets species and threatened habitats most useful to people and vulnerable to climate change. It aims to bank 75,000 plant species by 2020. We need to accelerate seed collection around the world.

Plants for Food

Children – and adults – are becoming more detached from the sources of their food. We want to show where our food comes from and how it is grown, how bio-fuels are produced, and to give visitors a chance to see rare breeds grazing in Wakehurst's green meadows. Conserving biodiversity, using farming practices, is another theme.

Sunset and Seed Play area

Engaging young minds is an important part of our mission. We plan an interactive play area that will awaken children to the importance of seeds, with an adjoining café for parents, including displays of public art.



B2028 Ardingly and Haywards Heath

Crawley and M23

The Vision for Kew 2008–2011 (subject to funding)

Kew Gardens in West London is home to the world's largest and most diverse collection of living plants. In July 2003 it was declared a World Heritage Site.

Flood Defences and Boundary

Our flood defences, ha-has, fences and gates need repair, and this provides the opportunity to focus on waterside habitats by presenting 'Kew-on-Thames'. We will also highlight the challenges associated with rising sea levels due to global warming.

Energy Conservation Project

We will switch to alternative sources of power generation wherever feasible and want to do this in a transparent way, sharing with our visitors the options that are available to us all.

Queen Elizabeth's Lawn

In keeping with the Thames Landscape Strategy, we will re-site the public car park and restore the historic Queen Elizabeth's Lawn on the riverside, creating a visual link to the Thames. Nearby, we will work with Historic Royal Palaces to open to visitors a unique and well-preserved Georgian kitchen that once served Kew Palace. We also envisage improved facilities in the Main Gate area.

Plants and People Visitor Orientation Centre

This new centre will help our visitors to understand the nature of a botanic garden and the Breathing Planet Programme.



World Heritage Site Maintenance

The 41 listed structures and historic landscape need maintenance and some restoration. In particular, the Temperate House and Palm House need investment to secure a sustainable future.

Joseph Banks Precinct

We will bring this low-profile, energy-efficient building back to life by converting it to a conference and hospitality centre.

Support for Science

Kew's collections underpin conservation all over the world. A new wing for the historic Herbarium will be ready in 2009. We have started the immense job of placing the collections online, and of completing the world checklist of plants. These huge tasks will need continuing investment in IT. The Jodrell Laboratory and Millennium Seed Bank will also need continued support and we must replace our aging plant quarantine house.

Lost World Habitat

The story of Kew is a race against time and human activity to discover and understand plant life on earth. We want to tell that story and show what has been lost and what remains at risk. This new display will focus on old landscapes with infertile soils where the flora is threatened by climate change.

Performance and funding

Measure	2002/03	2003/04	2004/05	2005/06	2006/07	2007/08
Visits to the behind-the-scenes collections	25,454	28,448	25,889	28,114	26,608	27,737
Page views delivered by Kew's website	6,910,000	8,834,000	12,297,000	21,595,000	30,524,000	29,000,000
Total research publications and compilations	420	457	399	354	465	518
Species use, species conservation assessments and plans supported	4,888	3,701	6,996	5,482	3,848	5,780
Total habitat conservation assessments supported	6	9	8	19	12	9
Total publications in the highest impact scientific journals	16	45	68	70	78	87
Total days with collaborators that contribute to conservation and sustainable use through capacity building etc.	4,875	4,561	5,135	7,604	6,310	7,827
Total visits to the gardens	1,374,615	1,466,096	1,713,674	1,906,764	1,836,470	1,958,860
Total Friends of Kew	60,800	62,380	64,292	66,877	71,863	78,600
Total revenue generated £000	27,025	36,219	38,660	44,353	43,244	51,257

The Royal Botanic Gardens, Kew:

devoted to building and sharing knowledge so that people benefit from plants and fungi – now and for generations to come.

700 staff (including 200 in science and 200 in horticulture) supported by 500 volunteers, students and affiliated researchers. Our impact is strengthened by partnership and collaboration in the UK and around the world.

a **world-leader in plant science** – and a major visitor attraction. Governed by Trustees and sponsored by the UK's Department for Environment, Food and Rural Affairs (Defra), which champions sustainability. Funding also comes from visitor income and fundraising.

two stunning gardens – Kew Gardens (a World Heritage Site) and Wakehurst Place in West Sussex – these house Kew's collections, laboratories and the Millennium Seed Bank – and show the importance of plants in all our lives.

Income 2007/08 (£'000)



Costs 2007/08 (£'000)



Staff and other costs 2007/08 (£'000)



Contact details

The Director
Royal Botanic Gardens, Kew
Richmond, Surrey, TW9 3AB
United Kingdom

Email: director@kew.org
Tel: +44 (0) 20 8332 5000
Fax: +44 (0) 20 8332 5197

Visitor information

Kew Gardens

Tel: +44 (0) 20 8332 5655

Wakehurst Place

Tel: +44 (0) 1444 894 066



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