

Kew

PLANTS PEOPLE
POSSIBILITIES

global strategy

Kew and the Global Strategy
for Plant Conservation



The Royal Botanic Gardens, Kew

The Royal Botanic Gardens, Kew (Kew) is recognized as one of the leading centres for advice and action on plant and fungal conservation. Kew's long involvement with conservation is made possible through its collections, the knowledge gained from the study of these and its historic and continuingly dynamic collaboration overseas in some of the most biodiverse regions of the world.

To meet increasing scientific and societal concern about habitat loss, erosion of plant diversity and climate change, there is an ever expanding demand for the information that Kew can produce, such as:

- **identification and distribution of species**
- **levels of threat to species**
- **assessment and monitoring of threatened habitats and plant diversity hotspots**
- **the effects of trade on threatened species**
- **legislation on biological diversity and implementation;**
- ***ex situ* conservation, reintroduction of species and restoration of habitats**
- **species survival in on-site reserves**
- **public education and raising awareness about the importance of plant conservation and sustainable use**
- **capacity building with others to better conserve biodiversity.**

Kew has ~ 650 staff, including scientists and horticulturalists with ~ 500 affiliated researchers, students and volunteers. There are two sites, Kew Gardens, a World Heritage site by the River Thames in West London; and Wakehurst Place in the High Weald in West Sussex.

RBG Kew holds 19 major collections – a unique global resource for studying plant diversity. The collections can be divided into 3 main groups:

Living and
genetic resources
collections

Preserved plant
and fungal
collections

Documentary and
visual reference
collections

Global Strategy for Plant Conservation

The overall objective of the Global Strategy for Plant Conservation (GSPC) is to halt the current and continuing loss of plant diversity. The Strategy includes 16 outcome-oriented global targets set for 2010 and is the first target-driven strategy to be developed under the Convention on Biological Diversity (CBD).

Kew played a key role along with other botanical organisations in the negotiation of the GSPC in 2002. The 2007 In-Depth Review of the Implementation of the GSPC noted that the GSPC has been successful in allowing botanic gardens to engage in the work of the CBD. Kew has mainstreamed the GSPC within its Corporate Plan, providing focus and specific targets for both our UK and international biodiversity programmes.

Objective 1: Understanding and documenting plant diversity **🕒Targets 1, 2, 3**

Objective 2: Conserving plant diversity **🕒Targets 4, 5, 6, 7, 8, 9, 10**

Objective 3: Using plant diversity sustainably **🕒Targets 11, 12, 13**

Objective 4: Promoting education and awareness about plant diversity **🕒Target 14**

Objective 5: Building capacity for the conservation of plant diversity **🕒Target 15, 16**

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

Understanding and documenting plant diversity

Target 1: A widely accessible working list of known plant species, as a step towards a complete world Flora

The Convention on Biological Diversity (CBD) Secretariat invited Kew to be the facilitating organisation for Target 1 of the GSPC. Around one third of all accepted plant species (103,517 species in 150 families) are now available on Kew's website. Globally, over 50% of the content for Target 1 is available online.

Kew played a key role in stakeholder consultation for Target 1 and continues to facilitate and promote this target. In 2004, Kew and Species 2000 hosted an international workshop, which identified major barriers and solutions to the completion of Target 1 and gaps in the status of checklist production for plant groups. The gap analysis has been utilized by the Global Biodiversity Information Facility (GBIF) to prioritize for funding applications. Checklists are now being produced for the two major gaps in coverage: Compositae and Melastomataceae.

Kew has worked through partnerships to be the major contributor of global checklist data for Target 1. Kew has produced online checklists of families notably, all 77 families of Monocots, Rubiaceae, Lamiaceae, Myrtaceae, Euphorbiaceae, and in collaboration with ILDIS, Leguminosae. Checklist compilation is a collaborative effort: over 100 individuals from over 20 countries have worked on checklists disseminated by Kew.

Plant Diversity Challenge, the UK official response to GSPC includes targets relating to fungi and plants. Kew's mycologists have made major contributions to the development of checklists including the *Checklist of the British & Irish Basidiomycota* (2005).

Kew plays a major role in the online International Plant Names Index (IPNI) which provides baseline nomenclatural data necessary for all checklists. IPNI is a collaborative venture between Kew, Harvard University, and the Centre for Plant Diversity Research, Canberra (CPBR). Kew has worked with New York Botanical Garden (NYBG) and Missouri Botanical Garden (MBG) to accelerate collaborative checklist building and ways to provide working lists for families where no checklists exist, by combining data held at Kew with other sources (e.g. MBG's Tropicos system).

apps.kew.org/wcsp/



Kew is involved as a partner in several checklist projects coordinated by others globally. Kew also contributes to many national and regional initiatives. These include *Flora of Tropical East Africa*, *Flora Zambesiaca*, *Flora of China*, *Flora Malesiana*, *Tree Flora of Sabah and Sarawak*, *Flora Neotropica* and *Flora of the Guianas*, and several inventory projects facilitating conservation on UK Overseas Territories, Cameroon, Guinea, Brazil and South East Asia.



Programmes to digitise herbarium collections, particularly type collections (the reference specimen for a particular plant name), are important in facilitating inventory work.

Kew is a founding partner of the Andrew W. Mellon funded African Plants Initiative (API), an international partnership working to produce an online database of information about African plants. The project includes over 50 botanical institutions representing 26 countries in Africa, Europe and the US. The database comprises mainly label data and high resolution images of African type specimens deposited in participating herbaria. Kew has contributed over 70,000 putative type specimen records. This project (launched in 2007), will support checklist preparation by making relevant materials available to researchers. For example, the Aloes of the World is in preparation and is based on API material. Work has begun on the Latin American Plant Initiative (LAPI) – to date 40 partners from 18 countries are involved. Kew will contribute c.100,000 type records.

Digitized specimen: *Oncidium ampliatum*



The 'Electronic Cataloguing and Imaging of Monocot Type Specimens' project, partly funded by GBIF, has databased and imaged well over half of the c.55,000 monocot type specimens held in Kew's Herbarium. All type specimens from SE Asia and Africa (in collaboration with API) have been digitised. The current focus is on specimens from South America (in collaboration with LAPI) and type specimens from Kew's actively researched monocot families, especially Arecaceae, Araceae, Cyperaceae, Orchidaceae and Poaceae.

apps.kew.org/herbcat/



Target 2: A preliminary assessment of the conservation status of all known plant species at national, regional and international levels

Kew collaborated with IUCN in the stakeholder consultation on Target 2 and pioneered ways to accelerate progress towards a preliminary conservation assessment for all known plant species. Kew monographs, Floras, journals (Kew Bulletin) and other scientific publications describing species now routinely include conservation assessments.

Kew staff are active members of IUCN specialist groups and evaluators of assessments produced by others. Nearly 5000 preliminary conservation assessments were disseminated by Kew staff over the last three years. Many full assessments have also been produced through on-going inventory work, resulting in Red Listing of many species.

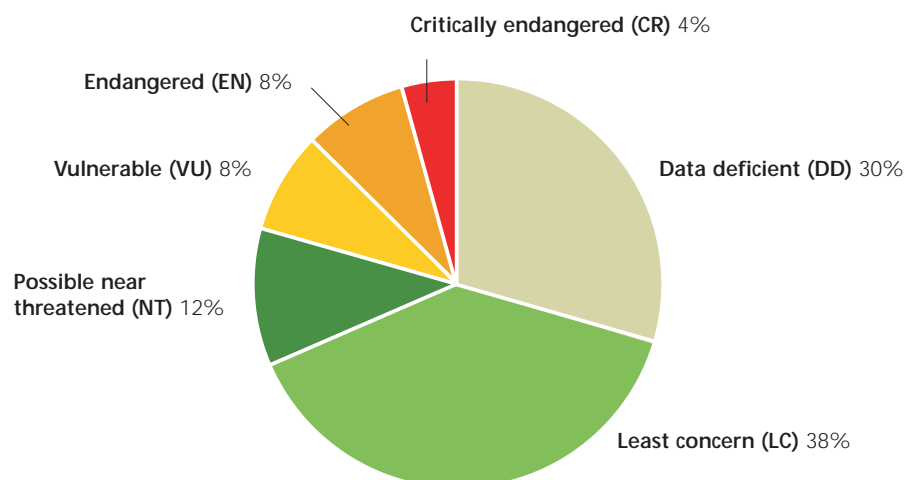
Kew has developed GIS-based systems to facilitate rapid production of specimen-based preliminary conservation assessments. Large scale digitization projects currently underway will help facilitate the generation of such assessments. These tools are now freely available to download from the Kew GIS Unit website.

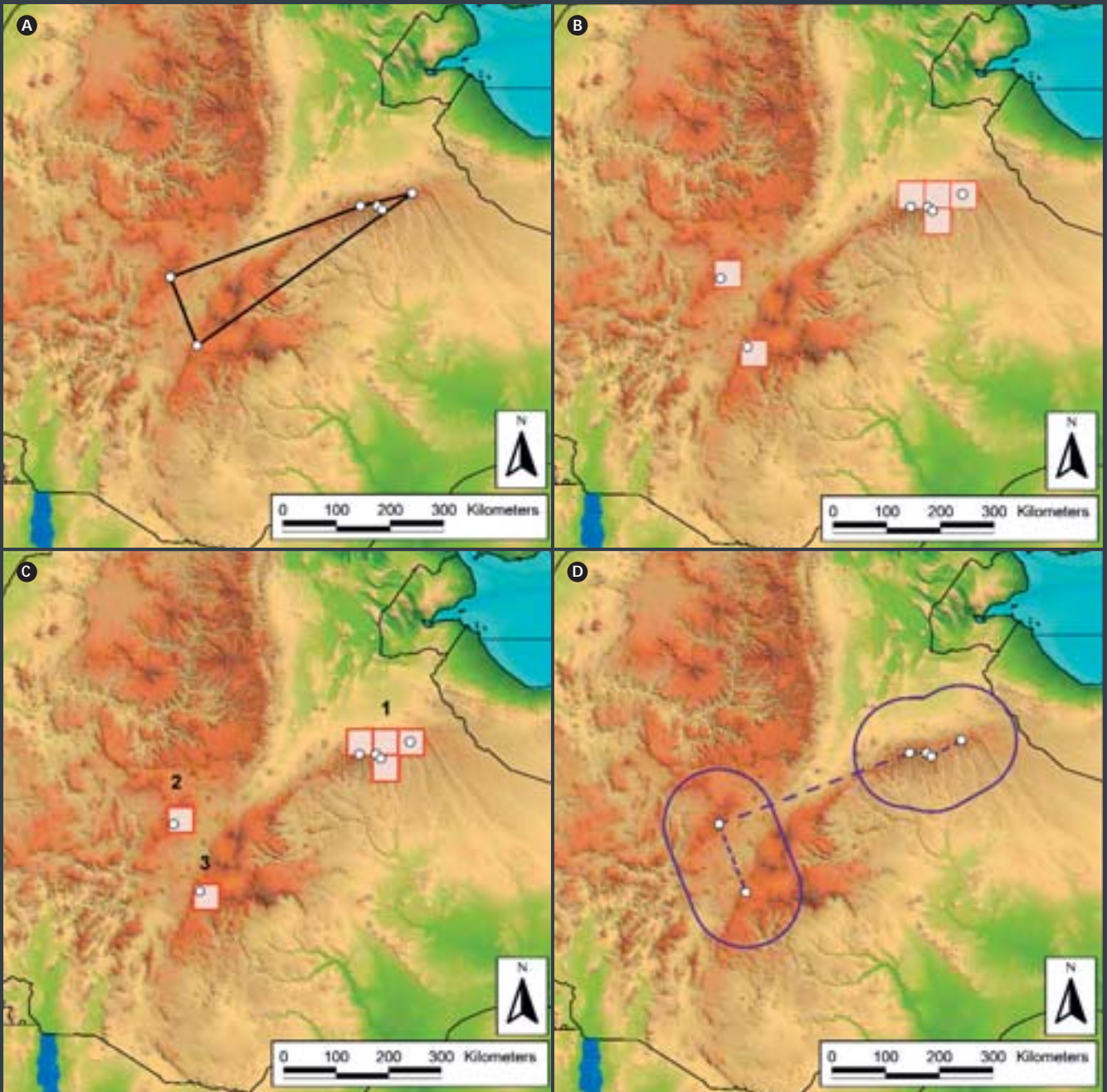
Kew coordinates the plant component of the IUCN Sampled Red List Index (SRLI). This project involves preliminary GIS-based conservation assessments for 1,500 randomly-selected species each of bryophytes, ferns, monocots and dicots, plus assessments of all gymnosperm species, a total of c.7,000 species. Full IUCN conservation assessments are carried out for those species identified as Threatened. The aim of this project is to produce a representative assessment of the global status of plant diversity; it will highlight areas and taxa of particular conservation concern and will be used to identify trends in conservation status in different parts of the world for setting conservation priorities. The SRLI has been adopted by the CBD to measure its target of "achieving a significant reduction in the current rate of loss of biodiversity" by 2010. Having completed these initial assessments by 2010, monitoring will continue beyond this to re-assess each species every 5 years and so track future trends in the status of plant diversity.

Preliminary assessment tools developed by Kew automatically calculate Extent of Occurrence (EOO), Area of Occupancy (AOO) and number of subpopulations following IUCN Categories and Criteria



Monocot threat status – results for preliminary assessments of almost 600 species





Automated preliminary GIS analysis of *Aloe pubescens* Reynolds from the highlands of Ethiopia. a) Geo-referenced specimens from the herbarium at Kew, showing the Extent of Occurrence (EOO) measured as a convex hull, b) Area of Occupancy (AOO), measured with a cell width of 48 km, c) number of subpopulations using the cell-adjacency method, d) number of subpopulations using Rapoport's Principle of Mean Proximity; see also Willis *et al.* 2003

The Millennium Seed Bank Project (MSBP) is a worldwide network for the conservation of seed from wild plant species. In 2004, Kew secured further funding from the UK Millennium Commission to capture and synthesize data from the Kew Herbarium and Library and the Herbarium at the Muséum National d'Histoire Naturelle for species which are of conservation priority for MSBP partner organizations. The compiled data, taken from herbarium specimens and available literature, are combined to provide seed collecting guides for partner organizations, increasing the efficiency and effectiveness of targeted seed collecting work. As well as information on the description, distribution and phenology of species, the guides include preliminary conservation assessments for all 6000 species treated.

www.kew.org/msbp



Target 3: Development of models with protocols for plant conservation and sustainable use, based on research and practical experience

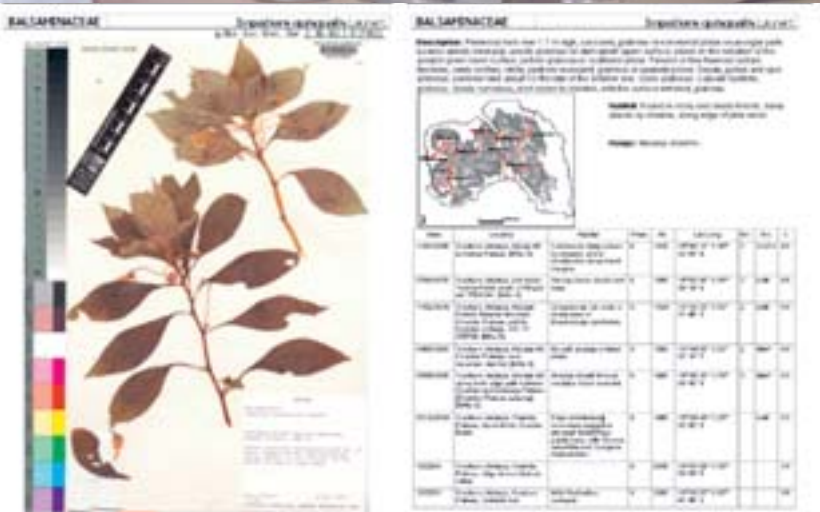
The Millennium Seed Bank Project (MSBP) has developed and disseminated protocols for all aspects of seed science and conservation from collecting in the field through to seed storage and germination of collections. For example, methods have been developed for seed drying to meet the needs of smaller seed banks that cannot afford and do not need large scale drying rooms. Another protocol provides guidance on the rapid, non-destructive measurement of seed moisture status, greatly assisting post-harvest handling both in the field and in the seed bank. Seed collecting guides developed by the MSB Enhancement Project incorporate information on the necessary conservation and restoration actions needed in the field for each threatened species.

Kew is coordinating partner in the European Native Seed Conservation Network (ENSCONET) which develops high standard protocols for Seed Collecting and Curation for native plant species in Europe.

Kew's Micropropagation Unit produce protocols for *in vitro* propagation and cryostorage. Over 3000 taxa have been studied. For example, *Cypripedium calceolus* is rare, threatened, or extinct throughout Europe and has a Council of Europe Conservation Action Plan. The Micropropagation Unit have developed *ex situ* propagation methods for this species and reintroduced plants around 20 sites in England. This successful project has shown the potential for reintroduction and reinforcement of orchid populations in other sites in Europe.

Seeds of endemic plant species from the UK Overseas Territories (UKOTs) are sent to Kew for germination and development of full horticulture protocols by highly skilled horticultural staff. The resulting protocols are disseminated to biodiversity authorities in-Territories. Protocols have been developed for *Acacia anegadensis* from the British Virgin Islands and *Rondeletia buxifolia* from Montserrat.

Clockwise from top left: MSB, developing protocols; developing the *Rondeletia buxifolia* protocol; collecting guide



Conserving plant diversity

Target 4: At least 10 per cent of each of the world's ecological regions effectively conserved

Much of Kew's Baseline Plant Diversity work (contributions towards Targets 1 and 2) provides the necessary information to identify and monitor work towards Target 4.

Kew's Millennium Seed Bank Project (MSBP) has focussed collecting priorities for *ex situ* conservation of plants, on the arid and semi-arid regions of the world. Nearly a fifth of the world's human population live in drylands and is directly dependent upon the plants that grow there. Dryland vegetation is threatened by human pressures exacerbated by drought. In the long term, climate change may increase the impact of droughts on the natural and human populations. Numerous dryland plant populations may only be saved by *ex situ* conservation (e.g. seed banking). Many dryland species produce desiccation-tolerant seed that can be stored for long periods in dry, cold conditions.

The Survey of Economic Plants for Arid and Semi-Arid Lands (SEPASAL) is a unique database, developed and maintained at Kew, which documents and disseminates published scientific information on the uses and related properties of wild and semi-domesticated tropical dryland plants, with a particular focus on Africa. Currently the database has extensive, referenced information on more than 6,800 dryland species which is freely available online, to assist those engaged in conservation and sustainable use programmes in tropical drylands.

In the Central Andean Valleys of Bolivia, Kew is involved in conservation of the drylands, promoting long-term conservation in 4 key areas with high tourist potential. The project (a follow up of the findings of a Darwin-Initiative project) includes field collecting, botanical inventories, production of information leaflets, raising community awareness of plant conservation and improving taxonomic knowledge in Bolivian botanists.

www.kew.org/scihort/tropamerica

www.kew.org/ceb/sepasal





Target 5: Protection of 50 per cent of the most important areas for plant diversity assured

Much of Kew's Baseline Plant Diversity work provides the necessary information to identify and monitor Target 5.

Projects in Madagascar and Cameroon have helped identify important plant areas in these countries. These countries are among those identified for IUCN/Botanic Gardens Conservation International (BGCI) projects to improve the conservation of native flora through protection of important areas for plant diversity while delivering poverty alleviation benefits.

In Cameroon, Kew's collaborative work with the National Herbarium has led to the creation of a new National park: Kupe-Muanenguba. Botanical inventory work in 1995 (supported by EarthWatch and the Darwin Initiative), led to a concise Flora documenting over 2400 species, and assessment their Red Data status (232 listed). "The Plants of Kupe, Muanenguba and Bakossi, A Conservation Checklist" was published in 2004. Surveys have continued to include c.2500 species. *Davis et al.* (1994) Centres of Plant Diversity series, shows that this is now the top documented centre of plant diversity in tropical Africa, all the more remarkable because it had never been suggested as being of continental importance before for plants.

The Francis Rose Reserve at Wakehurst Place is probably the first nature reserve dedicated to cryptogams in Europe. Within the 25 hectare reserve lie some of the UK's best sandstone rock habitats, already designated a Site of Special Scientific Interest for their bryophyte assemblages.

The publication of the first ever "Atlas of the Vegetation of Madagascar" has contributed significantly to *in situ* conservation decision-making and activities in Madagascar. This comprehensive atlas is the culmination of over 20 years of conservation work led by Kew, with the help of botanical and conservation institutions in Madagascar and abroad. Using innovative techniques and extensive fieldwork, the Atlas maps the existing protected area network and highlights areas and habitats that are lacking adequate protection. The Atlas feeds directly into the Madagascar Government's 'Durban Vision' of tripling the size of its protected area network. With a large proportion of plant species being endemic to the island (up to 90%) and already threatened, the new parks contribute substantially to Target 7.

www.vegmad.org



Target 6: At least 30 per cent of production lands managed consistent with the conservation of plant diversity.

In Peru, through its *Habitat Restoration and Sustainable Use of Southern Peruvian Dry Forest* project (supported by the UK Darwin Initiative), Kew is working in collaboration with 3 agro-industrial operations involving the production of asparagus, table grapes and avocado. These experimental initiatives include:

- **establishment of a small trial biodiversity/demonstration area on the edge of a large industrial asparagus farm, re-establishing native forest.**
- **re-establishment of native vegetation alongside dry stream beds through farmland**
- **experimental irrigation with farm wastewater/sewage as a means of restoring forest on waste ground.**

In all cases, facilitating integration of biodiversity within production lands is the rationale for engagement. The agro-industrial companies involved supply UK supermarkets, where emerging instruments such as the Tesco Nature's Choice 'Gold Standard' and EUREPGAP Protocols are placing increased pressure on suppliers to 'mainstream' biodiversity on their sites, as well as in the surrounding communities.

www.kew.org/scihort/tropamerica/

Target 7: 60% of the world's threatened species conserved *in situ*

Kew's work towards Target 7 includes advice on site management, propagation and supply of material for reintroduction and genetic studies to guide management.

Conservation and sustainable use of Tropical American flora is promoted through technical support for *in situ* conservation projects in Brazil, Bolivia and Peru, species evaluations/recommendations for priority taxonomic groups, local language publications on sustainable use, and applied research into sustainable fuel wood management in Northeast Brazil.

For example, in the Mato Grosso do Sul state of Brazil, Kew has been working with the extractive industry in vegetation surveying and providing baseline information (including data on rare species and sensitive habitats) with the use of remote sensing (satellite imagery), ground-truthing and quantitative surveying techniques. Results are being used to develop a biodiversity action plan for conservation on site, to improve habitat restoration and to aid selection of biodiversity offsets for future mine expansion, as required by Brazilian Law.

In the UK and elsewhere, Kew's genetic studies provide information to conservation management of populations of rare species. This involves working with Natural England, the Countryside Council for Wales and other agencies.

In the UK Overseas Territories, Kew is working with in-Territory partners in providing management plans for *in situ* conservation. For example British Virgin Islands and Montserrat plant data have been incorporated into management plans with the aim of conserving threatened plant species *in situ*. It is hoped in these Darwin Initiative funded projects that new protected areas will be established to conserve threatened species and habitats as a result of better knowledge and understanding of the distribution and status of these species and habitats.

Large- and small-scale propagation in Peru



Vegetation map of Montserrat





Target 8: 60% of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10% of them included in recovery and restoration programmes

Kew provides a significant input into global efforts for the *ex situ* conservation of threatened species and their recovery and reintroduction (Target 8). This target provides a major focus for the Millennium Seed Bank Project (MSBP) which has the aim of banking 10% of the World's flora by 2010. A further contribution comes from the provision of scientific and horticultural expertise which facilitates *ex situ* conservation of vascular plants and reintroductions. Studies of population genetics provide guidance on which populations and individuals should be held in *ex situ* collections.

The MSBP is Kew's largest capacity building project. It has developed long-term partnerships, based on Access and Benefit Sharing Agreements, to build capacity for *ex situ* conservation. The MSBP has seed conservation activities in 123 partner institutions in 54 countries.

Through the MSBP, seeds, herbarium vouchers and associated data are held in accessible collections in the country of origin, with duplicate collections held at the MSB in the UK. The MSBP has collected and conserved seeds from almost the entire UK native flora (96%). Since the International Programme started in 2001, over 18,000 species have been collected and conserved.

Around 200 MSBP seed collections have been used in recovery and restoration efforts to date.

Several of the MSBP international partners have chosen to focus their efforts on collecting species which are threatened in their country. In these countries, the MSBP is making a significant contribution to the attainment of Target 8.

In Burkina Faso, there is no formal list of threatened species. The MSBP has drawn up a list of 37 threatened species, thus contributing to Target 2. Seventeen MSB collections come from this list. The seed has been collected and conserved within Burkina Faso and in the MSB in the UK. Plants of 20 rare and important species have been grown from seed in order to enrich the flora of the urban Bangré Wéogo park of Ouagadougou. Some specimens of each species are also kept as living collections for demonstrations and education.

In Botswana and Namibia, MSBP partners aim to collect 100% of their Red List species by 2010. To date 36% have been collected and conserved in Botswana and 42% in Namibia.

In Georgia, the MSBP has been supporting seed collecting since 2005. MSBP collaborators at the Institute of Botany have collected and conserved one third of the 156 species on their national Red List.

www.kew.org/msbp

Threatened plant propagation in the UKOTs



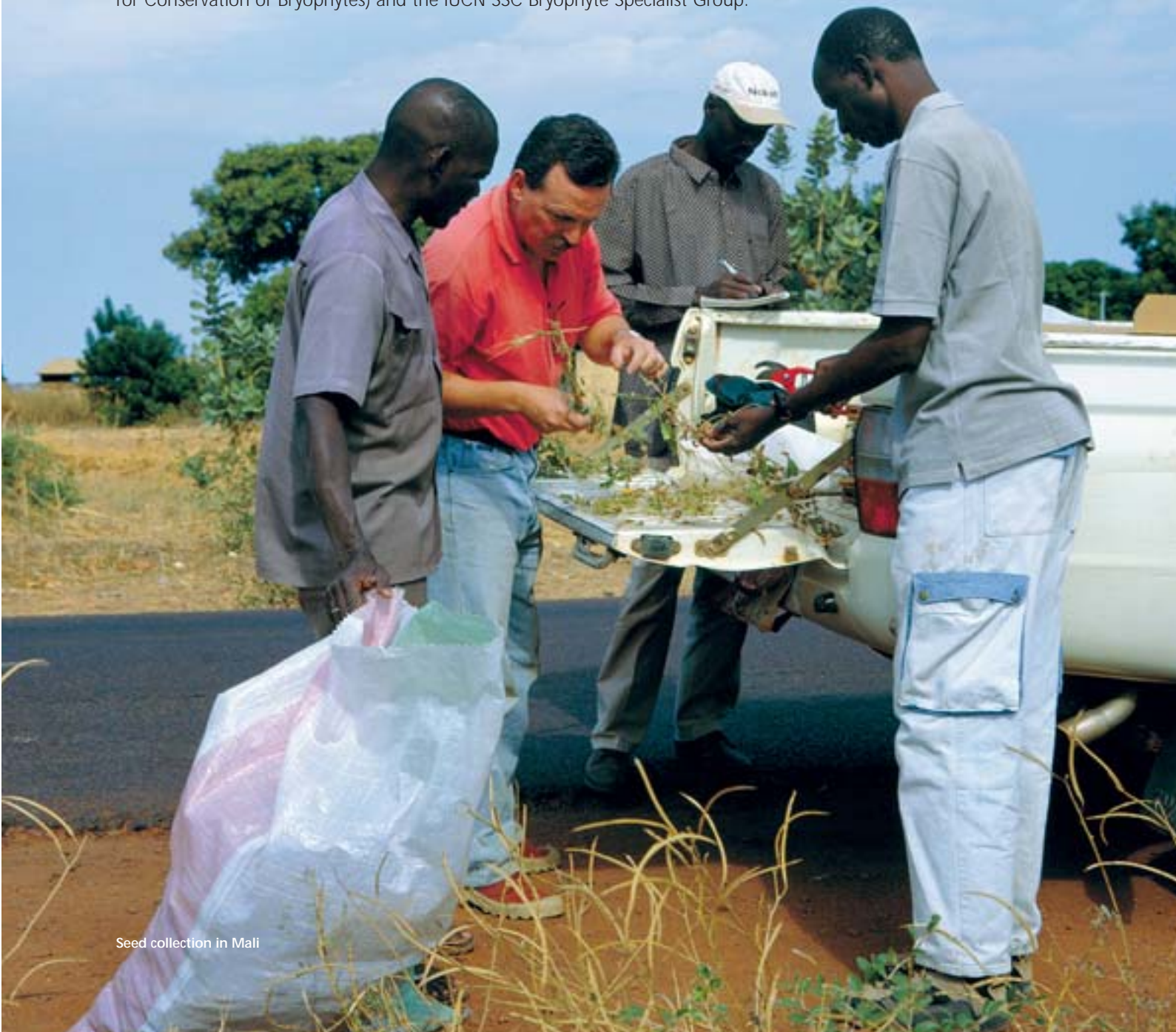
Inside the Millennium Seed Bank



Many critically endangered species present challenges for *ex situ* conservation because populations may be reduced in vigour with poor seed set. Kew's Micropropagation Unit develops and applies conservation biotechnology methods for *in vitro* culture and cryostorage of these taxa. Endemic species from island biodiversity hotspots such as St Helena, Seychelles and Mauritius have been propagated and repatriated. For example, *Cylindrocline lorencei* (extinct in the wild) has been propagated from vegetative cuttings in the laboratory. Seed set has been induced in the Café Marron, *Ramosmania rodriguesii* (only one plant left in the wild). Specialist techniques developed for the bottle palm *Hyophorbe lagenicaulis* (Critically Endangered) have been used for related species *H. amaricaulis* of which only one plant remains.

Within the UK Overseas Territories programme, Kew is helping establish new botanic gardens and/or helping re-develop existing ones with a focus on conservation of native floras e.g., in British Virgin Islands, Montserrat and Cayman Island native species nurseries have been set up within the botanic gardens where endemic and threatened species are in cultivation.

Kew's Micropropagation Unit has pioneered *ex situ* conservation techniques for UK Bryophytes. Novel methods for initiation and growth in aseptic cultures and cryopreservation have been developed. 22 species of high conservation concern are now in cryostorage with trials to reintroduce cryo-preserved material to natural sites. DNA from all cultures has been extracted and banked. No other country is developing a similar programme to conserve its bryophyte flora. There are ample opportunities to apply the protocols developed to bryophytes from countries outside the UK, especially in Europe. This has the support of the ECCB (European Committee for Conservation of Bryophytes) and the IUCN SSC Bryophyte Specialist Group.



Seed collection in Mali

Target 9: 70% of the genetic diversity of crops and other major socio-economically valuable plant species conserved, and associated local and indigenous knowledge maintained

Crops and their wild relatives may comprise a high percentage of regional floras. For instance, Kell *et al.*, 2008 indicate that this is as much as 83% of the Euro-Mediterranean flora. Consequently, the Millennium Seed Bank Project makes a significant contribution to Target 9 at the international level and, through its co-ordination of the European Native Seed Conservation Network, makes a specific contribution at the European level.

In collaboration with colleagues from Ethiopia, Mauritius, Spain, Tanzania and other countries, Kew has studied the genetics of a range of minor crops and their relatives, including capers, coffee, olives and yams.

Target 10: Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems

In 2001, Kew and Missouri Botanic Gardens agreed on a set of principles about the prevention and control of invasive plant species. These codes recognize the fundamental importance of education in controlling invasive plant species and seek to use self-governance and self-regulation, whilst acknowledging that legislation may also have a role to play.

Kew contributes to the working groups of the UK Government (Defra)-led review of non-native invasive species. Through this process Kew introduced the concept of a stakeholder-led approach to the development of the Horticultural Code of Practice *Helping to Prevent the Spread of Invasive Non-Native Species* (2005). Kew has been consulted on proposed changes to the Countryside and Wildlife Act and during recent investigations by parliament into the impact of invasive species in the UK.

Kew worked with the Joint Nature Conservation Committee (JNCC) to extend the principles of this review to UK Overseas Territories (UKOTs) which were excluded from the original Defra review. Kew is collaborating in several projects identifying and quantifying the invasive species threats in the UK Overseas Territories.

Kew has also incorporated advice to warn of potential risk of non-native species into a standard material supply agreements, which users of Kew plant material are asked to read and sign when receiving plant material.

Within the gardens, posters have been produced to warn staff of legal responsibilities when dealing with invasive weeds. Programmes to eradicate or control invasive weeds such as *Rhododendron ponticum* and *Smyrniun perfoliatum* on important natural/semi-natural areas of the estates at Kew and Wakehurst have received much enthusiastic input from staff and volunteers.

Olea europaea



Bashing *Smyrniun perfoliatum*



Using plant diversity sustainably



Target 11: No species of wild flora endangered by international trade

Kew provides scientific support and advice to the UK Government to allow it to fulfil commitments under the Convention on International Trade in Endangered Species (CITES) and the European Union Wildlife Trade Regulations. As the UK's CITES Scientific Authority for plants, Kew's main tasks are:

- to provide independent scientific advice (including a non-detriment finding) to the UK CITES Management Authority (Defra) and licensing agency (Animal Health) on applications for CITES permits and on the implementation and application of CITES and the European Union Regulations implementing CITES within the 27 member States;
- to undertake research into key plant groups affected, or that may become affected, by trade and CITES legislation;
- to work with and train enforcement officials on the inspection, holding and disposal of detained or seized CITES material; and
- to represent the Scientific Authority at technical meetings including the CITES Plants Committee, Conference of the Parties and the Scientific Review Group of the European Union.

Kew has advised the UK Government on over 28,000 CITES licence applications in the last five years and supported inspections of 50,000 plants and over 65 tonnes of timber for HM Revenue and Customs and Police.

In addition to publishing four CITES Checklists covering the accepted names for CITES-listed plant groups in trade, Kew has produced and published three CITES User's Guides. These publications cover key CITES plant issues, such as 'CITES and Plants' and 'CITES & Slipper Orchids'. All are published in the three working languages of CITES – English, French and Spanish. Kew has also freely distributed over 6,000 copies (hard copy and CD-ROM) of these CITES Checklists, CITES User's Guides and The CBD for Botanists to over 160 countries.

www.kew.org/conservation/cites-ind.html

Training wildlife inspectors at Kew



Target 12: 30% of plant-based products derived from sources that are sustainably managed

There is a need to develop sustainable harvesting practices to prevent adulterants or poor quality material entering trade. Kew's Chinese Medicinal Plants Authentication Centre and other projects dealing with authentication and chemical fingerprinting of economically important species relate to the over-exploitation of some species, especially those that are wild harvested.

Target 13: The decline of plant resources, and associated local and indigenous knowledge innovations and practices that support sustainable livelihoods, local food security and health care, halted

The Survey of Economic Plants for Arid and Semi-Arid Lands (SEPASAL) is a unique online database, developed and maintained at Kew, which documents and disseminates published scientific information on the uses and related properties of wild and semi-domesticated tropical dryland plants. It brings together information which is scattered in the literature, making it available to scientists, aid and development agencies, and extensionists working to improve livelihoods in dryland countries which would otherwise not have ready access to such information. Currently the database has extensive, referenced information on more than 6,800 dryland species, of which over 3,000 occur in Africa. Regional nodes have been established at the National Museums of Kenya (2002) and the National Botanical Research Institute of Namibia (2004), where local teams of ethnobotanists have been trained in using SEPASAL for recording and updating information on the useful plants of those regions.

Kew has also been working with the National Museums of Kenya in the African Wild Harvest project to assist collaborating communities in western Kenya to conserve their traditional knowledge relating to food plants.


Study of compounds with potent antioxidant activity isolated from the waste product of olives in Tunisia is part of Kew's research into the sustainable use of plant-derived products.

Fuel wood caters for 70% of domestic energy in Brazil. It represents a major cash crop with significant demand from the industrial sector. Overexploitation of *Caesalpinia pyramidalis* (catingueira), *Mimosa ophthalmocentra*, *M. tenuiflora* and *Croton sonderianus* has led to a degradation of caatinga vegetation, loss of biodiversity and overall ecosystem degradation. The Sustainable Management of the Caatinga Vegetation for Firewood Production Project (2001) is running an experimental programme to determine the most suitable harvesting technique for priority species, working in collaboration with local communities and school children.

Working with local communities in Caatinga Vegetation, Brazil



Promoting Education and Awareness

 **Target 14:** The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes

Kew's education programmes are underpinned by Target 14, the CBD, the relevant Millennium Development Goals and the UK Biodiversity strategy. This is both explicit and implicit in Kew's Education Policy and Strategy. All formal and many informal education activities have elements explaining the vital importance of biodiversity. Kew receives more than 1 million visits by the general public very year. Through interpretation in the gardens (exhibitions, guided tours, panels, information sheets), this theme is developed further.

Kew's school education programme reached over 100,000 schoolchildren across its two sites, and trained over 300 UK based teachers and student teachers in 2006.

Kew's Plant Cultures website was launched in 2005, to convey the richness and complexity of links between Britain and South Asia, through the story of plants and people. It is aimed at anyone interested in understanding the world around them.

www.plantcultures.org

At Kew Gardens, 'Climbers and Creepers' provides a unique interactive learning area where children have fun while learning about the interaction between plants and animals.

Kew supports an outreach community education programme in Argentina, focussing on the environment, biodiversity and the need for conservation. To date over 20,000 primary school teachers from rural areas have been trained. This programme is expanding to include a new module on 'biodiversity and climate change'. The outreach programme works through local community engagement, the development of an interpretation centre on natural resources for rural zones and capacity building courses on biodiversity and sustainable economies for key rural stakeholders in government and local business.

Kew staff attend the UK government (Defra) Education and Public Understanding meetings, working alongside other key biodiversity organisations. This group develops and oversees the implementation of education and communication aspects of England's overall strategy for biodiversity management 'Working with the grain of nature'. A new communication strategy was developed in 2008.

Kew is a partner organisation for 'Breathing Places', a BBC led 3 year initiative to raise awareness of the importance of local natural biodiversity and to encourage actions within communities and schools to sustain this.

Kew recently completed a two year EU project, working with 3 partner botanic gardens in Austria, Italy and Bulgaria (including the Institute of Education) to produce a new web and printed teaching resource in 4 languages, focussing on plant science and the development of critical thinking skills.

www.kew.org/education

www.plantsafe.net



The Princess of Wales Conservatory, Kew; Promoting awareness on-site, Climbers and Creepers



Building capacity



Target 15: The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of the strategy

Capacity building is the cornerstone of Kew's activities. Kew promotes a wide range of opportunities for collaborators to gain the skills required to implement the GSPC. These range from informal placements, internships, fellowships working with specific individuals and a range of formal courses including:

- **Kew Diploma in Horticulture**
- **International Diplomas in Herbarium Techniques, Botanic Garden Management, Plant Conservation Strategies and Botanic Garden Education**
- **Genetics and phylogenetics**
- **Plant propagation**
- **Seed Conservation Techniques,**
- **Courses in MSc programmes**
- **PhDs**

Kew's International Diploma programme has trained 377 participants from 103 countries since its inception in 1987. The GSPC forms a significant part of these courses.

The Millennium Seed Bank Project (MSBP) is Kew's largest capacity building project. The MSBP builds capacity for seed conservation through training, infrastructure improvements, collaborative research and information sharing. To date, The MSBP has provided training to ~ 1400 people from more than 50 countries. This includes 34 PhD students, 36 people trained during a 3 week Seed Conservation Techniques training course held in the UK, and more than 700 people trained in seed conservation techniques in-country.

The MSBP ensures all partner institutes work with appropriate facilities and equipment. Advice on seed bank facilities has been provided to 19 institutes across 10 countries.

The MSB "Difficult" seeds project (Defra-funded) improves the handling and storage of seed of 200 species important to rural livelihoods and has trained 60 gene bank staff from 38 African countries.

The DIRECTS project (a Darwin Initiative project) focuses on African community tree seeds. 49 people have been trained in tree seed storage and viability testing techniques,

The Kew Latin American Research Fellowships Programme offers support for visiting scientists from Latin America (including the West Indies and the Guianas) wishing to consult collections or conduct botanical research at Kew or the Natural History Museum. Fellowships often include visits to other European research institutes. This programme serves as an important mechanism for promoting active collaboration between UK and Latin American scientists whilst providing important technical training and capacity building for young botanists.

An African regional GSPC workshop was held in Uganda, run jointly by Kew, Botanic Gardens Conservation International (BGCI), CBD Secretariat and Makerere University. The aim was to raise awareness of the GSPC and to facilitate national and regional level implementation. 18 participants from 16 countries attended.

In 2006, Kew, BGCI, CBD Secretariat and the Joint Nature Conservation Committee organized a Caribbean GSPC regional workshop (Defra-funded), hosted by Kew's Darwin project partners on Montserrat. 16 delegates from 11 Caribbean countries and UKOTs attended.

Since 2001, Kew has trained over 450 CITES enforcement officers from the UK and abroad, 372 Kew staff on GSPC, CBD, CITES and Plant Health procedures, and 487 higher education students.



Target 16: Networks for plant conservation activities established or strengthened at national, regional and international levels

A Global Partnership for Plant Conservation (GPPC) has been established to support the world-wide implementation of the GSPC. Kew is a founding member of the GPPC, which is an initiative supported by a wide range of international and national organisations active in plant conservation. At the first GPPC conference in Dublin, October 2005, Kew facilitated workshops on Targets 1 and 2.

The *On Course* newsletter produced by Kew and sent to alumni from Kew's international training programmes facilitates networking for effective implementation of the GSPC.

The African Plant Initiative of which Kew is a founding member, comprises over 50 institutions with collections relevant to the study of African plants, and seeks to mobilise key data which will facilitate conservation planning.

Kew has co-ordinated a network of 12 institutions in Africa, Europe and in North and South America to accelerate efforts to find an appropriate DNA barcode for plants. The availability of such a barcode protocol and the reference database to support it, will enable rapid identification of plant material, including sterile and fragmentary samples, thus facilitating a range of conservation applications including identification of cryptic species and implementation of CITES by customs officials.

Kew is the lead partner of ENSCONET (the European Native Seed Conservation Network), which coordinates seed conservation of native plants within Europe. This network involves 24 partner institutions from 17 European countries, working together to exchange information on their experiences, protocols and facilities, and to develop common standard procedures for seed conservation. All the efforts lead to improved seed conservation practices: collecting, curation, data management and dissemination. This project has received funding from the European Commission's Sixth Framework Programme for Research and Technological Development.

Kew supports the Association pour l'Etude Taxonomique de la Flore d'Afrique Tropicale (AETFAT), a network of researchers and practitioners focused on systematics, conservation and sustainable utilisation of Tropical African plants.

Kew is the host organisation for the Botanic Garden Education Network (BGEN), that enhances good practice in the delivery of biodiversity and conservation education. Kew is a major contributor to, and current chair of, the network supporting both the strategic development and training provision for over 250 environmental educators across the UK and into Europe.

Kew has initiated a program to train staff and partners in species conservation assessments with an emphasis on the IUCN Red List Categories and Criteria. A successful five day training workshop took place at the University of Costa Rica as part of the Darwin Initiative funded project 'Conservation and Monitoring of Meso-American Orchids'. The 12 participants included University of Costa Rica students and staff members from Costa Rican partner institutions.

Training Workshops in Mozambique (2007) and China (2005), DNA barcode



National Focus

In 2003, a conference organized by Kew, Plantlife International and the Joint Nature Conservation Committee (JNCC) was held at Kew, leading to the official UK response to the GSPC, *Plant Diversity Challenge* (PDC), the first such national response. In 2006, a meeting again co-organized by Kew, JNCC and Plantlife International was held at Kew to assess progress against the targets. This resulted in an update to PDC (published in 2007) which identified successes and remaining challenges in reaching the 16 targets, explicitly building a consideration of climate change into the recommendations.

European Focus

The first European Strategy for Plant Conservation (ESPC) was developed by the Planta Europa Network and Council of Europe as a regional component of the GSPC. Kew staff were involved in the formulation of some of the targets and the review of progress. The final review of progress and challenges involved consultation with Kew staff and partners (ENSCONET). A new ESPC was developed (2007), closely modeled on the GSPC with European targets. Building on the first strategy, it also includes emerging issues such as climate change, biofuels and landscape connectivity. The mid-term review is designed to coincide with the end of the GSPC and to take plant conservation activities forward.

Kew is the lead partner of ENSCONET. This network involves 24 partner institutions working together to improve quality, coordination and integration of European seed conservation practice, policy and research for native plant species. In the updated ESPC (2008–2014), ENSCONET contributes as the lead organization of targets 2.1 and 8.1.

International Focus

'Beyond Johannesburg – delivering our international Biodiversity commitments' is the UK government's delivery plan for World Summit on Sustainable Development (WSSD) commitments, addressing the headline target –to achieve a significant reduction in the rate of loss of biodiversity by 2010. The plan focuses on international commitment, including the UK's Overseas Territories (UKOTs) which hold significant components of global diversity.

There are several objectives of this plan with direct relevance to the GSPC. These include:

- **Promoting efforts to complete Target 1 – a working list of known plant species, work which Kew facilitates.**
- **Work via CITES to secure global sustainable trade in threatened species using the Significant Trade process (where scientific monitoring ensures that trade does not significantly threaten species survival).**
- **In partnership with the JNCC, developing, collating and promoting UK experience in GSPC implementation through UK's CBD clearing house and through up to 10 regionally – based workshops/seminars in developing countries by the end of 2008**

The UK Overseas Territories (UKOTs) were specifically excluded from the UK's response to the Strategy and the publication of *Plant Diversity Challenge* in 2004. Kew is working with others to raise awareness of the GSPC within the Territories and help develop an implementation strategy. Some UKOTs are involved in a network to review the status of the GSPC in each UKOT. Funding from the UK government (Defra, International Sustainable Development Fund) has enabled this network to be extended to the South Atlantic UKOTs.

A large, gnarled tree with a thick trunk and a wide, spreading canopy of green leaves stands in the foreground. The background is a dense forest of similar trees, shrouded in a thick, white mist or fog. The overall atmosphere is serene and somewhat somber due to the muted colors and the presence of the mist. The lighting is soft and diffused, typical of an overcast day in a forest.

Beyond 2010?

The Global Strategy has been a useful tool to focus Kew's conservation efforts towards 2010 through partnership, research, capacity building and raising awareness. However, there is a need to consider how to plan beyond the current Strategy and how progress will be assessed towards the present targets post 2010. The existing targets are strongly related and heavily rely on progress towards Target 1. Although global progress towards Target 1 has been good, barriers to taxonomy at the national level remain an issue. Similarly, progress towards Target 2 affects implementation of work towards Targets 4, 5, 7 and 8. In the review of the current targets, it will be particularly important to consider broader impacts such as climate change, land degradation through desertification, habitat loss and mainstreaming into political agendas.

Kew

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