A CBD manual for botanic gardens

BGCI

Plants for the Planet

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Preface

The Convention on Biological Diversity (CBD) came into force on 29 December 1993 and has now been ratified by over 190 countries. The CBD aims to conserve biodiversity and ensure its sustainable use, as well as promoting the fair and equitable sharing of the benefits arising from the use of genetic resources. The CBD's scope covers all levels of biodiversity and its work is divided into a number of thematic areas and cross-cutting issues, one of which, the Global Strategy for Plant Conservation (GSPC), is of particular relevance to botanic gardens. Indeed it was the botanical community, led by a number of leading botanic garden scientists, that spearheaded the development of the GSPC and ensured its adoption by the CBD in 2002.

The inclusion of the GSPC within the CBD marked a turning point for biodiversity conservation, as this was the first time that specific time-bound targets for conservation had been agreed at the international level. Two years after the adoption of the GSPC, CBD member states agreed that measurable targets and specific goals were essential to monitor progress in saving the world's biodiversity. As a result, the targets of the GSPC were incorporated into the CBD's programmes of work as a series of sub-targets, which, together with other newly-developed targets, contribute to the CBD's overall goal of significantly reducing the rate of biodiversity loss by 2010.

The experience of the GSPC has shown how a small group of committed individuals can have an impact at the global level. It has also shown that, through working together, the botanical community can influence decision making at the highest levels. In light of global climate change we must continue, and indeed strengthen our efforts to ensure the conservation of the world's biodiversity. With the 2010 deadline rapidly approaching, we encourage the world's botanic gardens, whatever their size or geographical location, to take action now. The CBD provides the framework within which conservation actions, however small and localised, can be brought together to make a real difference globally.

With its huge scope and the complicated language associated with its status as an international legal agreement, the CBD may seem remote and irrelevant to many small botanic gardens. However many aspects of the Convention, and not only the GSPC, are relevant to the work of botanic gardens. We hope with this manual to 'de-mystify' the CBD and explain its importance to all organisations that are concerned with the conservation and use of natural resources.

This manual is the second in a series of botanic garden guides produced by BGCI, aimed at stimulating plant conservation action by explaining the international context for such work. The first, *A CITES manual for botanic gardens*, published in 2007, urges botanic gardens to ensure that CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora) is fully effective for plants, and thus no plant species become endangered by international trade. Although this second manual has a much broader scope, its aim is the same – to ensure that botanic gardens play their part in the implementation of an international biodiversity treaty. The manual provides suggestions as to how botanic gardens can better focus their work in the framework of the CBD and how they can ensure that their valuable work is recognised as contributing to the overall aim of the CBD to reduce the rate of biodiversity loss by 2010.

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1. Introduction

Botanic gardens have developed and flourished through a long tradition of exchanging, studying, displaying and conserving plants from around the world. They have served as places of serenity and wonder and centres for medical and taxonomic research, but have also played a central role in the historical distribution of useful plants worldwide and the development of national economies. Now, as plant species worldwide are declining due to a potent mixture of threats – habitat degradation and loss, invasive alien species, overexploitation, pollution and climate change – conservation is becoming a vital rationale for existing botanic gardens and the development of new ones.

Today, individual botanic gardens place varying emphases on local or global plant diversity, public education and outreach, research in botany, ecology and horticulture, *in situ* conservation initiatives, *ex situ* conservation techniques and the investigation of new environmentally sustainable uses of plants. All of these activities fall within the scope of the United Nations Convention on Biological Diversity (CBD), an international framework convention that has led to the development of many new national laws, policies and initiatives around the world. Botanic gardens provide important bridges between the research and conservation communities, government authorities, local communities and commercial sectors such as the horticultural and pharmaceutical industries. These links, so valuable to society, need to be recognised and considered in the context of the CBD.

Gardens exchanging plant material in this new environment require a good understanding of the many, sometimes contentious issues that surround access to genetic resources and the sharing of benefits derived from their use, including the concepts of prior informed consent and fair and equitable benefit-sharing, even though in many cases countries themselves have not yet decided how to put such concepts into practice. The CBD approach – stressing benefit-sharing, scientific and technical cooperation and technology transfer – relies on partnership and communication between providers and users of biodiversity; gardens can provide many inspiring examples of successful partnerships, and should continue to create more. Gardens also need to demonstrate to governments how vital their contributions are towards implementation of all the CBD's objectives. It is crucial that botanic gardens

understand the legal, social and ethical implications of this global treaty to continue their work constructively and reputably.

This booklet summarises the principles and practices of the CBD as a reference for botanic gardens. It explains why the CBD was developed, how it works and how it differs from other conservation-related conventions, such as CITES. It highlights some of the issues and initiatives most relevant to botanic gardens. It also suggests positive measures that botanic gardens can take to ensure that their work is compliant with developing laws and ideas of best practice in some of the more convoluted areas of the CBD, and ways that botanic gardens can provide input to the CBD work programmes.

The International Agenda for Botanic Gardens in Conservation (Wyse Jackson & Sutherland 2000) provides guidance on the development of a garden's individual conservation mission, linking actions directly to the CBD (see Box 1). While botanic gardens are certainly affected by the many new CBD-inspired measures at national and international levels, they do not need to be just passive respondents. With a good understanding of how the CBD works and what it seeks to achieve, gardens can spearhead initiatives and send messages to wide audiences across generations and national borders. The Global Strategy for Plant Conservation was conceived, developed and presented by the botanical community, and was received gratefully and uncontroversially by the CBD; the GSPC's target-based approach is now being rolled out across other CBD work programmes, and indeed the whole convention, in the 2010 Biodiversity Target.

Human beings depend on biodiversity for survival, and the protection and sustainable management of biodiversity is central to the achievement of the Millennium Development Goals (MDGs), a set of measurable goals and targets adopted by world leaders to be met by 2015. The MDGs focus on poverty alleviation, health and sanitation, education, equity and sustainability; no single MDG explicitly addresses biodiversity, but healthy, functioning ecosystems, sustainable food production systems and rich genetic resources for medicines are essential to achieve the goals. As the primary international instrument covering the conservation and sustainable use of biodiversity, the CBD provides a framework for action at all levels, and it aids botanic gardens to situate their work in the broader development context.

Box 1: *The International Agenda for Botanic Gardens in Conservation*

The *International Agenda* was developed by and for botanic gardens in association with BGCI. Published in 2000, it provides a mechanism by which botanic gardens can directly contribute to the implementation of the CBD and undertake a wide range of related conservation and sustainable development objectives. Over 400 botanic gardens worldwide have adopted the International Agenda demonstrating their commitment to securing plant diversity for the benefit of people and the planet.

2. Outline of the Convention on Biological Diversity (CBD)

2.1 What is the CBD?

The Convention on Biological Diversity (CBD), also known as the Biodiversity Convention, is an international framework convention with three objectives: conservation of biological diversity, sustainable use of biological resources, and the fair and equitable sharing of benefits derived from the use of genetic resources. The CBD was opened for signature on 5 June 1992 at the United Nations Conference on Environment and Development (the Rio Earth Summit), and came into force on 29 December 1993, 90 days after the thirtieth ratification. A country becomes a Party once it has ratified the Convention (that is, made it formally valid at the national level, for example by passing it through national legislation). Over 190 countries are now Parties to the CBD.

A number of important conservation-related conventions pre-date the CBD, such as the Convention on Migratory Species (CMS, 1979), the Convention on International Trade in Endangered Species of Fauna and Flora (CITES, 1973), and the Ramsar Convention on Wetlands (1971). These taxon-, threat- and habitat-specific conventions play a vital role in conservation, but many experts felt the treaties' combined coverage was not sufficient to stem the global decline of species and habitats from an increasingly wide range of threats.

In the early 1980s, led by the International Union for the Conservation of Nature (IUCN), international conservationists started working towards developing a new global conservation convention. The task was taken up under the United Nations Environment Programme (UNEP) in 1988. The scope of the proposed treaty was broadened to include the relatively new concept of sustainable use, in the recognition that it would provide a greater political, economic and social rationale for long-term conservation, and to cover all levels of biodiversity – genes, species and ecosystems. At an early stage, special emphasis was placed on the recognition of countries' sovereign rights over biological resources (from the Stockholm Declaration, 1972), and biodiversity as a common concern rather than common heritage of mankind.

However, the prototype treaty did not gain wide international acceptance until the third objective was added: the fair and equitable sharing of benefits derived from the use of genetic resources. Many countries with high levels of biodiversity are relatively undeveloped and poor in financial resources. These countries were concerned that they would have to bear most of the costs of conserving their biodiversity, while more developed countries would continue to profit from biodiversity-based technologies underpinned by free access to other countries' resources. A funding mechanism was built in to address the uneven conservation costs, but biodiverse countries pressed for more control over their genetic resources and a direct share in the benefits from their use and related technologies. Often called 'the Grand Bargain', the concept of benefit-sharing in exchange for access to genetic resources was enshrined in the heart of the CBD, but in practice it remains the most contentious and ambiguous issue for Parties.

The original CBD text is composed of 42 Articles, which lay out definitions, provisions and operations of the Convention. Many of the Articles are highly relevant to botanic gardens, such as those covering identification and monitoring, *in situ* and *ex situ* conservation, sustainable use, research and training, public awareness, and access and benefit-sharing. Since its first meeting in 1994, the governing body of the CBD, known as the Conference of the Parties (or 'COP'; see Box 2), has produced many Decisions, which also become a part of the CBD. Botanic gardens managers should be aware of relevant initiatives that have been adopted through these Decisions, such as the Global Taxonomy Initiative, the Guiding Principles on invasive alien species and, most crucially for botanic gardens, the Global Strategy for Plant Conservation. Botanic gardens were key players in the development of the GSPC.

Box 2: CBD organisation

- **The Conference of the Parties (COP)** is the governing body of the CBD. COP meetings, where the Parties make decisions and review progress, take place every two years and are attended by thousands of delegates from Parties and observers such as non-Parties, intergovernmental organisations, non-governmental organisations, indigenous peoples' groups, research institutions, industry, and other stakeholder groups.
- Several other CBD bodies have been set up to guide and inform the COP. These include the **Subsidiary Body on Scientific, Technical and Technological Advice (SBSTTA)**, and various **Ad Hoc Open-Ended Working Groups** that have been convened to tackle particularly complex or controversial issues, such as access and benefit-sharing and protected areas. These groups meet between the COP meetings and make recommendations to the COP.
- The **Secretariat of the CBD**, based in Montreal, Canada, is the administrative body of the CBD, coordinating overall organisation, meetings, documentation and the CBD website.
- The **Clearing House Mechanism (CHM)**, also coordinated by the Secretariat, is a mainly web-based agency to promote and facilitate technical and scientific cooperation between countries and to exchange and integrate information on biodiversity. The CHM consists of the CBD website, the network of national CHMs, and partner organisations. See www.cbd.int/chm.
- Each Party is expected to nominate a **National Focal Point (NFP)**, an individual or agency that can provide information on national CBD strategies, legislation, procedures and activities. Countries may also nominate other NFPs to handle particular areas of the CBD, for example access and benefit-sharing, the Global Strategy for Plant Conservation and the Global Taxonomy Initiative. National Focal Points and other country contacts are listed on the CBD website at: www.cbd.int/countries/.

The primary methodology for the CBD, adopted by COP in 2000, is the 'ecosystem approach': a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way and so seeks to balance the three objectives of the CBD. It is based on the application of appropriate scientific methodologies focused on levels of biological organisation which encompass the essential structure, processes, functions and interactions among organisms and their environment. It recognises that humans, with their cultural diversity, are an integral component of many ecosystems.

The CBD's vast scope covers all levels of biodiversity, though it excludes human genetic resources. To tackle this breadth, the Convention has divided its work into a set of thematic work programmes and cross-cutting issues. The seven thematic work programmes correspond to major biomes: forests, dry and sub-humid lands, agricultural lands, seas and coasts, inland waters, mountains, and islands. The programmes set out a vision, principles, key issues for consideration, planned activities, potential outputs and a suggested timetable for action. The cross-cutting issues (see Box 3), as their name suggests, are relevant to all thematic programmes. Work on these issues helps to support and link the thematic programmes and to develop implementation tools such as guidelines, principles and databases. The COP and SBSTTA periodically review the implementation of the thematic programmes and the cross-cutting issues. A full list of the CBD's work programmes and issues is available at www.cbd.int/programmes/.

Box 3: CBD cross-cutting issues: those most relevant to botanic gardens highlighted

- **2010 Biodiversity Target**
- **Access to genetic resources and benefit-sharing**
- **Climate change and biodiversity**
- **Communication, education and public awareness**
- Economics, trade and incentive measures
- Ecosystem approach
- **Global Strategy for Plant Conservation**
- **Global Taxonomy Initiative**
- Identification, monitoring, indicators and assessments
- Impact assessment
- **Invasive alien species**
- Liability and redress – Art. 14(2)
- **Protected areas**
- **Sustainable use of biodiversity**
- **Tourism and biodiversity**
- **Traditional knowledge, innovations and practices – Art. 8(j)**
- **Technology transfer and cooperation**

The CBD is a framework convention, designed to allow the addition of more specific legally-binding protocols to address particular issues. As of 2008 only one protocol has been developed, the Cartagena Protocol on Biosafety, which seeks to protect biodiversity from potential risks posed by living modified organisms (LMOs) resulting from modern biotechnology, using a precautionary approach, and establishes an advanced informed agreement procedure for countries exporting or importing LMOs. Other protocols may be developed in future: current negotiations on access and benefit-sharing could potentially result in a new protocol, and some Parties seek a protocol on protected areas.

The CBD is also a framework in the sense that its provisions are legally binding, but national sovereignty is central to the CBD: Parties decide individually how to implement the provisions at the national level. Parties are expected to develop National Biodiversity Strategies and Action Plans (NBSAPs) as a starting point. Depending on their existing systems, perceived gaps and priorities, countries may then decide to change or draft new laws and policies, set up conservation initiatives (such as designation of new protected areas) and work out how to integrate conservation and sustainable use into relevant sectoral plans (such as those for energy, transport and trade). Information on measures taken, and an assessment of their effectiveness, is then fed back to the CBD using a system of standard-format National Reports which Parties are expected to produce at certain intervals. NBSAPs and National Reports are posted on the CBD website, and National Reports can be searched and analysed issue by issue. They can be very useful to find out whether a country is in the process of developing new laws that might affect botanic gardens' work. Gardens should seek and take all opportunities to contribute examples of CBD implementation to their governments for inclusion in National Reports.

The CBD is funded through several sources. The Global Environment Facility (GEF; funded by the United Nations Development Programme, the United Nations Environment Programme and the World Bank) is the designated funding mechanism. GEF funds are contributed by donor countries and are available to developing countries and countries with economies in transition. GEF provides co-financing for projects, and funds 'enabling activities' such as development of national action plans. GEF projects are driven by countries, not by international or developed country institutions. Project cycle priorities are guided by the COP and set out in GEF's biodiversity strategy. More information about GEF is available at www.gefweb.org. The work of the CBD Secretariat and other CBD bodies (such as SBSTTA and working groups) is funded by contributions by developed country Parties, agreed at COP meetings. The CBD website includes contacts for a range of international financial resources and case studies of funding from business and foundations.

The concerns of the CBD overlap with those of other international environmental conventions – such as CITES, the Convention on Migratory Species, the Ramsar Convention on Wetlands, and the other two Rio conventions, the UN Framework Convention on Climate Change and the Convention to Combat Desertification – and the conventions actively communicate and work together, for example through their support for the Millennium Ecosystem Assessment. However, their approaches, organisation and implementation vary. Most botanic gardens have some experience of working with CITES, an older treaty with more specific and established national and international implementation measures, and may be able to better understand and comply with the CBD's complexities by comparing the two conventions (see Box 4).

Box 4: The CBD and CITES compared, highlighting some differences relevant to botanic gardens

CBD	CITES
Regulates biodiversity conservation, sustainable use and benefit-sharing, addresses all threats	Regulates international trade in endangered species, addresses over-exploitation
Covers biodiversity at all levels – genetic, species, ecosystem	Covers specific taxa and specified parts and derivatives listed in Appendices
Provides general provisions and goals, but countries decide individually how to implement, according to national priorities and circumstances	Provides common Appendices and baseline for regulation (though member states may implement stricter legislation)
Governing body makes decisions by consensus (sometimes leading to deliberately ambiguous text)	Governing body makes decisions by vote
Many different national authorities and agencies involved	Countries have Management and Scientific Authorities
Depending on country, access involves range of collecting and/or export permits and agreements from government and other authorities/communities	Standardised permit system of CITES export and import permits, with flexibility for national modification
Terms for access to resources may cover access to and use of specimens in-country and internationally; each user must keep track of original terms as specimens are transferred between users	Only cross-border trade regulated; new permits required for next border crossing
National laws apply; no international monitoring, reporting or trans-border enforcement involving CBD Secretariat or other Parties.	Exports and imports monitored nationally, reported to CITES Secretariat and enforced internationally by national customs authorities in all Parties

For further information see Stolpe and Fischer, 2004.

2.2 Cross cutting issues of relevance to botanic gardens

2.2.1 The 2010 Biodiversity Target

In recent years, the CBD has adopted a target approach in several areas of its work, setting out time-limited and outcome-oriented goals, with measurable indicators, to shape expectations and stimulate coordinated action by Parties and stakeholders. This approach was first piloted in the CBD by the Global Strategy for Plant Conservation (see below), which focuses on plant conservation and sustainable use. Botanic garden managers should also be aware of the overarching 2010 Biodiversity Target: *'to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth'*. This target was adopted by COP in 2002 and endorsed by the World Summit on Sustainable Development, and its support by world leaders relates to the importance of sustainable and equitable use of biodiversity for the achievement of the Millennium Development Goals. In 2004, COP adopted a Strategic Plan that sets out a framework of seven focal areas, each with goals, sub-targets and indicators, to evaluate progress in implementing the target. The focal areas focus on: reducing the rate of loss of biodiversity; promoting sustainable use; addressing major threats to biodiversity; maintaining ecosystem integrity; protecting traditional knowledge; ensuring benefit-sharing; and mobilizing resources. A global initiative, the 2010 Biodiversity Indicators Partnership, was established to further develop and promote indicators for monitoring and assessment of biodiversity (see www.twentyten.net). The 2010 Biodiversity Target framework covers several important themes, such as benefit-sharing, that are highly relevant to botanic gardens.

2.2.2 Access to genetic resources and benefit-sharing (ABS)

Access to genetic resources and benefit-sharing is one of the three objectives of the Convention as well as a cross-cutting issue. The main provisions on Access to Genetic Resources and Benefit-Sharing (ABS) are set out in Article 15. States have sovereign rights over their genetic resources, and so national governments have the authority to determine how material is accessed, but should facilitate access for 'environmentally-sound uses'. Access should be granted only with the prior informed

consent of providers and requires mutually agreed terms between providers and users. Research should be carried out with the full participation of, or carried out in, provider countries, and benefits from use should be shared fairly and equitably. The CBD is not retrospective, so the provisions do not apply to resources acquired before the CBD came into force; such material is often described as being 'pre-CBD'. ABS provisions also appear in several other articles, related to traditional knowledge (Article 8(j)), technology transfer (Article 16.3) and biotechnology (Articles 19.1 and 19.2).

Box 5: Why a new international regime on ABS?

Despite the provisions of the CBD, the Bonn Guidelines and new ABS laws and codes of conduct, many countries are still not reaping the expected level of benefits from access to and use of their genetic resources. This perceived lack of benefit-sharing may be due to various factors, ranging from unrealistic expectations to poor contracts to outright misappropriation (often called 'biopiracy'). The main complaint is that once users take resources outside a provider country, they are not forced to comply with the provider's national laws, because most countries with users under their jurisdiction have not set up laws to enforce compliance with other countries' national laws. Some countries also wish for the scope of the new regime to extend beyond that of the Bonn Guidelines and the CBD, for example to cover derivatives of genetic resources, or new uses of resources collected before the CBD came into force. Negotiators are debating what 'user measures' could be developed in order to promote and enforce compliance with providers' national laws. One idea under consideration is a system of internationally-recognised certificates of origin (or compliance with national laws) to travel with genetic resources as they are used, to link back to original mutually agreed terms and providers, with checkpoints at key stages of use (e.g. at patent offices). Another is a requirement for researchers to disclose the origin of material when applying for intellectual property rights such as patents. It is possible that a range of different measures will be developed for use by different sectors.

As with the rest of the CBD, individual governments decide how to interpret and implement these provisions at the national level, and each country has its own legal systems, national authorities and stakeholders. Consequently there is wide variation in how countries are implementing ABS, which can lead to confusion for both providers and users of genetic resources. To address this uncertainty, a working group on ABS was set up in 2001, and in 2002 the COP adopted the voluntary Bonn Guidelines on access to genetic resources and fair and equitable sharing of the benefits arising from their utilisation. This tool provides guidance for governments and other stakeholders (such as institutions or companies) on the development of domestic laws and policies and steps in the negotiation of ABS contracts. They provide some clarification on prior informed consent (including advice on a workable system, and information users should provide) and mutually agreed terms (what should be included, and examples of typical terms). Valuably for botanic gardens, the guidelines set out examples of non-monetary as well as monetary benefit-sharing, and remind providers that access for taxonomic work should be facilitated. The Bonn Guidelines also emphasise the need for ABS National Focal Points and Competent National Authorities, to provide information on national procedures for access and benefit-sharing; contact details can be found on the CBD website.
Many countries and companies are now using the Bonn Guidelines, and botanic gardens seeking ABS agreements should be familiar with them. However, the voluntary guidelines are likely to be absorbed into a new international regime on ABS under the CBD (see Box 5), following a call from the World Summit for Sustainable Development in 2002. Negotiations on this regime, carried out in the ABS working group, are vigorous and ongoing, due to be completed by COP10 in 2010. Botanic gardens

Box 6: The other ABS treaty: the International Treaty on Plant Genetic Resources for Food and Agriculture

The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) entered into force on 29 June 2004. The objectives of the Treaty are the conservation and sustainable use of plant genetic resources for food and agriculture and the equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity. The Treaty establishes a Multilateral System of Access and Benefit-Sharing (MLS) that covers a defined list of crops and forages included in *Annex I*. This annex includes crop genera such as rice (*Oryza*), banana (*Musa*), yams (*Dioscorea*) and maize (*Zea*), and certain legume and grass forage species. The 64 crops and forages account for 80 percent of the food derived from plants. As of July 2008, 117 countries and the European Community had ratified the Treaty. For more information, see www.planttreaty.org.

CBD approach	**ITPGRFA approach**
Covers access to all types of genetic resources, except human genetic resources.	The Treaty itself covers all plant genetic resources for food and agriculture, but the MLS it establishes is limited to certain plant genetic resources. Does not cover access for other purposes (e.g. medicinal use, ornamental display, biofuels).
Covers genetic resources in countries that are Party to the CBD.	Covers collections that are under the management and control of Contracting Parties and in the public domain, though all other holders are invited to make their material available to the MLS. The MLS also includes *Annex I* material held in the *ex situ* collections of the Consultative Group on International Agricultural Research (CGIAR).
Covers material accessed after the CBD came into force (29 Dec 1993).	No distinction between pre-existing material held and material acquired after entry into force of the Treaty.
ABS decisions are made bilaterally between providers and users, so terms will vary depending on the countries, actors and circumstances involved.	The MLS sets out standard conditions for access and benefit-sharing in a Standard Material Transfer Agreement (SMTA).
Access to be 'facilitated for environmentally sound purposes' but likely to involve more complex processes and/or negotiations. Users may need to keep records of use and/or transfers.	Access to material listed in *Annex 1* is expeditious and free of charge at the present (though fees may cover minimal cost); individual accessions do not need to be tracked.
Prior informed consent and mutually agreed terms may be set out in different forms, e.g. permits, agreements, letters, institutional Material Transfer Agreements.	The SMTA sets out the obligations of the provider and recipient of the material, provides details of the benefit-sharing mechanisms and administers the sharing of benefits.
Users to share monetary and/or non-monetary benefits with providers. The CBD itself does not specify how benefit-sharing will occur.	The Treaty provides for mandatory payment of an equitable share of monetary benefits back to the MLS when a commercial product is developed using genetic resources pooled in the MLS, if there are restrictions on further use by others for research and breeding (e.g. intellectual property rights, especially patents). If others may use it, payment is voluntary.

should ensure they are informed and involved, as the talks could result in a legally-binding protocol that sets out new international rules for users of genetic resources.

Gardens should also be aware that the CBD is not the only international treaty that governs access to genetic resources and benefit-sharing. The International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA) is an innovative treaty negotiated under the Food and Agriculture Organization (FAO) that covers all genetic resources for food and agriculture and facilitates access to a defined list of crop and forages listed in its *Annex I*, in the interests of agriculture and global food security. It is intended to work in harmony with the CBD but differs from it in several key respects, set out in Box 6. Many botanic garden collections hold some of the species covered by the ITPGRFA, and so will sometimes need to follow this treaty's procedures.

2.2.3 Climate change and biodiversity

The United Nations Framework Convention on Climate Change (UNFCCC), opened for signature at the Rio Earth Summit alongside the CBD, is the primary international treaty that handles climate change. However the issue is also addressed by the CBD, as it is becoming increasingly clear how dramatically the rate and magnitude of climate change is directly and indirectly affecting biodiversity: according to the Millennium Ecosystem Assessment (2005), climate change is likely to become the dominant direct driver of biodiversity loss by the end of the century. Biodiversity is also involved in climate change mitigation and adaptation. A CBD technical expert group first assessed linkages between biodiversity and climate change in 2001. Following this, in 2006 another technical expert group on biodiversity and adaptation developed guidance for promoting synergy among activities to address climate change, linking the CBD with the UNFCCC and the United Nations Convention to Combat Desertification (UNCCD, the third Rio Convention). COP has adopted Decisions encouraging Parties take measures to manage ecosystems to maintain resilience to extreme climatic events and to help mitigate and adapt to climate change, highlighting the importance of integrating biodiversity considerations into all relevant national policies and plans on climate change. Current mitigation activities such as biofuel production and use, and emerging proposals such as ocean fertilisation may have tremendous impacts on biodiversity, and debate on these topics already swamps discussion on many thematic areas of the CBD. As well as technical reports from the expert groups, the CBD's outputs include web-based guidance on the integration of biodiversity within adaptation planning and a database of case studies. The CBD continues to collaborate with the UNFCCC and UNCCD in a joint liaison group.

2.2.4 Communication, education and public awareness

Biodiversity is central to our lives and its sustainable use is crucial for our future, and yet many people are not familiar with these terms and concepts. Furthermore, the work of the CBD can appear confusing and distant to many who are not familiar with international laws and treaties. The cross-cutting work programme on Communication, Education and Public Awareness (CEPA), arising from Article 13 of the CBD, seeks to communicate the scientific and technical work of the CBD in accessible ways, to integrate biodiversity into education systems in all CBD Parties, and to raise public awareness of the importance of biodiversity to our lives and its intrinsic value. Working with the United Nations Educational, Scientific and Cultural Organization (UNESCO) and other international organizations, the CBD has developed a Global Initiative on CEPA. The CEPA initiative involves a huge range of actors: the CBD Secretariat, Parties, international and national organizations, businesses, indigenous and local communities, universities and scientists, civil society and children worldwide. It has spawned many projects, including a toolkit to help CBD National Focal Points engage stakeholders and mobilize national action, developed in collaboration with the IUCN Commission on Education and Communication (see www.cbd.int/cepa/toolkit/index.html). As another tool to raise awareness and understanding of biodiversity issues, the UN has proclaimed May 22nd as the International Day for Biological Diversity.

2.2.5 Global Strategy for Plant Conservation

The Global Strategy for Plant Conservation (GSPC), adopted by the COP in 2002, is a strategic framework for plant conservation action at global, regional, national and local levels, linking governmental and non-governmental partners and existing programmes. The ultimate and long-term objective of the GSPC is *'to halt the current and continuing loss of plant diversity'* and it sets out 16 outcome-oriented targets to be met by 2010 (see Box 7). The targets are gradually being incorporated into the thematic programmes of work of the CBD, and also overlap with the work on cross-cutting issues, such as invasive alien species, Article 8j on traditional knowledge and the Global Taxonomy Initiative.

Box 7: GSPC sub-objectives and targets

A) Understanding and documenting plant diversity:

(i) A widely accessible working list of known plant species, as a step towards a complete world flora;

(ii) A preliminary assessment of the conservation status of all known plant species, at national, regional and international levels;

(iii) Development of models with protocols for plant conservation and sustainable use, based on research and practical experience.

B) Conserving plant diversity:

(iv) At least 10 per cent of each of the world's ecological regions effectively conserved;

(v) Protection of 50 per cent of the most important areas for plant diversity assured;

(vi) At least 30 per cent of production lands managed consistent with the conservation of plant diversity;

(vii) 60 per cent of the world's threatened species conserved in situ;

(viii) 60 per cent of threatened plant species in accessible *ex situ* collections, preferably in the country of origin, and 10 per cent of them included in recovery and restoration programmes;

(ix) 70 per cent of the genetic diversity of crops and other major socioeconomically valuable plant species conserved, and associated indigenous and local knowledge maintained;

(x) Management plans in place for at least 100 major alien species that threaten plants, plant communities and associated habitats and ecosystems.

C) Using plant diversity sustainably:

(xi) No species of wild flora endangered by international trade;

(xii) 30 per cent of plant-based products derived from sources that are sustainably managed.

(xiii) The decline of plant resources, and associated indigenous and local knowledge, innovations and practices that support sustainable livelihoods, local food security and health care, halted.

D) Promoting education and awareness about plant diversity:

(xiv) The importance of plant diversity and the need for its conservation incorporated into communication, educational and public –awareness programmes.

E) Building capacity for the conservation of plant diversity:

(xv) The number of trained people working with appropriate facilities in plant conservation increased, according to national needs, to achieve the targets of this Strategy;

(xvi) Networks for plant conservation activities established or strengthened at national, regional and international levels.

Stakeholder consultations were held on each target to discuss how to measure progress, and the lead institutions that facilitated the consultations continue to play an active role. To help countries to meet the targets and to bring together information on implementation at all geopolitical levels, a consortium of international and national plant and conservation agencies formed the Global Partnership for Plant Conservation (GPPC) in 2004. The work of the GPPC is facilitated by BGCI. It has been widely acknowledged that, more than any other initiative, the GSPC has stimulated the engagement of the botanical and plant conservation communities in the work of the CBD.

At the national level, CBD Parties are encouraged to develop national or regional strategies and targets, and to nominate GSPC National Focal Points to promote implementation and monitoring. Developing a national strategy requires countries to draw together ongoing actions and define national priorities. In some cases,

Box 8: China's National Strategy for Plant Conservation

China is one of the world's most biodiverse countries. Over half of its 30,000 native plant species are endemic, it is the centre of origin for some of the world's most important crop, medicinal and ornamental species, and it is also contains some of the last habitats of relic species such as dawn redwoods and ginkgos. However, around 20% of the country's plants are at risk from habitat destruction and unsustainable collecting, threats that have burgeoned with China's rapid development.
The Chinese national response to the GSPC, unveiled in 2007, seeks to halt the loss of plant diversity and safeguard 5,000 threatened species through an ambitious, whole-country approach involving three state agencies, the State Forestry Administration (SFA), Chinese Academy of Sciences (CAS) and the State Environmental Protection Administration (SEPA).

The Chinese strategy's goals follow those of the GSPC but are adapted to the Chinese context. Specific and measurable targets and sub-targets have been developed for each major goal, as benchmarks for measuring success. The project notably includes plans for reversion of almost 15 million hectares of farmland to forest within 3 years, calls for a halt to logging in stretches of forest in the upper reaches of the Yangtze and Yellow Rivers, a ban on potentially polluting development projects near key areas for biodiversity, and a crackdown on illegal logging and harvesting across the country. The strategy also highlights the need for huge state investment into scientific research and management of ecological reserves, and exploration of novel 'eco-agricultural' methods for more sustainable land management practices. The Chinese strategy seeks to realize the economic potential of Chinese biodiversity, and features a '3R Model' system (Resources, Research and Resolution) for development of new economically useful plants. China's 160 botanic gardens play a central role in implementation of the strategy and the 3R Model, acting as genebanks for native biodiversity conservation and research centres for breeding, and the strategy calls for an increase in investment in these gardens. Part of the revenue from 3R Model projects, such as the commercial development of a new variety of golden-fleshed kiwi fruit from wild native vines, will be fed back into plant conservation. (China's Strategy for Plant Conservation, 2007)

countries have chosen to widen the scope of the GSPC; for example the United Kingdom's strategy extends to lichens, algae and fungi because of their ecological and cultural importance in the UK. National and regional progress is reported back via Parties' National Reports to the CBD Secretariat, where the data are collected and analysed by the GSPC programme officer.
The CBD and GPPC websites provide news and further information.

While the deadline for achieving the existing GSPC targets is 2010, commitment to the further development of the Strategy beyond 2010, including an update of the current targets was confirmed at the 9th Conference of the Parties to the CBD in May 2008. This followed a 2006 call for action from the Gran Canaria Group (an ad hoc group of plant conservation scientists that originally developed and presented the GSPC to the CBD) through its '*Gran Canaria Declaration on Climate Change and Plant Conservation*'. This declaration argues for a re-definition of the GSPC post-2010 to respond to the realities of climate change. It provides guidelines for action and suggests that priorities should include development of more detailed climate change modeling to detect species under threat, implementation of adaptive management systems in vulnerable ecosystems, and sustainable management of existing natural vegetation and the monitoring of carbon offset plantings. It identifies the key role played by botanic gardens as messengers and as insurance policies for safeguarding wild plants.

2.2.6 Global Taxonomy Initiative

The CBD recognises that taxonomy is crucial to the implementation of the Convention, and that progress is obstructed by the 'taxonomic impediment': there is not sufficient taxonomic knowledge, and there are not enough taxonomists worldwide. The need for taxonomic information is set out in Article 7(a) and in many Decisions; the Bonn Guidelines on ABS urge governments to facilitate access for taxonomy, and GSPC Target 1, a widely-accessible list of known plant species, is a taxonomic target. The CBD's response to the taxonomic impediment is the Global Taxonomy Initiative (GTI), a cross-cutting issue that reminds

policymakers that CBD implementation requires taxonomic knowledge. The GTI work programme's operational objectives focus on taxonomic needs assessments, building and maintaining capacity, infrastructure and networks for taxonomic collections, facilitating access to taxonomic information (building a global checklist of known species), and inserting taxonomic objectives into the other CBD thematic programmes and cross-cutting issues. Lack of resources is always an issue for the GTI, as countries have been slow to identify taxonomy as a conservation priority, but Parties have recently adopted a set of outcome-oriented deliverables for each of the planned activities of the work programme, which may give impetus and stimulate funding, and a Special Fund is being developed under the guidance of BioNET-International. The GTI is steered by a Coordination Mechanism, with members drawn from Parties and leading taxonomic institutions, and Parties are encouraged to set up GTI National Focal Points. Further information is available on the CBD website: www.cbd.int/gti/

2.2.7 Invasive alien species

The spread of alien, or non-native, invasive species is one of the most important direct drivers of biodiversity loss and change in ecosystem services (Millennium Ecosystem Assessment 2005). Invasive species are organisms that are introduced, either intentionally (by release) or unintentionally (for example via transport) into new areas where they can spread and displace native species and create serious impact, for instance by dramatically changing the species composition or spreading diseases. The severe impact of invasive alien species on native ecosystems causes hundreds of billions of dollars of damage per year and irretrievable losses of habitats and species. Globalisation and climate change are accelerating the problem.

Article 8(h) of the CBD determines that Parties should prevent the introduction of, control or eradicate those alien species which threaten ecosystems, habitats or species. Invasive alien species have pervaded the thematic programmes of work, and a cross-cutting work programme has been developed. GSPC Target 10 and sub-targets 6.1 and 6.2 of the 2010 Biodiversity Target concern the need for control and management plans for major alien species. In 2002, COP6 adopted Guiding Principles for the prevention, introduction and mitigation of the impacts of alien species. This guidance can be used by governments and organisations to develop effective strategies to prevent the introduction and minimise the spread and impact of invasive species.

Many national governments have now launched invasive species programmes and developed legislation. The Global Invasive Species Programme (GISP) is the international focal point for this issue and coordinates the Global Invasive Species Strategy; among its many scientific, educational and capacity-building activities, GISP has developed a toolkit for best practice. The GISP website links to invasive species databases worldwide, including the Global Invasive Species Database developed by the IUCN/SSC Invasive Species Specialist Group as part of the GISP-led global initiative. There is also a joint programme of work between the CBD and the International Plant Protection Convention, a plant health treaty under the Food and Agriculture Organisation. IPPC is currently developing guidance in the area of plants for planting, particularly as related to ornamental plants and horticulture.

2.2.8 Protected areas

Protected areas are widely regarded as one of the cornerstones for biodiversity conservation and are vital to the achievement of the 2010 Biodiversity Target and the Millennium Development Goals; in the CBD they form an important element of almost every thematic and cross-cutting work programme. However, the concept regularly faces challenges from those that perceive the CBD's involvement as a threat to national sovereignty and consider protected areas as lost opportunities for other more profitable uses, and concerns about the rights and loss of livelihoods of indigenous and local communities living in or around such areas. Marine protected areas are especially controversial because it is unclear how the CBD process relates to areas outside countries' boundaries.

The provisions in Article 8 on *in situ* conservation include the establishment of protected area systems, development of guidelines for their management, regulation of biological resources inside and outside protected areas, promotion of protection of ecosystems, natural habitats and viable species populations in natural surroundings, and promotion of environmentally sustainable development in areas adjacent to protected areas. Most countries have now set up systems of protected areas, but they do not yet offer adequate coverage of ecosystems and species, and so in 2004 the COP adopted a cross-cutting work programme with the objective of supporting the establishment and maintenance of comprehensive, effectively managed and ecologically representative national and regional protected areas that together contribute to achieving the 2010 target - by 2010 for terrestrial areas and by 2012 for marine areas. The work

programme presents a framework for action at national and regional levels, organized under four interlinked programme elements (planning and management, governance and equity, enabling activities and standards and monitoring), with 16 goals and corresponding targets as well as indicators and activities. As with the GSPC, countries can develop national and regional targets and implement them according to their national needs and priorities. A working group on Protected Areas has been set up to further progress in this challenging area of the CBD.

2.2.9 Sustainable use of biodiversity

The sustainable use of biological resources is a pillar of the CBD: it is one of the convention's three objectives. Article 2 of the convention provides the following definition of sustainable use: '*Sustainable use means the use of the components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations*'.

The components of biological diversity can be divided into ecosystems, species and genetic material. Sustainable use, as understood in the context of the CBD, can, therefore, involve the use of each of these components. Using biodiversity in a manner that maintains its potential to meet current and future human needs and aspirations and to prevent its long term decline, is also an effective tool for achieving the Millennium Development Goals, eradicating extreme poverty and hunger and ensuring environmental sustainability. Sustainable use can also generate incentives for the conservation and restoration of biodiversity because of the social, cultural and economic benefits that people derive from it.

Article 10 sets out that countries should integrate sustainable use into national decision-making, adopt measures to avoid adverse impacts to biodiversity, protect and encourage sustainable customary use in accordance with traditional cultural practices compatible with conservation, support actions by local populations to restore degraded areas, and encourage cooperation between government authorities and the private sector to develop methods for sustainable use. Adopted in 2004, the Addis Ababa Principles and Guidelines for the sustainable use of biodiversity lay out 14 practical principles and operational guidance. The ecosystem approach and the focus on fair and equitable benefit-sharing at the heart of the CBD place emphasis on participation of local communities and development of resources *in situ*, in countries of origin. This is in contrast to the approach traditionally taken by CITES, which has leaned towards ex situ solutions to problems caused by unsustainable levels of use, such as artificial propagation and captive breeding initiatives often far from countries of origin. However the conventions are drawing closer together.

One of the challenges ahead for the CBD's activities under the theme of sustainable use is to develop a set of critical indicators for the monitoring of sustainable use in each category of use, both at the local and global levels.

2.2.10 Tourism and biodiversity

Biodiversity draws tourists, but it is seriously impacted by poorly-planned and unsustainable tourism. Well-planned and managed tourism can contribute funds towards biodiversity conservation, provide livelihoods for local people and give countries strong incentives for conservation and sustainable use. The CBD has produced international Guidelines on Biodiversity and Tourism Development to support responsible planning and sustainable management, using the ecosystem approach. The tool provides guidance on impact assessment and engaging the participation of a wide range of stakeholders, including indigenous and local communities, NGOs and the private sector. The CBD

has also produced a user's manual to help implement the guidelines. The manual and other resources are available from the Biodiversity and Tourism Network, a web-based platform created by the CBD and the World Tourism Forum for Peace and Sustainable Development to disseminate information on use of the guidelines and to exchange knowledge. Visitors can use the website to find out about sustainable tourism destinations. The website is located at http://tourism.cbd.int/.

2.2.11 Traditional knowledge, innovations and practices – Article 8(j)

The global community is belatedly recognising the value of the knowledge and skills built up by indigenous and local communities that lead traditional lifestyles closely dependent on local biological resources, even as these cultures fight for survival. At the same time, many traditional peoples are increasingly concerned about the misuse of their knowledge by the outside world, provoked by cases of companies using traditional knowledge to develop patented products but sharing few or no benefits with the knowledge holders in return.

The protection of traditional knowledge is one of the most complex cross-cutting issues in the CBD. Article 8(j) sets out that, subject to national legislation, the knowledge, innovations and practices of indigenous and local communities relevant for conservation and sustainable use should be respected, preserved, maintained and promoted, with the approval and involvement of the knowledge holders, and that benefits from use should be shared equitably. The CBD's approach faces difficulties: CBD dialogue is mainly intergovernmental, and fair representation of communities is problematic in the CBD. National legislation may not reflect the wishes of knowledge holders, as relations between governments and indigenous peoples are strained in many countries. Traditional knowledge is difficult to define, generally intangible, and may span national borders. Traditional societies' customary laws may be difficult to integrate with national legal systems. The CBD working group on Article 8(j) attempts to address these issues and to involve more traditional peoples. It is working on several measures to retain and protect traditional knowledge and developing implementation tools, such as guidelines for documenting traditional knowledge, and an ethical code of conduct to ensure respect for the cultural and intellectual heritage of indigenous and local communities relevant to biodiversity conservation and sustainable use. The CBD website's Traditional Knowledge portal provides extensive information, resources and links.

2.2.12 Technology transfer and cooperation

Technology transfer and cooperation are important means of achieving equitable benefit-sharing and improving countries' abilities to carry out their own research and development. The issue appears throughout the CBD. Article 16 directly addresses technology transfer and technical cooperation, setting out the need for facilitated access to and transfer of technology on fair and most favourable terms for developed countries, the involvement of the private sector and the importance of respecting intellectual property rights but ensuring that those rights are supportive of the CBD and do not run counter to its objectives. Article 18 sets out the needs for capacity building and technical cooperation with developing countries, and also mentions cooperation for the development of indigenous and traditional technologies and promotion of joint research and technology development programmes. Additionally, Article 12 covers research and training, Article 15 on ABS mentions development of research in countries of origin and sharing results of research and development, Article 17 concerns information exchange and 19 covers effective participation in and benefit-sharing from biotechnological research. Technology transfer and cooperation was adopted as a work programme in 2004, to provide guidance in four areas: technology assessments, strengthening of information systems, creation of enabling environments (putting new frameworks in place and removing barriers), and capacity building. The programme identifies main actors and timelines, but much of the work must be country-driven. Its implementation is intended to contribute to the achievement of the 2010 Biodiversity Target and the Millennium Development Goals. In 2008, COP adopted a strategy for practical implementation, to explore voluntary means and strategic activities to enable and facilitate technology transfer, and plans for a new Biodiversity Technology Initiative are being considered. The CBD website hosts a Technology Transfer and Cooperation database that links to case studies, documents and other initiatives.

3. Botanic gardens and practical CBD implementation

3.1 Action on GSPC targets

Botanic gardens were central players in the development of the GSPC and they help to guide it (via involvement in the Global Partnership for Plant Conservation and through national and regional initiatives). Gardens are at the forefront of implementing many of the GSPC targets, particularly those on *ex situ* conservation, taxonomy, development of protocols for conservation and sustainable use, education and public awareness and capacity-building. The GSPC has been particularly effective in allowing botanic gardens to engage with the work of the CBD and many gardens have now mainstreamed the GSPC targets within their ongoing work programmes (see Box 9). Furthermore, a number of botanic gardens act as national GSPC focal points.

The 2010 Botanic Garden Targets, finalised in 2005, were developed as a contribution towards the GSPC and to help measure the achievement of the objectives of the International Agenda for Botanic Gardens in Conservation. Gardens can use these targets to focus their activities and to report their progress on both initiatives to their GSPC National Focal Points, BGCI and national botanic garden networks.

Some national and regional botanic garden networks have developed their own strategies and projects under the GSPC, for example the North American Botanic Garden Strategy for Plant Conservation (see Box 10), or the PlantNetwork Target 8 project that encourages all British and Irish botanic gardens to develop horticultural protocols for certain threatened native plants (see Box 11).

Gardens also need to look to the future, and should consider how they can act on the suggestions presented in the *Gran Canaria Declaration on Climate Change and Plant Conservation* for revising the GSPC targets to recognise the impact of climate change.

Box 9 Botanic gardens – mainstreaming the GSPC and its targets

Missouri Botanical Garden, USA, focuses its work on seven of the 16 GSPC targets. These include taxonomic and inventorying activities, identification of centres of plant diversity and endemism to aid conservation priority setting, working with local communities to develop models for sustainable plant use, public education and awareness raising and training and capacity building. (www.mobot.org)

The Royal Botanic Gardens, Kew, UK, has mainstreamed the GSPC within its Corporate Plan and this provides the focus and specific targets for its work both in the UK and internationally. Globally, Kew plays a leading role in the implementation of Target 1 and provides significant input into efforts to conserve threatened species *ex situ* awaiting recovery and reintroduction (Target 8). Kew's activities also have a major impact on six further GSPC targets (Targets 2, 11, 13, 14, 15 and 16). (www.kew.org)

The Oxford Botanic Garden, UK, has ensured that the GSPC has been incorporated into the teaching in all years of the Biological Sciences degree course at the Oxford University. The Strategy itself has become the syllabus for a module in the Plant Conservation course. Every one of the 12,500 school children who visits this Garden is shown how they can contribute to at least one of the targets of the GSPC. Every visitor to the Garden is given a guide to the GSPC that takes the visitor through each of the 16 targets. (www.botanic-garden.ox.ac.uk)

Box 10: A regional response: the North American Botanic Garden Strategy for Plant Conservation

Recognising that effective conservation requires joint action, and that plant distributions do not follow political boundaries, botanic garden associations in the United States, Canada and Mexico have launched a comprehensive, continent-wide strategy based on the GSPC targets. The North American Botanic Garden Strategy for Plant Conservation (NABGS) was developed by the American Public Gardens Association, the Asociación Mexicana de Jardines Botánicos, Botanic Gardens Conservation International, the Canadian Botanical Conservation Network and the Centre for Plant Conservation, over three years of consultations and discussions. The group also reached beyond the botanic garden community to others in the plant conservation community, such as non-governmental organizations, government agencies and university researchers.

The NABGS recognizes that the botanic gardens in North America hold some of the most diverse collections of plants from around the world, and also that many gardens have the expertise, knowledge and resources to expand their plant conservation efforts beyond North America and assist in conserving non-native species in the countries of origin. Prior to the NABGS, there was a botanic garden strategy in Mexico, but no country-specific botanic garden frameworks in the U.S. or Canada; the NABGS seeks to address the three countries' priorities, strengths and gaps.

The NABGS adopts the GSPC's five sub-objectives as its goals (adding a sixth, building support for the NABGS). Specific and measurable targets and sub-targets have been developed for each goal, adapted for the North American context and setting benchmarks for measuring success, and action plans to meet the targets are being developed cooperatively. Many of the sub-targets offer gardens a more detailed and tailored framework than the GSPC targets to structure their actions – for example the sub-targets on invasive species management and education call for 80% of botanic gardens to develop an invasive species policy and to endorse the voluntary codes of conduct in the St. Louis Declaration on Invasive Plant Species, and for more botanic gardens to provide the public with opportunities to become involved in actions to combat invasive species. The strategy is a dynamic document and will be revisited and further developed as progress is assessed. More information on the NABGS is available at http://www. plants2010.

As well as helping to deliver messages about conservation and sustainable living to their visitors, gardens can become involved by adapting their *ex situ* conservation activities to embrace species that are potentially threatened by climate change. Further information on the impacts of climate change on plants are provided by Hawkins *et al* (2008), including recommendations for actions by botanic gardens and other conservation organisations.

3.2 ABS in practice

Botanic gardens are arguably more affected by the CBD's ABS provisions, and national responses to them, than by any other part of the Convention. Gardens need to understand and follow several key steps in order to acquire new plants under the CBD's terms. They need to get **prior informed consent** (PIC), that is, explain to the provider(s) of genetic resources how the plants will be used - not just by the collector but by others in the

Box 11: PlantNetwork Target 8 project: practical horticulture in support of conservation of the flora of Britain and Ireland

The PlantNetwork Target 8 project is a useful example of a regional botanic garden network's response to the GSPC. The aim is for member gardens to grow the threatened plants of Britain and Ireland *ex situ* and to link them to conservation work *in situ*. The objectives are to build horticultural expertise and knowledge in growing the native flora; to involve member gardens in practical *in situ* conservation partnerships; to collect the germination and cultivation protocols into a database; and to raise public awareness about the threatened flora of Britain and Ireland.

In keeping with the GSPC approach, emphasis is placed on partnership. Participating gardens are encouraged to find out about and liaise closely with *in situ* conservation organisations and projects to assist species recovery efforts. After selecting one or more target species, and using an appropriate source for seeds and propagules (consulting with relevant authorities to avoid damaging declining wild populations, and potentially using seedlings from the Millennium Seed Bank), gardens record details of germination trials, growth and flowering and fruiting and keep track of the successes and failures of each propagation method used. Data entry protocols are provided by PlantNetwork, which coordinates the project. Results are communicated to the GSPC national focal points in the UK and Republic of Ireland. Gardens are also expected to promote their project activities and the work of plant collections in support of conservation, through interpretation panels (generic templates are provided by PlantNetwork) and other imaginative means.

More information about the project is available at www.plantnetwork.org/projects/target8.htm.

botanic garden or university - so that permission is informed. New PIC may be needed for new uses. Gardens also need to find out whose PIC is needed. Even if a governmental permit is sufficient for legal collection, it is good practice also to seek the consent of local communities and other stakeholders who would be affected by the fieldwork and research. **Mutually agreed terms** for use and benefit-sharing need to be set out in some form (e.g. permits or agreements), and these terms must be kept with the material as it moves from one collection or user to another. Mutually agreed terms are often set out in a material transfer agreement (MTA), which may be as simple or comprehensive as needed for the individual project or collaboration. Gardens will need to work out, with providers, how best to **share benefits**, which may be non-monetary or monetary. All of these steps take time, planning and commitment. Gardens are advised to examine their current practices, procedures and partners in the light of international CBD developments, and to develop policies that are appropriate for their institutions' needs and situations (see Box 12).

The first step for a garden wishing to collect or work in another country is likely to be finding a partner institution in that country that can collaborate and benefit from the work, and help find out about necessary procedures and other relevant stakeholders that might need to be consulted or involved. Gardens can find out about countries' ABS laws and procedures by contacting the ABS National Focal Point or Competent National Authority, checking the CBD website for information on national ABS laws, and consulting colleagues with recent experience of (legally) working in the country, as well as by asking local partners. Some indigenous groups have now developed codes of practice for researchers who wish to work on their lands. Gardens should be aware that sometimes there are different access rules for country nationals and foreigners, and it is essential to follow the appropriate rules – especially if plant material will be exported to an overseas collection.

Access may be simplified if the provider is another *ex situ* collection. Depending on national laws, an *ex situ* provider may be able to provide its own PIC, but be sure to check if other authorisation is needed to export material. Remember that even if benefit-sharing expectations from other collections are lower, there may be obligations from the original *in situ* provider, and these terms must always be transmitted and respected. Botanic gardens are increasingly using institutional MTAs when they supply material, to set out terms for permitted general or specific uses, non-commercialisation, transfer to third parties and benefit-sharing (such as acknowledgement, copies of publications). Note that gardens supplying material covered by Annex 1 of the International Treaty on Plant Genetic Resources for Food and Agriculture for purposes related to food or agriculture must use the

Standard Material Transfer Agreement rather than an in-house MTA if they are located in a country that is Party to the ITPGRFA and their collection is in the public domain (see section 2.2.2/Box 6).

Regardless of whether plants were acquired pre- or post-CBD, gardens should consider how they can share benefits with countries of origin. The Bonn Guidelines set out some practical examples of possible monetary and non-monetary benefits that might arise, but benefit-sharing is limited only by the imagination. A garden does not need to be large and involved in well-funded international capacity-building projects in order to share benefits from using plants. Gardens might consider whether they could share taxonomic information, horticultural protocols or educational materials; donate garden tools; lend a staff member to, or host a colleague from, a garden in a country whose plant species are showcased. A collection box could be placed in front of a particularly popular plant.

Botanic gardens need to be clear about whether or not they make plants in their collections available for sale or for commercially-oriented research. Commercialisation can generate useful tangible, financial benefits, but a poorly-designed scheme could damage a garden's reputation and its future capacity to work with countries of origin. For post-CBD material, gardens will need PIC from the original provider (preferably in the country of origin) and to agree upon the process and benefit-sharing. It is also advisable for gardens to consider consulting with countries of origin and sharing benefits from commercial use of pre-CBD material. Gardens may wish to deal with commercial enquiries by directing them to contacts in the country of origin (such as the CBD National Focal Point, or an in-country garden or research institution). Or gardens may choose to become actively involved in a commercialisation project, working with trusted partners in the country of origin and commercial sector.

Box 12: Developing a policy on ABS

A policy should ideally set out how the garden acquires, uses, curates and supplies plant material, how it will share benefits and how it will handle 'pre-CBD' material. It should also be clear about any commercial activities, such as plant sales or commercially-oriented research (directly or through a university or industry partner). A policy on ABS helps a garden to clarify its priorities, improve its procedures, educate its staff and communicate its intentions to partners and policymakers.

Botanic gardens were among the first ABS stakeholders to take action and develop guidelines for best practice. Two schemes have been adopted by many gardens, the Principles on Access to Genetic Resources and Benefit-Sharing (the Principles) and the International Plant Exchange Network (IPEN).

The Principles, developed by an international group of gardens from developed and developing countries, provide a framework for gardens and herbaria to use when developing their own individual policies, to cover different types of material (e.g. living plants and seeds, herbarium specimens, DNA samples) and uses (potentially including commercial uses). They address acquisition (from *in situ* and *ex situ* sources), use and supply of material, curation and tracking, benefit-sharing and commercialisation. The Principles are well-suited to gardens that conduct fieldwork, have a wide range of collections and research activities and/or active links with universities and commercial sectors.

IPEN establishes a system of facilitated exchange for a network of gardens that have signed up to a common Code of Conduct on ABS. The IPEN system only covers non-commerical use of living collections, and is particularly well-suited to gardens that obtain most of their material through traditional seed exchange. It cannot currently be used for the exchange of herbarium or other preserved collections. A documentation system has been developed to keep track of information on terms of use and country of origin, and to simplify transfers between IPEN gardens, and a common non-commercial Material Transfer Agreement is used for transfers outside IPEN.

An institution can choose both to endorse the Principles (to develop a policy that covers all of its activities) and to join IPEN to be able to use its exchange mechanism for suitable living material for non-commercial use. More information on both schemes is available from the BGCI webpages on ABS (www.bgci.org/abs).

Many botanic gardens that carry out no commercial research do have regular plant sales. Plant sales are a form of commercialisation, and so must be considered carefully – new PIC may be needed to sell some plants! Most plants sold will probably end up in the hands of amateur gardeners, but there is potential for plants to be acquired by the commercial sector, so gardens must check the terms on any plants (and national laws, for native plants) before putting them in a plant sale, and communicate any restrictive terms to buyers (such as terms prohibiting export or further commercialisation). An alternative is to buy in plants from commercial suppliers. Gardens also need to consider how to share benefits arising from plant sales. One possible option is to set up a 'benefit-sharing trust fund', pooling a percentage of profits for use in specific capacity-building activities – useful where the individual profits per plant and per country would be dwarfed by the transaction costs.

The BGCI webpages on ABS provide examples of botanic garden policies, MTAs and examples of CBD-friendly commercialisation projects and plant sales procedures (www.bgci.org/abs).

3.3 Working with traditional knowledge

Botanic gardens help to tell the public about how people have always depended on plants for survival and wellbeing, the contributions made by traditional knowledge to modern society and the importance of protecting cultural diversity. Some gardens work with indigenous and local communities to create gardens-within-gardens that showcase their ancient and continuing bonds with biodiversity (see Box 13). Others have formed partnerships with healers, traders, local authorities and commercial nurseries to develop medicinal plant gardens. Some gardens conduct ethnobiological field programmes, involving close,

Box 13: Gardens as cultural crossroads: highlighting indigenous peoples' heritage

Botanic gardens can provide contemplative and inspiring spaces for cultures to learn about each other and increase tolerance and understanding through showcasing human and plant diversity and interdependence. Some excellent examples are emerging of gardens working in close partnership with indigenous groups.

The First Nations Garden is a 2.5 hectare contemporary garden at the heart of the Jardin Botanique de Montréal, Canada, that presents the close bonds that Amerindians and the Inuit have with the plant world and provides opportunities for sharing knowledge and building cultural understanding. The botanical garden and a committee of First Nations representatives worked together to develop guidelines and criteria to integrate into the project design. The diversely-planted but natural setting is divided into five zones (hardwood and softwood forest, an arctic zone, a pavilion and gathering place) and highlights Native peoples' traditional knowledge and activities such as food and medicine gathering, crop-planting and house construction. The learning and communication tools used include interpretation panels, interactive terminals, visitor activities and shows, guided tours by Native interpretation staff, a website with links to various communities' sites and a gift shop selling Native art and handicrafts.

The Botanic Gardens Trust, Sydney, Australia, has worked together with local Aboriginal communities to develop a wide range of themed gardens and displays, educational programmes, guided tours, publications and community outreach programmes at the three gardens governed by the Trust, recognising the traditional owners of the lands and the significance of the lands to Aboriginal people. For example, the First Encounters display, at Royal Botanic Gardens in Sydney interprets the Aboriginal cultural heritage of area and provides insights into the interaction 200 years ago between the traditional inhabitants and the new European arrivals, focusing on their different environmental perspectives. Each botanic garden has developed lessons with Aboriginal themes for schoolchildren, linked to curriculum requirements, covering topics such as Aboriginal bush foods, encounters with Europeans, and current social issues. Aboriginal education officers lead many of the lessons.

More information on these examples is available at www2.ville.montreal.qc.ca/jardin/en/premieres_nations/premieres_nations.htm (Jardin botanique de Montréal) and www.rbgsyd.nsw.gov.au/welcome_to_bgt/quick_links/aboriginal_heritage (Botanic Gardens Trust).

long-term work with communities and the systematic collection of traditional knowledge, while others carry out fieldwork for rapid botanical inventories where plant uses may be recorded to help assess conservation value. Article 8(j) is relevant to all gardens that work with indigenous and local communities and their knowledge. Several of the concepts discussed under ABS apply.

Gardens that wish to collect traditional knowledge associated with genetic resources need to specify this interest when they are seeking prior informed consent, and will require the consent of knowledge holders, not just government permits to collect. As traditional knowledge is generally (by its nature) held by communities, not individuals, getting PIC will involve gaining an understanding of how communities are structured, how many communities need to be contacted and who is entitled to give permission; customary processes may be complex and unfamiliar. All of this preliminary work will take time, resources (for interpretation and repeat visits), perseverance, and above all, respect for the values of the communities concerned.

Researchers also need to be clear about how they intend to use and disseminate the information they collect. Even if the research itself is non-commercial, published information enters the public domain where it then may be used for commercial purposes by others, so indigenous and local community organisations are increasingly wary about how information is released. Communities may enthusiastically welcome outside assistance to document their knowledge as long as they retain some control over its use: researchers may find that they are only permitted to publish certain subsets or levels of information (such as broad plant usage categories). Botanists should also be cautious about putting traditional knowledge information on specimen labels. Broad usage categories can still be used to indicate resource value for conservation management, without broadcasting sensitive information to the wider world. Some groups may regard publication positively, and expect co-authorship as a form of benefit-sharing. Appropriate benefits need to be discussed with communities from the start as part of project planning.

Luckily, good practice guidance is available for gardens planning to work in this complex area. Principles and codes of conduct are being produced by an increasing number of indigenous peoples and local communities and also professional societies (such as the International Society for Ethnobiology), international agencies, NGOs and the private sector; see the CBD Traditional Knowledge portal for links. Additionally, some guides to ABS practice provide advice on working with associated traditional knowledge. The CBD working group on Article 8(j) is currently developing a code of ethics which may help to provide overarching general guidance.

3.4 Sharing taxonomic information and expertise

Botanic gardens with active taxonomic research programmes can contribute to GTI implementation. To provide direct national input, they can contact their GTI National Focal Point – or potentially offer their services as a NFP if one has not been designated. Gardens can contact BioNET-International (www.bionet-intl.org), a global networking initiative dedicated to promoting taxonomy, to find out about how to link into the regional and national locally owned and operated partnerships (LOOPs). Gardens can also contribute biodiversity information and images to the Global Biodiversity Information Facility (GBIF), which is building an interoperable network of biodiversity databases and information technology tools. GBIF seeks to disseminate primary biodiversity data held in institutions for global use, contributing to the information base needed by the GTI, GSPC and the Global Invasive Species Programme. International organisations can become GBIF participants, or gardens can participate through their government's membership.

Box 14: Preventing garden escapes: invasive species codes of conduct and policies

Codes of conduct can provide a useful framework for gardens to develop comprehensive policies to tackle invasive species and prevent new invasions. One of the first codes proposed was 'the Chapel Hill Challenge' issued by the North Carolina Botanical Garden in 1999, setting out 7 simply-worded actions that botanic gardens should consider. The 2001 St Louis workshop on Linking Ecology and Horticulture to Prevent Plant Invasions developed a set of voluntary professional codes of conduct for five different plant user sectors: botanic gardens and arboreta, the nursery trade, landscape architects, government and the gardening public. These codes provide detailed suggestions for effective practical measures. The codes of practice and further information can be found on the Center for Plant Conservation website (www.centerforplantconservation.org/invasives/).

The Chicago Botanic Garden has developed a policy based on these concepts of best practice to cover its wide-ranging activities, including expeditions abroad to collect species of horticultural merit. Its work links to the 2010 targets for botanic gardens and the International Agenda. The first step involved gathering a team of 'stakeholders' from across the garden, to ensure that the policy would be accepted by staff. Important regional invasive, and potentially invasive, species were identified, and species in the garden are checked against this list. Problem species are removed, phased out or evaluated, depending on the perceived risk. Incoming plants are screened against the list, and risk assessments are carried out for new species. The garden has chosen to discontinue its Index Seminum because of the risk of introducing invasives. The policy is distributed to staff in all departments and to the education team, and the invasive team checks plants in the plant sales and gift shops. More information about the garden's policy, and useful suggestions for how the public can help, is available on the CBG website (www.chicagobotanic.org/research/conservation/invasive/policy).

Other initiatives linked to GTI and GBIF include Species 2000 and the Integrated Taxonomic Information System (ITIS). For further information visit www.sp2000.org.

3.5 Tackling invasive alien species

The invasive species issue is highly relevant to botanic gardens. Most invasive plants have been introduced as ornamental plants and therefore owe their introduction to gardens and nurseries. The ornamental horticulture trade is responsible for many unfortunate deliberate introductions and subsequent spread; for instance, about half of North America's 300 worst plant invaders were introduced to gardens and parks – (Wittenberg and Cock, 2001). In a number of cases, botanic gardens have taken the first step, sometimes by showcasing new exciting but invasive species (for example *Heracleum mantegazzianum*). Gardens need to prevent future accidental or intentional introductions from their collections, and some may also face problems with invasive species in habitats they manage. On the positive side, botanic gardens are perfectly positioned to show leadership and send powerful messages out to the public and to the horticultural trade.

Botanic gardens can take a number of actions to tackle invasive species. They should find out about international and national laws, strategies and initiatives (such as eradication programmes or codes of practice), to see how they can contribute skills and efforts to their implementation. Ideas of best practice are beginning to emerge from the botanic garden community, and several codes and policies have been developed (see Box 14), which provide valuable guidance. First and foremost, botanic gardens need to identify known invasive species in their collections and consider carefully whether they should continue to grow or exchange them. Whether or not to supply is a complex question, as plants may be harmless in the garden's region but highly invasive in other areas: botanic gardens might choose to supply known invasive species only to other scientific institutions, with printed warnings on the shipping labels or transfer agreements, and not to supply to the private sector. Where possible, they should work to use alternative non-invasive and native plants. If the decision is made to keep certain known invasives, they should be tightly controlled to prevent their escape - for instance by cultivating them in greenhouses or under nets, removing flowers or young seeds, and preventing transport by air or by animals. Ideally they should be interpreted to raise public awareness of the issue. Staff need to be educated and to stay alert to signs of potential invasiveness in the

plants they grow, especially those that are not yet recognised as invasive, and should communicate this information to the botanic garden community, relevant national authorities, or invasive species initiatives such as GISP. They also should examine their horticultural practices to see where potential risks lie (such as in plant disposal and composting).

3.6 Spreading sustainability

Botanic gardens can be powerful advocates for sustainable use of plant diversity in several ways: by adopting sustainable management practices, by conducting research on potential sustainable uses of plants, and by raising public awareness of the issue generally. Botanic gardens can work as nodes to connect different stakeholders such as nurseries, conservation authorities, traders, herbalists and traditional communities. By working closely with local communities, botanic gardens can help to document indigenous and local knowledge about plant resources and incorporate this knowledge into initiatives for sustainable plant use. The horticultural expertise and research capacity in botanic gardens can be used to develop propagation protocols, allowing species that are under threat from over-harvesting in the wild to be cultivated instead of directly harvested, thus taking the pressure off wild populations.

With their large visitor numbers and potential to influence public opinion, it is important that botanic gardens themselves are models of sustainability. Of particular importance is the need to ensure that all plant-based materials used in the gardens come from sustainable sources – for example, using timber only from certified sources – and ensuring that visitors are aware of this.

Many botanic gardens have gift shops which provide an ideal outlet for sustainably-produced plant-based products. Skilful production and marketing of such products can not only serve to raise awareness of sustainability issues with the purchasing public, but can also provide valuable livelihood support for the producers of the products.

3.7 Communicating biodiversity

With over half the world's population living in urban areas, increasingly cut off from nature, spreading the biodiversity message becomes an ever increasing challenge. As the majority of botanic gardens are located near urban centres, they offer unique opportunities for people to learn about and enjoy biodiversity. Botanic gardens generally include a wide range of diversity – both native and exotic, wild and managed, and they attract a broad range of visitors. Most botanic gardens consider biodiversity education to be a core activity, and thus many have established close linkages with local schools and educational groups. Increasingly teachers are being encouraged to use botanic gardens as 'open-air classrooms' and botanic garden educators work with teachers to raise awareness and understanding of the importance of biodiversity amongst school children. Despite this, levels of understanding remain low. With over 200 million visitors each year, the world's botanic gardens must ensure that every opportunity is taken to engage with and inform the public about biodiversity.

3.8 Sharing technology

Gardens make use of many technologies in their scientific and horticultural work. Glasshouse technologies and irrigation systems vary from the simple to the highly computerised. Herbarium climate and pest control systems can involve a range of equipment and chemicals. Data collection and management require information systems. Certain *ex situ* conservation techniques such as seed banking and micropropagation generally require specialised facilities and tools.

Box 15: Technology transfer and the Millennium Seed Bank Project

The Millennium Seed Bank Project (MSBP), based at the Royal Botanic Gardens, Kew, is an international collaborative plant conservation initiative that aims to safeguard 10% of the world's seed-bearing plants (around 24,000 species) against extinction by 2010. The project explicitly addresses the three CBD objectives of conservation, sustainable use and fair and equitable benefit-sharing, and one of the project's objectives is technology transfer: to encourage plant conservation throughout the world by facilitating access to and transfer of seed conservation technology. The MSBP is based on partnerships and collaborations with other organisations around the world. The project works with partners to develop their technical infrastructure and so build capacity for *ex situ* conservation. Seed banking of wild, rather than crop, species is a relatively recent and specialised area of technology, demanding use of both 'hard' and 'soft' technologies. Soft technology involves knowledge and understanding of species variation in, for example, seed viability or resistance to desiccation, and working out appropriate methodologies to increase success. Examples of hard technology involved in seed banking include databases and geographical information systems to manage collection and storage data and track specimens; drying facilities to reduce seed moisture content; X-ray machines to assess proportions of damaged seeds; aspirators to separate mature seeds from other material; hermetically sealed containers for seed storage; hygrometers for non-destructive measurement of water content; cold rooms; and incubators for germination testing. Each partner's needs, capacities and priorities are different and sometimes more traditional technologies or inexpensive commercial alternatives can be used. The MSBP also provides technical advice and training opportunities such as seed banking workshops, courses and studentships. The project has created an international network that encourages technology transfer between partners. More information about the MSBP and its work on technology transfer is available at www.kew.org/msbp/index.htm and on the CBD technology transfer and cooperation database at www.cbd.int/doc/case-studies/tttc/tttc-kew-en.pdf.

Scientific and technical knowledge, understanding and skills are needed to design and manage appropriate systems, solve problems and develop new methodologies. Botanic gardens with expertise in these areas can help to implement the CBD's provisions on technology transfer by offering technical advice, training opportunities, or funds for equipment and renovation to other gardens (see Box 15). Obviously it is important to consider a garden's particular needs and constraints: the most advanced technologies are not appropriate if they are not sustainable, for example if energy or water supplies are erratic or long-term support is not available. Gardens can also exchange information about low-cost solutions and innovative protocols.

4. A CBD checklist for Botanic Gardens

The following checklist may help to define an individual botanic garden's policy and procedures and enable more active contribution to national CBD implementation.

National context

- Contact your CBD National Focal Point, find out about your country's National Biodiversity Strategy and Action Plan and consider how your garden can actively contribute to national CBD implementation.
- Offer information on your garden's activities on conservation, sustainable use, access and benefit-sharing to the NFP for inclusion in National Reports.
- Urge your garden's overseas partners to inform their CBD National Focal Points about collaborative contributions to national CBD implementation.
- Consider ways to improve communication with government and other CBD stakeholders, for example by hosting visits and participating in stakeholder meetings.
- Take opportunities to participate in the national delegation to CBD meetings (such as SBSTTA).
- Does your country have a GSPC National Focal Point? If not, and your garden is very active in plant conservation measures at a national level, consider offering to become the GSPC NFP.
- Does your country have a GTI National Focal Point? If not, and your garden has a strong taxonomic research programme, consider offering to become the GTI NFP. Consider how to contribute information and skills to national and international taxonomic initiatives.

Garden engagement

- Find out about and participate in regional and national botanic garden network initiatives for GSPC implementation.
- Use the 2010 Botanic Gardens targets to focus garden activities, and report progress to GSPC National Focal Points, BGCI and national botanic garden networks.
- Publicise the value and obligations of CBD and your role in its implementation through plant conservation and sustainable use displays, exhibits, educational materials and leaflets, and press releases.
- Distribute information about CBD and related institutional policies to all your staff, volunteers and members of your governing board (e.g. Board of Directors) and ensure they understand what is required of them. Consider a staff training programme.

Access and benefit sharing

- For plants and specimens collected post-CBD (Dec 1993): always obtain the appropriate documents showing prior informed consent and mutually agreed terms (e.g. collecting permits, export permits, letters of permission from landholders and/or material transfer agreements) – in addition to any necessary CITES and/or plant health documentation.
- Ensure that no illegally collected or acquired plants come into your collections 'through the back door'.
- Assess the range of your garden's collections (living and preserved; from *in situ* and/or *ex situ* sources), activities and research interests, and the principal users of the collections, as a first step towards developing an institutional policy on access and benefit-sharing.

- Develop and implement a policy that addresses how your garden will acquire, use and supply plants, how benefits will be shared, how your garden will treat pre- and post-CBD material, and your garden's position on commercialisation.

- Adapt existing procedures or develop new procedures so that information on prior informed consent and terms of use (from permits and agreements) is kept linked with plants and specimens as they are used and transferred between users. Assign clear staff responsibility for curation and tracking issues.

- Check terms on plants from your collections before you supply or sell them to others outside the garden, to ensure that you are legally able to do so.

- Use an institutional Material Transfer Agreement (MTA) when supplying plants from your collections to research/commercial users outside the garden, to set out terms for use and benefit-sharing.

- Ensure that public plant sales only include plants whose terms allow for sale and that any restrictions (e.g. non-commercialisation) are communicated to buyers, for example on seed packet labels.

- Consider buying in plants from commercial sources to sell in public plant sales.

- If your garden contains collections in the public domain that are covered by the International Treaty on Plant Genetic Resources for Food and Agriculture, use the ITPGRFA Standard MTA for supplying specimens when appropriate.

- Consider what benefits your garden generates from its use of plants, and how these can be shared with countries of origin, for example through sharing information, skills, protocols and tools.

- Consider endorsing the Principles on Access to Genetic Resources and Benefit Sharing (the Principles) and joining the International Plant Exchange Network (IPEN).

Traditional knowledge

- If your institution collects and works with traditional knowledge, ensure that researchers are aware of and comply with relevant codes of practice and national and customary laws, and that research is carried out with the approval and involvement of local communities. Agree on whether and how information can be disseminated and what benefits can be shared.

- When working with traditional knowledge in the public domain, consider opportunities for acknowledgement of the original knowledge-holders, and benefit-sharing.

Invasive species

- Find out about relevant international and national laws and policies in your area and establish precautionary measures to avoid introducing invasive species.

- Develop a policy towards invasive species that addresses display, supply, plant disposal and plant sales.

- Consider risk-assessment procedures when accepting new plants; consult relevant international and national invasive species databases or lists.

- Avoid planting known invasive species except for public awareness or scientific purposes (e.g. for research on control measures).

- If known invasive species are planted for such purposes, take suitable measures to avoid their spread.

- Look out for signs of potentially invasive behaviour in established plants, and share your experiences, e.g. by informing other botanic gardens and your national authorities.

- Build public awareness of invasive species, for example through interpretation, exhibits and education modules, and consider how your garden can work with stakeholders such as local nurseries and landscapers to promote non-invasive alternatives for public use.

Sustainable use

- Ensure that all plant-based products used in the garden come from sustainable sources.

- Consider using the retail outlets (café, restaurant, shops etc.) to market sustainably-produced products (including fair-trade products) that support local livelihoods.

- Develop programmes with local communities that make use of the garden's horticultural expertise to support the sustainable use of local plant diversity.

Communication, education and public awareness

- Develop interpretation materials that provide information about the importance of biodiversity for all visitors.

- If they don't already exist, consider developing linkages with local schools and provide opportunities for children to experience nature first-hand.

- Try to influence national education departments to include biodiversity education in national curricula – and develop supporting materials for such courses.

- Consider celebrating International Biodiversity Day (May 22nd) at your garden.

5. Abbreviations and acronyms

ABS	Access to genetic resources and benefit-sharing
CBD	Convention on Biological Diversity
CEPA	Communication, Education and Public Awareness
CHM	Clearing House Mechanism
COP	Conference of the Parties
GBIF	Global Biodiversity Information Facility
GPPC	Global Partnership for Plant Conservation
GSPC	Global Strategy for Plant Conservation
GTI	Global Taxonomy Initiative
ITPGRFA	International Treaty on Plant Genetic Resources for Food and Agriculture
MAT	Mutually agreed terms
MDGs	Millennium Development Goals
MS	Multilateral System (of the ITPGRFA)
MTA	Material Transfer Agreement
NBSAP	National Biodiversity Strategy and Action Plan
NFP	National Focal Point
NGO	Non-governmental organisation
PIC	Prior informed consent
SMTA	Standard Material Transfer Agreement (of the ITPGRFA)
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Nations Framework Convention on Climate Change
WSSD	World Summit on Sustainable Development

6. References and resources

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Web Sites

CBD Home Page: Official site of the CBD Secretariat. The CBD website provides a comprehensive source of information on all aspects of the CBD, including the text and decisions, national contact details, NBSAPs and National Reports, ABS laws and policies, meeting documents, publications (such as the CBD Technical Series), principles and tools, news headlines and the clearing house mechanism. Much of the content is also available in French and Spanish. Hard copies of publications can also be obtained on request.
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Countdown 2010: This is a network of active partners working together towards the 2010 biodiversity target. Each partner commits additional efforts to tackle the causes of biodiversity loss. The secretariat – hosted by the International Union for Conservation of Nature (IUCN) – facilitates and encourages action, promotes the importance of the 2010 biodiversity target and assesses progress towards 2010. www.countdown2010.net

Botanic Gardens Conservation International: Global network linking botanic gardens to preserve and promote plant diversity for people and the planet. The website provides information and resources for plant conservation and sustainable use, an education portal, plant and garden databases and policy tools including GSPC documents and guidance on ABS. www.bgci.org

IUCN- the International Union for Conservation of Nature: The world's largest professional conservation organisation. IUCN brings together governments, non-governmental organisations, institutions and individuals to help nations make the best use of their natural resources in a sustainable manner. www.iucn.org.

Global Partnership for Plant Conservation: Brings together international, regional and national organisations to contribute to GSPC implementation and provides links to national GSPC initiatives. www.plants2010.org

Global Invasive Species Programme: An international partnership programme that facilitates and assists the prevention, control and management of invasive species worldwide. www.gisp.org.

BioNET-INTERNATIONAL: Works with governments and scientists around the world to establish local partnerships for taxonomy. www.bionet-intl.org

Global Biodiversity Information Facility: Membership organisation of participating governments, organisations, institutions and individuals building a network of databases to openly and freely share biodiversity data. www.gbif.org

International Treaty for Plant Genetic Resources: Provides text of the treaty and the Standard Material Transfer Agreement as well as information on membership, the multilateral system, funding strategy and farmers' rights. Also includes training materials. www.planttreaty.org

Earth Negotiations Bulletin: Tracks the major environmental negotiations as they happen and provides background. Also extensive archive material and lots of photographs of the meetings. www.iisd.ca

Science and Development Network (SciDevNet): Provides news, views and information about science, technology and the developing world. Dossiers are available on issues including biodiversity, climate change and indigenous knowledge. Users can sign up for email alerts of news on selected topics. Includes content in French, Spanish and Chinese. www.scidev.net

GRAIN: International non-governmental organisation (NGO) that promotes the sustainable management and use of agricultural biodiversity based on people's control over genetic resources and local knowledge. The website contains up-to-date information on biodiversity laws. www.grain.org/brl/

UN Millennium Development Goals: A set of 8 goals to respond to the world's main development challenges, agreed by all the world's countries and leading development institutions, to be met by 2015. www.un.org/millenniumgoals

Millennium Ecosystem Assessment: A major international scientific initiative, carried out 2001-2005, to assess the consequences of ecosystem change for human well-being and the scientific basis for action needed to enhance the conservation and sustainable use of those systems. The website contains the full reports, synthesis reports and useful links. www.millenniumassessment.org

Biodiversity and Tourism Network: Web-based platform created by the CBD and the World Tourism Forum for Peace and Sustainable Development to disseminate information on use of the guidelines and to exchange knowledge. http://tourism.cbd.int

CABI: Not-for-profit intergovernmental organization specialising in scientific publishing, research and communication that is active in the area of invasive alien species and is currently developing an Invasive Species Compendium. www.cabi.org/invasives

International Plant Protection Convention (IPPC): A plant health treaty, under the Food and Agriculture Organisation, that focuses on actions to prevent the spread and introduction of pests of plants and plant products, and to promote appropriate measures for their control. www.ippc.int

UNEP-World Conservation Monitoring Centre: The specialist biodiversity information and assessment centre of the United Nations Environment Programme (UNEP) run cooperatively with WCMC 2000, a UK charity. UNEP-WCMC's mission is to evaluate and highlight the many values of biodiversity and put authoritative biodiversity knowledge at the centre of decision-making. www.unep-wcmc.org.

Species 2000: Aims to create a validated checklist of the world's species (plants, animals, fungi and microbes). The programme, which operates in partnership with the **Integrated Taxonomic Information system (ITIS)** of North America, currently produces the Catalogue of Life. This is used by the Global Biodiversity Information Facility (GBIF) and Encyclopedia of Life (EoL) as the taxonomic backbone to their web portals. www.sp2000.org

The Food and Agriculture Organization of the United Nations: Leads international efforts to defeat hunger, helping developing countries and countries in transition modernise and improve agriculture, forestry and fisheries practices and ensure good nutrition for all. www.fao.org.

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