THE ROLE OF BOTANIC GARDENS IN THE THIRD MILLENNIUM

SARA OLDFIELD

Botanic Gardens Conservation International

Botanic gardens have been created over the past five hundred years to carry out a range of different functions. There are currently over 2,500 botanic gardens in more than 150 countries, with over half of them established in the past 50 years. A commonly accepted definition of a botanic garden is "An institution holding collections of documented and living plants for the purposes of scientific research, conservation, display and education".

The earliest botanic gardens were established as physic gardens in the sixteenth century, dedicated to the cultivation and study of medicinal plants. In the colonial era, botanic gardens were important as plant introduction and testing centres supporting the development of tropical agriculture. Documentation and classification of plants have always been significant roles as part of the teaching function of botanic gardens. Public education and awareness are now predominant roles as people become increasingly disconnected from the natural world.. Equally over the past 40 years the value of botanic gardens as centres for plant conservation and sustainable use has become increasingly important.

The world's botanic gardens contain between 80-100,000 living plant species, approximately 30 percent of known plants. This figure includes many plant species that are threatened with extinction and some that are already extinct in the wild. Botanic gardens in the Third Millennium undertake various roles in the conservation of plants. Their role in *ex situ* conservation through the maintenance of living collections is most widely acknowledged. This provides the plant material for restoration and reintroduction programmes, increasingly important at a time of rapid global change. Botanic gardens also have an important role in *in situ* conservation either through biodiversity assessment or directly protecting areas of natural vegetation within their grounds or associated reserves.

Biodiversity conservation is arguably the most important role botanic gardens can play given the current scale of biodiversity loss. The global biodiversity situation has recently been comprehensively described by the Millennium Ecosystem Assessment, called for by UN Secretary General in 2000 and reported on in 2005. This is the largest assessment ever undertaken of the health of ecosystems involving 1,360 experts from 95 countries. The Assessment was led by a multi-stakeholder board included government, business, NGOs and representatives of indigenous peoples. The resulting Assessment represents a consensus of the world's scientists: where there is broad consensus within the scientific community this is noted and also where controversies or uncertainties remain in understanding and recording information on ecosystems.

Unfortunately plants are poorly represented in the findings of the Millennium Ecosystem Assessment primarily because threatened plants have been inadequately catalogued at a global scale. Overall it is estimated that there are around 300,000 flowering plant species. The 1997 IUCN Red List for plants documented 34,000 species as being threatened with extinction (Walter and Gillett, 1997). The 2006 IUCN Red List, using a different system for categorising threat lists 12,906 species. There is an urgent need to increase the documentation on the conservation status of plants in the wild around the world and this is an important task that botanic gardens can contribute to.

The Millennium Ecosystem Assessment provides a general backdrop on the status of the world's biodiversity against which the specific actions being taken for plant conservation can be considered. The Global Strategy for Plant Conservation (GSPC) which was adopted unanimously by the 187 Governments at the Conference of the Parties of the Convention on Biological Diversity in April 2002 is a Strategy developed specifically to tackle the conservation of plant diversity. The long-term objective of the GSPC is to halt the current and continuing loss of plant diversity.

Three Key Findings of the Millennium Ecosystem Assessment

Key finding 1: Human activities are fundamentally, and to a significant extent irreversibly, changing the diversity of life on earth, and most of these changes represent a loss of biodiversity

- All components of biodiversity have been greatly reduced over the last 150 years
- The rate of loss is continuing or increasing
- Changes to species diversity are significant and largely irreversible
- Humans have increased the species extinction rate by as much as 1,000 times over background rates typical over the planet's history (*medium certainty)*
- 10–30% of mammal, bird, and amphibian species are currently threatened with extinction (*medium to high certainty)*

Key finding 2: Biodiversity contributes directly and indirectly to many constituents of human well-being

- Degradation tends to lead to the loss of non-marketed benefits from ecosystems
- The economic value of these benefits is often high and sometimes higher than the marketed benefits

Key finding 3: The drivers of loss of biodiversity and the drivers of changes in ecosystem services are either steady or increasing in intensity

The scope of the GSPC covers the following broad themes:

- Understanding and documenting plant diversity
- Conserving plant diversity
- Using plant diversity sustainably
- Promoting education & awareness about plant diversity
- Capacity building for plant conservation

The Strategy consists of 16 outcome-oriented targets to be met by 2010. The Strategy was considered as a pilot approach for the use of targets under the Biodiversity Convention and was used as a template for developing sub targets for the goals of the overall 2010 target: "*a significant reduction in the current rate of loss of biological diversity".* The overall 2010 biodiversity goal was first adopted by the CBD in 2002 and was confirmed by the World Summit on Sustainable Development held in Johannesburg in the same year. Recently the goal was reinforced by the G8 leaders in their summit declaration, "Growth and Responsibility in the World Economy", issued in June 2007. This is the first time that a G8 Summit has included a commitment on biodiversity – recognizing its value and strengthening commitment to conservation.

BGCI has been very much involved in the GSPC from its original conception in 2000, through its development and subsequent adoption by the CBD in 2002 and it continues to support its implementation in

a wide variety of ways. As well as seconding a member of staff to the CBD Secretariat to act as GSPC Programme Officer, BGCI also provides the Secretariat to the Global Partnership for Plant Conservation which was established to support implementation of the Strategy. Furthermore BGCI has mobilised some considerable level of funding to support GSPC-related activities worldwide through the HSBC Investing in Nature Programme. The GSPC has been completely mainstreamed within our programmes and activities and provides the basic framework for BGCI's new Five Year Plan 2007-2012.

The botanic garden community as a whole has also widely embraced the GSPC and around the world, botanic gardens are implementing a very wide range of activities that support the GSPC targets. The extent to which these activities are reported to the CBD through the national reporting framework is however variable, and BGCI considers that a gap exists between the extent of activity actually taking place, and the amount that this is being reported. The GSPC has recently been subject to an in-depth review and a report will be presented at the Ninth Conference of the Parties in 2008.

Botanic gardens are involved in implementing all the targets of the GSPC. Examples of targets which directly address the challenge of plant extinctions include Targets 7 and 8. Target 7 calls for 60% of the world's threatened species conserved *in situ.* This is clearly a challenging target and one that is of fundamental importance of plant conservation. It is difficult to measure overall progress towards Target 7 not least because of the lack of collated data on globally threatened plant species. It is interesting to note, however, that more than 400 botanic gardens around the world manage natural areas for *in situ* conservation within their boundaries.

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

BGCI, together with Bioversity International is the lead facilitating agency for this Target. As part of BGCI's contribution to Target 8, BGCI has developed the PlantSearch Database as a means to identify plants in cultivation in botanic gardens. This database was launched on BGCI's website (www.bgci.org) in 2003. The database currently holds records for over 150,000 taxa, provided by nearly 700 botanic gardens. The plant records are presently linked to five databases – the 1997 and 2006 IUCN Red Lists of threatened plant species, the International Plant Names Index (IPNI), a list of Crop Wild Relatives and the Tree Conservation Database. An initial index of medicinal plant names has also recently been added. The database allows individual institutions to upload and manage their own data and provides a valuable means for in-country organizations to manage and review data on their own and on other national collections.

The ability to cross reference the species list with current Red List data shows which globally threatened species are in cultivation and thus require conservation action. At present, nearly 12,000 globally threatened species are recorded in the database. Given that the present number of globally threatened plants is around 34,000 (1997 Red List), a milestone agreed for 2007 of 40% of threatened plants in *ex situ* collections would translate to around 13,500 species. The PlantSearch database indicates that this milestone is close to being reached by botanic garden collections alone. However as we know very few plant species have been assessed for threat status at the global level.

The focus for BGCI now is to ensure that the major seed bank collections (such as the Millennium Seed Bank, ENSCONET seed banks and the crop genebanks) are also assessed with the PlantSearch database and that data is analysed with regard to the status of conservation in the country of origin. Further work is also required to identify and record species in recovery programmes. In this respect, BGCI has recently adapted the 1992 BGCI Propagation database for endangered British and Irish plants and will link this to the PlantSearch Database; this database will help to promote the link to *in situ* conservation and monitor the achievement of the second part of Target 8: *10% of threatened plant species included in recovery and restoration programmes*.

GSPC Target 13 calls for *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.* This Target links to policy and actions that recognise the vital importance of biodiversity for human well-being - a key message of the Millennium Ecosystem Assessment. Ways in which botanic gardens are supporting the use of biodiversity to improve human well-being are documented by Waylen, 2006.

GSPC Target 14 calls for *The importance of plant diversity and the need for its conservation incorporated into communication, education and public awareness programmes.* BGCI is also the lead facilitating agency for this cross-cutting Target. As botanic gardens around the world receive more than 200 million visitors per year, they provide an excellent opportunity to engage with the public about the value of plants and the threats that they face.

Progress towards the various GSPC targets has been variable but overall the Strategy has been a considerable success in stimulating and harmonising plant conservation efforts. It has been particularly exciting to see the development of a national response published by China this year with support from BGCI. China has ten percent of the world's flora and at a time of repaid economic development many species are under threat within the country. Developing a national response to the GSPC has brought together China's network of botanic gardens to work with government conservation agencies on a common plan for the first time.

In general progress towards targets relating to sustainable management of production lands and products (GSPC Targets 6 and 12) has proved particularly challenging for all countries. This is no doubt to be expected but is of concern given that habitat transformation – particularly for agriculture - is one of the main drivers in biodiversity loss as noted in the Millennium Ecosystem Assessment. Overall constraints noted by the in-depth review process from experiences in national GSPC implementation:

- limited institutional integration,
- lack of mainstreaming – particularly in relation to agricultural policy,
- lack of supporting policies and legal framework
- lack of data, tools and technologies
- resource (financial and human) challenges

Despite these constraints, it is very clear that the botanists must make sure that the GSPC is a resounding success. As part of this botanic gardens must continue to give clear messages on the need for

plant conservation, demonstrate our effectiveness and publicise our results. The threats to wild plants are increasing at a time of rapid global change. Beyond 2010, the innovative target-setting approach for plant conservation under the auspices of the CBD will need to be adapted to reflect the reality of climate change within the Third Millennium but in the meantime we need to demonstrate that the existing targets can substantially be met.

REFERENCES

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