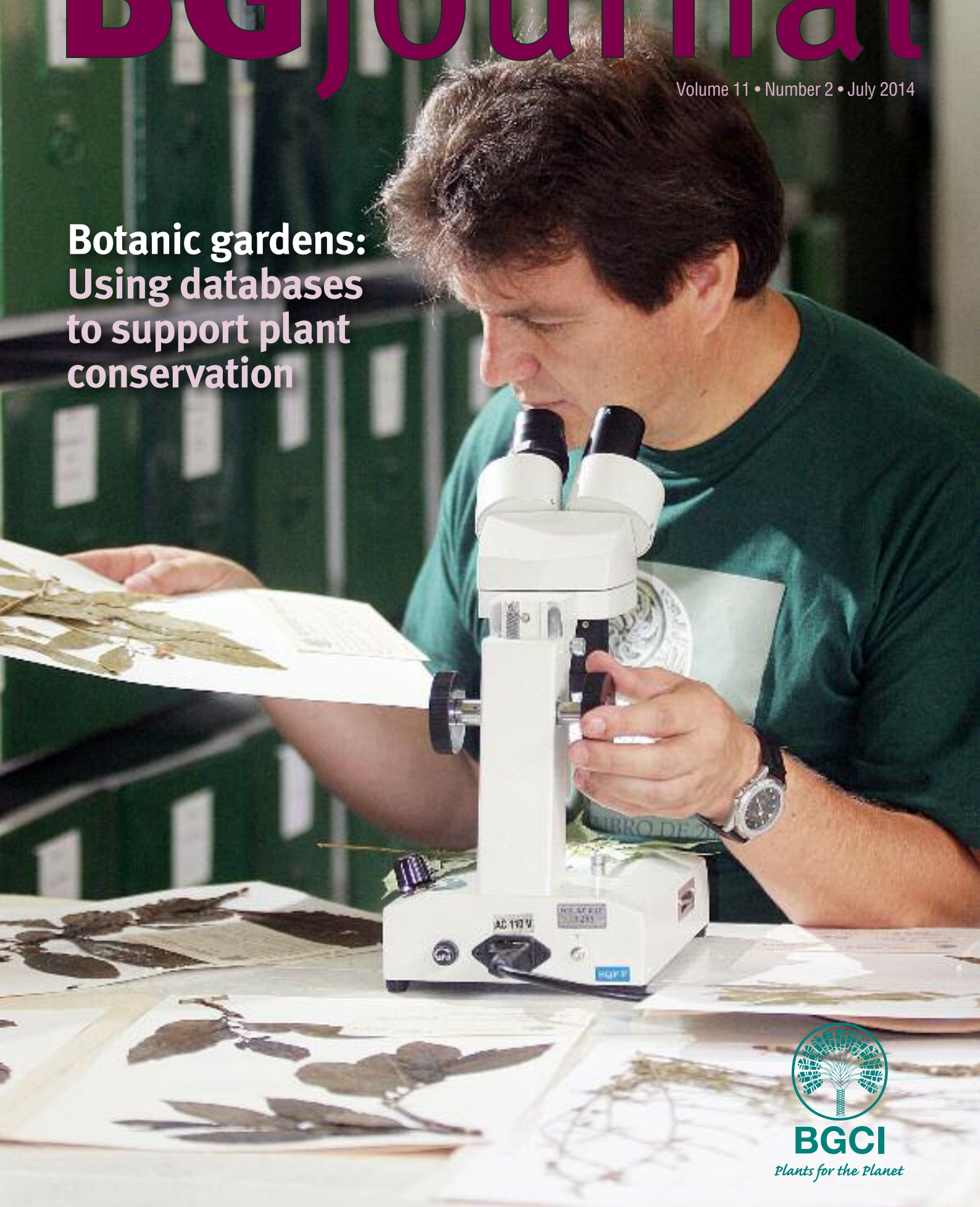


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# BGjournal

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**Botanic gardens:  
Using databases  
to support plant  
conservation**



**BGCI**

*Plants for the Planet*

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**Cover Photo:** Examining herbarium specimens in Curitiba herbarium, Brazil (Michael William / SMCS)

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United Nations Decade on Biodiversity

# CULTIVATING BITS AND BYTES

## Introduction

For many years botanical gardens have been recognized as the guardians of knowledge about plants. Compiling specimens from all over the world in their collections, both preserved in their herbaria, or alive in their gardens, they attracted and housed researchers and experts. This work of botanical gardens generated much of today's knowledge of plants, and this was further transmitted to the wider society through their education and outreach programmes. However, this is about to change.

The way in which the information is generated and consumed by society has changed dramatically in the last decade. With the advent of information and communication technologies (IT), especially with the "Internet boom", we are facing a new kind of science - "Network Science" (Nielsen, 2011), and also a new kind of society.

## Botanists and computers

Botanists have been exploring the use of computers for quite some time. For example, in 1962 the paper "Data-processing for the Atlas of the British Flora" was presented at a symposium entitled "The applications of data-processing methods to research in the biological sciences", sponsored by the American Society of Plant Taxonomists, the Botanical Society of America and Ecological Society of America; in Corvallis, Oregon, USA (Perring, 1963). Since then, huge progress has been made, especially during the 1980s and '90s. In December 1982, the Systematics Association held an international symposium on Databases in Systematics where Allkin and Bisby (1984) noted:



Scientists working on the Brazilian Flora Checklist Online.

**“...The feeling that we were experiencing a period of rapid technological development, particularly in the effectiveness of small computers and the availability of database software...”**

Following that, the first meeting of the Taxonomic Databases Working Group (TDWG), was held at the Conservatoire et Jardin Botaniques, in Geneva, Switzerland, in September 1985 to establish international collaboration among biological database projects. TDWG, a not for profit scientific and

educational association affiliated to the International Union of Biological Sciences aimed to promote the wider and more effective dissemination of information about the world's heritage of biological organisms for the benefit of society at large.

The capacity and competence of the early pioneers in biological databases permeated through the institutions where they worked and resulted in the development of new departments of "Scientific Information" and "Biodiversity Informatics". Today this interface between information science and biodiversity has become of great strategic importance to many botanic gardens and their staff have become



*Orchid specimens in the laboratories of the Xishuangbanna Tropical Botanic Gardens (Barney Wilczak)*

experts in the field of ‘biodiversity informatics’ - a new term coined around 1992 by a Canadian Consortium (Berendsohn, 2013).

### Bringing data sets together

More recently, botanic gardens have used new biodiversity informatics technologies to consolidate, assemble and publish their vast knowledge of the world’s plant diversity. Of particular note are the efforts of the Royal Botanic Gardens, Kew and the Missouri Botanical Garden, to publish in 2010 “The Plant List” – the first ever list of botanical names of all known plant species. The Plant List was created by combining multiple checklist data sets held by these institutions and other collaborators.

*“The Plant List was created in response to Target 1 of the Global Strategy for Plant Conservation (GSPC), which called for a widely accessible working list of known plant species to be created by 2010. It is available on-line at [www.theplantlist.org](http://www.theplantlist.org)”*

Version 1.1, of the Plant List, which was released in September 2013, includes new data sets, updated versions of the original data sets and improved algorithms to resolve logical conflicts

between those data sets. Version 1.1 includes: 642 plant families, 17,020 plant genera and 1,064,035 scientific plant names of species rank. Of these 350,699 are accepted species names and 242,712 names are yet to be resolved.

Compiling a list of the accepted Latin name for most species, with links to all synonyms by which that species has been known, is a huge step towards a system that may offer a unique and stable reference to the taxonomic concept which those names intend to represent, allowing information and knowledge related to those taxa concepts to be linked and brought together.

### Beyond a list of plants

The tenth meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 10) was held in Japan in 2010. At this meeting, a consolidated update to the Global Strategy for Plant Conservation (GSPC)

was adopted, with sixteen updated global targets for plant conservation, including Target 1 of developing, by 2020, an online Flora of all known plants.

In response to this, a document “A World Flora Online by 2020: a discussion document on plans for the achievement of Target 1 of the Global Strategy for Plant Conservation by 2020” was prepared by the Missouri Botanical Garden, the New York Botanical Garden, the Royal Botanic Garden Edinburgh, and the Royal Botanic Gardens, Kew. This led to the launch of the World Flora Online in India, at an event held during COP 11 in October, 2012.

The first World Flora Online (WFO) Meeting was held at Missouri Botanical Garden, USA, in July 2012. On that occasion, the participating institutions were invited to sign a Memorandum of Understanding (MoU), in order to compose an “informal international consortium to facilitate the achievement of a World Flora Online by 2020”.



*Examining plant labels at Auckland Botanic Garden, New Zealand*

The MoU also provides an expression of interest for organizations to become involved in an international World Flora Online (WFO) project .

At that meeting also, two working groups were created in order to define the technology and taxonomic aspects of the WFO implementation.

The massive presence of botanic garden institutions (Berlin, Edinburgh, Geneva, Kew, Missouri, New York and Rio de Janeiro), in the Technical Working Group reflects the high level of Biodiversity Informatics capacity and competence amongst these institutions.

### Looking to the future

Initiatives such as The Plant List and The World Flora Online will have a huge impact on conservation projects, where such authoritative databases will offer a 'one-stop-shop' to access the best available information on the world's plants.

One example is the on-going work on threat assessments of Brazilian plants, which is coordinated by the National Center of Flora Conservation - CNCFlora, in Rio de Janeiro Botanical Garden, Brazil. This relies heavily on the Brazilian Flora Checklist Online in order to compile all the information available about the assessed species. In turn, the Brazilian Flora Online will make an important contribution to the World Flora Online.



*World Flora Online Meeting, July 2012*

In this new world, where computers talk to each other, bits and bytes flow through an overwhelming network of high tech hardware which embraces every almost every corner of the planet. Data readily reaches millions of households, through a myriad of handheld devices and mobile phones. Botanic gardens have been part of this revolution – and have learned – and are still learning new tricks to reach their audience.

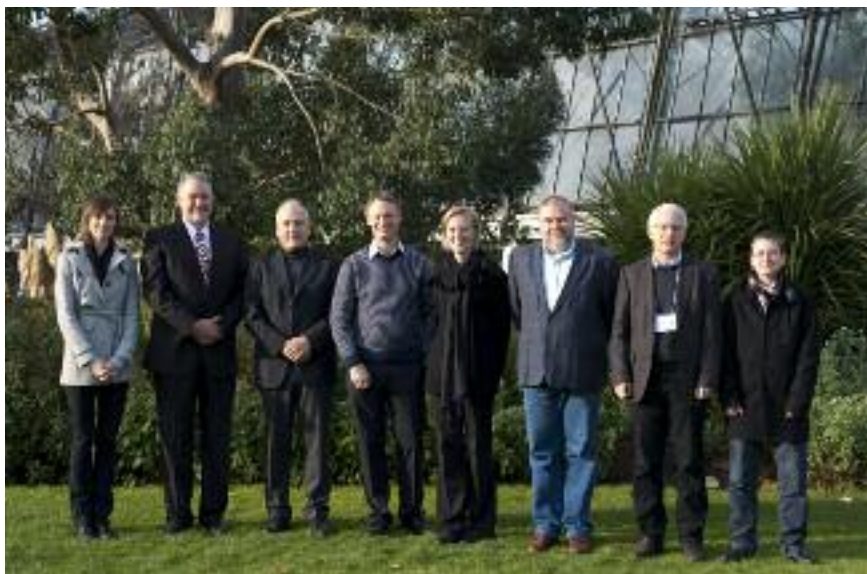
From being amongst the pioneers of the biodiversity informatics revolution, botanic gardens are today becoming the one of the pillars of a global

infrastructure of biodiversity information, where the most optimistic envisage an era where an efficient monitoring of biodiversity will promote and ensure the effective conservation, and sustainable and fair use of biodiversity for all.

### References

- Allkin, R., and Bisby, F. 1984. *Databases in Systematics*. The Systematics Association Special Volume No. 26.
- Berendsohn, W. 2013. Apr 14. "Biodiversity Informatics", *The Term*. Retrieved from Botanischer Garten und Botanisches Museum Berlin-Dahlem: <http://archive.today/i4DJd>
- Nielsen, M. 2011. *Reinventing Discovery: The New Era of Networked Science*. Princeton University Press.
- Perring, F. 1963. Data-Processing for the Atlas of the British Flora. *Taxon*, 12(5).

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*World Flora Online Technical Working Group Edinburgh, November 2013*