Advances in living collections management

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Abstract

The living collections at Missouri Botanical Garden serve many purposes, including research, conservation, education, and display. With increasing threats to plants and plant habitats worldwide, conservation has become the most important aspect of the living collections. However, outdated curatorial practices, including the plant records database system, were inadequate and impeded progress towards the science and practice of plant conservation. MBG recognized the urgent and critical need to redesign and redevelop its plant records database and supporting curatorial practices. Now, these modern approaches are helping MBG achieve the highest standards of record-keeping and curation, and are making the comprehensive information on its living collections accessible to visitors, staff, and scientists.

Keywords

Collections, conservation, curate, database, plant records, GIS, technology

Missouri Botanical Garden's (MBG) living collections serve as the basis for meeting key horticultural, educational, research, and conservation goals and are of critical importance to multiple constituencies, including staff, Garden visitors (onsite and on-line), and scientists and conservationists working at local and international levels. In order to ensure top-quality collections care and maintenance, meet programmatic goals, and serve important audiences, living collections must be adequately tracked, documented, labeled, interpreted, and curated. Comprehensive information about the collections must be easily accessible to multiple audiences in multiple formats.

Unfortunately, many of the curatorial practices used at Missouri Botanical Garden had become antiquated, and the information about MBG's living collections was spread out among several fragile, outdated, and incompatible database systems that had been developed over a 20-year period. These systems each served a narrow purpose and were not coupled or integrated. They were prone to poor access speeds and data capture failure when accessed by multiple users simultaneously. Data could not be easily transferred to internet-compatible formats. Due to the time and cross-referencing necessary to enter data, or to transfer data from one database to another, information was entered incorrectly, lost, or skipped over entirely. Work was duplicated and valuable time, effort, and accuracy was lost. When data needed to be accessed by staff, visitors, or scientists, it was not easily found or sometimes even available at all. The inadequacy of the various database systems directly affected the care of collections and the fulfillment of programme goals and audience needs. It was a barrier preventing progress toward MBG's strategic goals in key areas.

Recognizing the urgent and critical need to redesign and redevelop the living collections management system, MBG embarked on a process to create a modern, comprehensive collections management system. Firstly, the database infrastructure was upgraded to meet current technological standards, basic plant records fields were fine-tuned, data from the GIS was integrated, and taxonomy and related data from MBG's renowned Tropicos® plant database (the world's leading repository of scholarly botanical information) was integrated. This new living collections management system was built in SQL Server, a global standard relational database system with strong integration to ESRI software, and provides a stable and robust platform for daily operations and programmatic growth. This modern database technology has also allowed the development of many features that improve living collections curation.

First and foremost, the new database features seamless integration between plant records data and GIS data. In most plant records systems, these systems are separate, essentially resulting in duplicate information in two database systems that is difficult to maintain and keep synchronized. In the new Living Collections management System (LCMS), plant records data can be updated on the same user screens as GIS data, and while the plant records data and GIS data are held in separate SQL databases, the synchonization between the two systems is seamless and invisible to the user. This enables increased efficiency and accuracy, and also the ability to visualize the locations of specific taxa on interactive maps and edit inventories in the field (See figure 1).

As the LCMS was further developed, fields and functionality were added to support various projects and workflows. For example, MBG developed and produced custom field books for MBG staff, with fields to record information on location, habitat, soil type, etc. that will enable horticulturists to more successfully grow the plant *ex-situ*. A concerted effort was made to match the fields in the LCMS to the fields in the field books exactly. In addition, the fields match MBG's Tropicos plant database as well as several fields in the Center for Plant Conservation (CPC) database. This allows for more accurate and efficient record-keeping, as well as enabling data linkages between databases used by staff in different divisions (See figure 2).

Other features in MBG's LCMS include:

- The addition of fields for data associated with permits and agreements. These documents are scanned, data pertaining to the document is entered, and each document is linked to the appropriate accession records. This allows for easy document storage and retrieval, especially as it relates to CBD (See figure 3).

- Labels and accession tags can be requested in the LCMS by horticultural staff and printed directly to engravers and embossers.

- All stages of propagation are tracked and related data can be queried and valuable reports can be generated.

- Data from a RAWS weather station on garden grounds is routinely uploaded to LCMS, along with temperature readings from several sensors located in various areas of the garden. This data is used in various analyses and reports, alongside plant records data, and to provide meaningful information for our horticulture, education, and research programmes.

- Tools within LCMS allow the printing of QR code labels directly to a mobile printer via an iPad or other mobile device for use on accession tags. A scan of the code directs the user to the planting edit screen.

- A data dashboard provides collections information at a glance that allows horticulture staff to understand and plan future additions to the collections.

- A user interface designed specifically for mobile devices with commonly used tools provides easy access to add data such as assessments and measurements, images, and phenology (See figure 4).

- A visitor-friendly user interface allows easy access to cultural information for over 7400 plants in the LCMS. The site is extremely popular, and allows the public to access gardening information, plant locations in the Garden, photos, and more.

In conclusion, well-documented living collections are one of the greatest assets of public gardens (Hird and Dosmann, 2010). While some curatorial practices remain the same as they were 150 years ago, modern technology can allow more data to be stored, increase accessibility, and streamline curatorial processes, ultimately increasing the value of living collections. High quality

standards are vital in order for living collections to be used for research and conservation, and MBG has already experienced a higher demand for using the living collections for scientific research and conservation projects. This, in turn, has resulted in exciting and relevant stories to share with the public, which increases their understanding and appreciation for plants.

References

Hird, A., and Dosmann, M., 2010. Getting the most out of your BGCI plant upload. *Bgjournal* Vol 7 (1) pp18-21

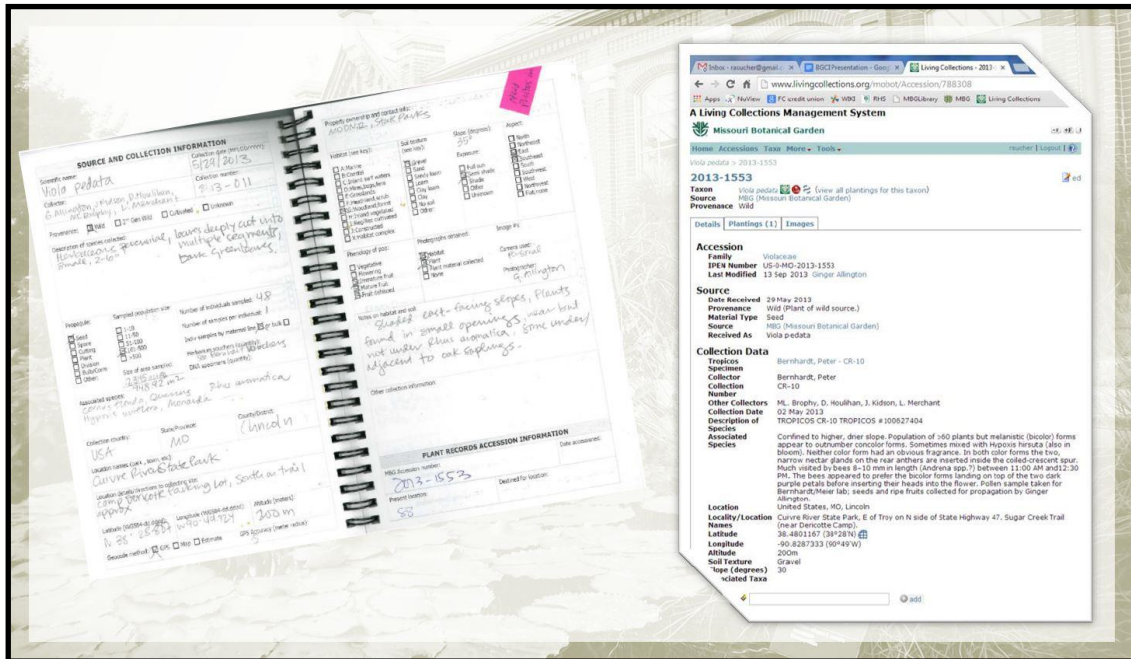Figure:1 Screen shot from MBG's Living Collection Management System

Figure 2 Field books produced in house that match database fields exactly
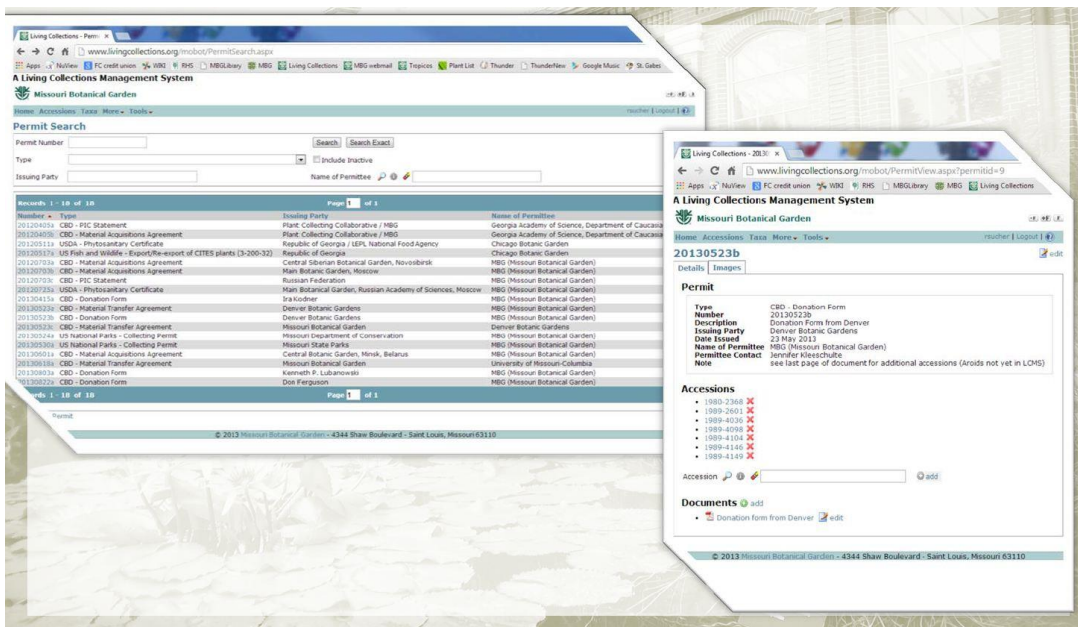

Figure 3 Permits and agreement s can be linked to multiple access records

Figure 4 Database screens designed for mobile devices, for tasks commonly performed in the garden