

Living Collections Development and Curation: workshop discussion at 7GBGC

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Living plant collections held in botanic gardens are highly documented living collections that are curated and developed to serve many purposes. There are many different strategies and processes used in botanic gardens to curate, focus and manage collections. The Living Collections Development and Curation workshop run at the 7th Global Botanic Gardens Congress (7GBGC) in Melbourne, Australia from the 25-29th September 2022 was structured around common challenges botanic gardens face in developing and managing their living collection, and ways to optimize collections for conservation and research, and integrating these collections into landscapes to achieve success across broader mission areas. Attendees worked in small groups to discuss key aspects of living collections development and curation by highlighting the challenges botanic gardens face when managing their living collections and identifying opportunities to support the development of living collections plans.

Key aspects explored of living collection management were:

- Research and conservation horticulture in gardens of all sizes
- Building and landscaping with collections
- Attracting, training, and retaining quality horticulturists
- The value of living collections in botanic gardens

The workshop attendees were surveyed at the start of the session to understand the diversity of roles and gardens represented in workshop. Over 100 people attended the workshop from all over the world including Argentina, Australia, Bahamas, Canada, England, The Netherlands, New Zealand, Scotland, Singapore and USA. 44% were from major city botanic gardens (50+ staff), 20% were from large regional botanic garden (10+ staff), 19% were from medium regional botanic gardens (3-10 staff), 3% were from small botanic garden (2 or less staff, or volunteer run), 2% were from a university affiliated botanic gardens and 13% were classified as other. Attendees were relatively evenly spread across the different botanic garden roles including horticulturist, nursery staff, curator/records officer, plant scientists, visitor engagement/education and manager/team leader. In terms of the primary goal for individual gardens, most attendees selected display (47%) or conservation (33%). Fewer thought their main purpose was education (6%), research (2%), cultural (2%) and other (11%). More than half the attendees had a living collections plan with 48% understanding how it applied to their role and 15% not sure how it applied to their role. 33% did not have a living collections plan and 4% were unsure if they had any living collections documents. Of those gardens that did not have a living collections plan, the majority of these were regional botanic gardens.

Research and conservation horticulture in gardens of all sizes

Wild provenanced collections add value and diversity to the collections gardens curate. Depending on the region, there will be different protocols and permissions required. Seeking permission from landowners (private or public) can be slow, physical access may be difficult, identifying how and what to target for collections (site vs species) is complex, and ability to genetically represent a population in a collection may not always be possible. There can be a “stamp collecting” approach to plant collections which leads to great representation but little diversity. *Amorphophallus titanum* (the “panda of the plant world”) is widely held in collections, but due to restrictions on wild collection has very shallow genetic

diversity. Collaboration and metacollections can help address this and build genetic diversity in plant holdings. “Conservation through commercialization” can be an attractive option for plant conservation, but often limited by restrictions on the use of collected material. Similar restrictions can limit transfer between gardens.

Transfer of material to or from a garden requires a complex web of permits and permissions including landowners, biosecurity and quarantine protocols, traditional owner collaboration and Access and Benefit Sharing arrangements. Seed is often the easiest source of material from a practical and biosecurity perspective, with the BGCI Index Seminum supporting seed transfer. Protocols have not yet been fully developed for meeting Access and Benefit Sharing requirements, often limiting collections to in country. Successful alternatives include large botanic gardens developing out of country partnerships to support local gardens to care for their own flora. This way the material ownership remains vested in the country of origin and isn't transferred. A potential problem with this approach can be a lack of resources and technical skills in partner countries, especially for tissue culture and other laboratory propagation. Even when permitting is possible, it is still beyond the reach of small botanic gardens, but this creates opportunities for large botanic gardens to support collaborative collecting trips.

Ensuring plant records data is maintained is important for robust, scientifically based collections. Many gardens struggle with allocating time for updating records and the cost of plant record systems. While databasing new accessions may be relatively straightforward, maintaining accurate and timely records for existing collections is difficult for many gardens. Ways to ensure plant records are a priority for staff include having a specific plant records role, allocating time in work programs for record keeping, including record keeping in job description KPIs, and developing an organizational culture where records are prioritized and valued. It is also important to ensure the system being used is fit for purpose and accessible (such as the BGANZ project for making Hortis accessible to its members) and an appropriate basic (core) dataset is identified, regardless of the size of the collection. There are also processes in records management that all gardens undertake, such as taxonomic/name changes, which could be streamlined across gardens.

Botanic gardens are an ideal place for research, internal and external, to occur. Small gardens are not generally well used for research, but opportunities exist for collaboration with other institutions, such as universities. The better documented the collection, the more valuable it is to researchers. Making collections accessible through partnerships with research institutions and searchable online networks such as the International Plant Sentinel Network, builds opportunities for collections to be more widely used. Inadvertent duplication of research can be a problem in conservation horticulture. There is a need to broaden research targets, as it is common for the same conservation criteria to be used across studies, leading to a very small pool of taxa being targeted. The breadth of research can be expanded by selecting a plant two or three steps down the conservation priority list. Broadening our idea of what research looks like in a garden may also expand how and what is used, such as ethnobotanical and medicinal research, plant selection for sustainable water devices like green roofs and sustainable horticulture.

Building and landscaping with collections

This theme explored strategies for creating aesthetic horticultural displays using living collections. One major challenge for gardens is growing plants that are new to cultivation. With little information

available on how to grow a new species, how well it will perform in the landscape, maintenance needs, weed potential, and where it will fit best all make it difficult to plan for new species, especially long term. One way to address these challenges is to delineate areas of the garden into quadrants and habitat types. Broader thematic areas allow for more diverse collections and overall quality of displays. Trial and error are used by many gardens in using new species in the landscape, and documenting successes and failures helps to build knowledge. Inter-mixing new cultivars and wild species with known cultivation requirements and desired aesthetics are good ways to increase display factor and increase visitation.

Another challenge related to landscaping with living collections is the lengthy process of master plan development and thematic planning. Policies, processes, and red tape, and even unplanned infrastructure, such as new monuments or artworks, can hinder the implementation of a project. As these obstacles are navigated, one project can multiply into many, often overwhelming horticulture staff and reducing morale. Once a master plan is developed, it can be difficult to find species that fit into a particular landscape concept. Conversely, sometimes valuable wild collected species do not fit into a master plan, or the species that are chosen by landscape architects are not appropriate or do not include a wide enough variety of species. For this reason, curators and horticulturists are crucial in the plant selection process and a living collections policy is essential.

Other barriers related to displaying living collections in a landscape include an array of pests and diseases. Damage by wildlife is common, such as by bats, rabbits, and possums, but humans can also cause significant damage through trampling as well as theft. Diseases are an ongoing issue, such as armillaria, phytophthora, and other soil pathogens that are difficult if not impossible to manage. Staff in Australia and New Zealand gardens are preparing themselves for unknown long-term impacts of myrtle rust, a fungal disease that affects plants in the Myrtaceae family, which Australia has a significant number of as part of their native flora. A database of rust-susceptible species is being created to support research and help botanic gardens strategically plan and manage their collections.

As a result of Covid, gardens experienced low visitation, resources dwindled, and lower staffing levels effected the maintenance levels of our landscapes.

Attracting, training, and retaining quality horticulturists

Skilled, trained staff and retaining those staff has become increasingly challenging in botanic gardens. We see passionate people, eager to learn joining botanic gardens, but often lack basic botanical and horticultural skills. Botanic gardens are ideal places for education with vast opportunities to develop skills while fostering passion and interest in plants. Botanic gardens as a place of professional training can cover aspects such as record keeping, plant knowledge and identification, technical skills, propagation, germplasm collection, horticultural and garden management, environmental and seasonal observations, landscape design and arboriculture. While learning these specialist skills, they will also develop collaboration, communication and engagement strategies.

These skills may be learnt through various ways both formally and informally. Formal training may include internships, traineeships, organisational training opportunities, inductions and health and safety training. Informally training may include mentoring, partnerships, on the job experiences and pursuing personal interests. These opportunities may be limited by resourcing which will differ across botanic

gardens. As an industry, we can create and support these opportunities by ensuring staff are exposed to a range of experiences, assigning responsibilities for tasks or projects, partnering with other garden for secondments or internships, professional development for upskilling, attending industry related events, making time and space for conversations about aspirations and tailoring support to individuals. Discussions with other gardens and institutions should be ongoing to seek new opportunities.

We are not seeing the skills we want and need in our workforce, and therefore the training currently offered is not meeting our needs. A specialised training programme would be beneficial for botanic gardens to train staff in living collections management and conservation horticulture, and better recognise it is as fulfilling and successful career path. Ways we could develop training opportunities could be through industry partnerships, scholarships, professional programmes, aligning with local universities and other tertiary training providers and connecting outside of our own organisation. For these to be successful, advocacy of their importance and appropriate resourcing is required.

To attract staff to this industry there are challenges that can be difficult to address. Salary expectations and career progression are continually raised by staff. This requires a significant social shift in how horticultural roles are perceived and valued. However, there are a number of ways we can support this such as raising the profile of roles or other aspects that lead to job satisfaction, promoting opportunities like staff exchanges, presenting opportunities to build professional skills and personal networks, supporting university partnerships and offering formal and informal training opportunities.

Retaining and continually engaging staff is important. With competitive salaries being a limitation, we must highlight the other intrinsic and extrinsic benefits of botanic gardens roles. The diversity of work and teams is unique and provides opportunities to learn and be exposed to different ideas and ways of thinking. The ability to rotate through collections builds extensive plant knowledge and staff with a well-rounded understanding of the gardens and collections. There is a desire for plans and documents to provide clear structure and guidance for work programmes. Staff value building connections with colleagues, recognition for their contribution and working with great team culture. They also want to have more opportunities to work as teams in collections, involved in research and conservation projects, have mentoring and see a defined career path.

The value of living collections in botanic gardens

This theme explored the value of living collections in several contexts including at an organisational level, within the botanic gardens team and with the public. A challenge for some botanic gardens, particularly at a regional level, is having a wider understanding of their value and role within their organisations. Regional gardens have difficulty connecting with relevant teams within their organisation (either council or government departments). Changes within organisations and upper management means a level of re-education must occur to advocate for botanic gardens and their contributions to conservation, environmental, mental and physical wellbeing. Capital city gardens have seen a positive shift in how government agencies value their role and contribution to environmental outcomes.

There are a number of ways we can help address this barrier including

- staff moving to other parts of the organisation become internal champions for botanic gardens and help bridge the gap of understanding of botanic gardens importance in research, education and conservation
- promoting layered conservation messaging to capture a wider audience
- partnering with zoo and museums to create awareness of likeminded institutions

- advocating the unique flora of a region and making some of these available to the public to grow at home

Within in our own gardens, we need to meaningfully collaborate and communicate the value of our plant collection. Involving multiple disciplines/departments during collection development planning helps bring teams along the journey where they gain a deeper appreciation for the content, stories and messages our plant collections are trying to tell. The collaboration and understanding of the living collections will enable staff to be better placed to carry out their own roles. It's particularly important to build relationships with infrastructure and horticultural teams to ensure the best outcomes for the collections are achieved. We may need to engage more widely on specialist topics, such as government biosecurity teams, to connect them to the work we do and expand our own knowledge. Having documentation around living collections is a valuable tool for communicating the 'why' to others. It's also an opportunity to document the history of a collection and to see the journey, progression and thinking behind a collection. Documentation also builds a solid foundation of common knowledge and goals staff are working towards, and every role plays an important part in this. Invite your colleague out of the office and meet in the collections. This is a great way to see 'real time' what is happening in the gardens and promotes questions, ideas and knowledge shared. We may also explore registering specific collections for accreditations to build the profile and significance of them at a national or international scale.

Engagement with our visitors is another way to advocate botanic garden's role. In recent years, the global pandemic has changed and enhanced the way we connect with our visitors. Many gardens rose to the challenge of telling their stories in new and exciting ways, and they can be modified for our ever-changing world to continue educating our visitors. Human connection is one of the most powerful tools we have available. Visitors love knowing about the people involved in the work botanic gardens do, so guided walks, workshops and events provide us with a captive audience. Behind the scenes tours excite our visitors when they get a glimpse into the work we do. Simple displays and tools, such as the magnifying glasses at Gardens by the Bay, invite visitors to start exploring plants in our collections. For technology users, QR codes provide an additional layer of interpretation that can be updated and changed easily and increase accessibility at our gardens. Many of the conference attendees visited the Royal Botanic Gardens Cranbourne and were inspired by the 'Raising rarity' programme where rare plants are sold to the public. One of the barriers to plant conservation for visitors is understanding what they can do to support it, and purchasing a plant is a very tangible and approachable first step. Art can also be a hook for many visitors. Florilegia, botanical art exhibits and sculpture trails connect visitors to plants and gardens. Our diverse collections are also a chance for communities to find a plant or a place in our gardens that reminds them of old homelands or allows for new or continuing traditions.

Working together and conclusions

Final discussions of groups focused on how gardens can support each other in terms of living collections, and specifically looked at how larger gardens can support small, regional gardens. All gardens want more time and resources to achieve their goal, and this is not limited to small gardens.

Establishing relationships between gardens, particularly small gardens, can facilitate staff exchanges and information sharing, as well as opportunities to share plant material, establish new meta collections, or even retrospectively create metacollections by combining the management of disparate ex situ

collections into single metacollections. Using existing networks, such as Botanic Gardens Australia and New Zealand (BGANZ) and Australian Network for Plant Conservation (ANPC) can enable gardens to work together on conservation by providing leadership or coordination and overcoming permitting barriers. BGANZ have regional groups that facilitate gardens in a region or state to regularly discuss their priorities and projects, which can then enable cross-garden collaboration and capacity building for regional gardens. Smaller regional gardens also offer opportunities for large gardens to spread their collections, reducing collection risk.

Botanic gardens, regardless of size, face similar challenges in managing their living collections. Individually, gardens have found ways to address these challenges, often through collaboration and knowledge sharing. The workshop provided an opportunity to share these learnings and reduce barriers to collections management for all gardens.