DE HORTUS BOTANICUS AMSTERDAM – DEVELOPING THEMES IN AN ESTABLISHED COLLECTION

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ABSTRACT

To thrive and stay relevant to the needs of society, botanic gardens need to be able to adapt and change. This is especially the case now that there is such an urgent need to explain the changing world to visitors. There is also a need to accept that their collections and gardens are difficult to change due to their inherent limitations and historical context. This paper seeks to address this issue by providing an overview of one of Europe's oldest botanic gardens, de Hortus Botanicus Amsterdam, as one which has developed a collection policy to provide greater flexibility to shape the organisation while retaining the spirit of place or *genius loci*. The paper provides a framework to help reconsider the context and content of collection themes and to provide a sustainable basis that best meets the needs of the current organisation. This framework also provides a flexible approach to planning collections in the future.

SUMMARY

At the height of the philosophical brilliance in Ancient Greece, Heraclitus (540BC–480BC) reputedly stated that "nothing endures but change" (Laertius, early 200AD). Change is still a constant yet also remains one of the most difficult areas to manage. In relation to botanic gardens, change can be tracked by the passing of time through the publicised raison d'être of the individual institutions, such as in collection policies. They can also be observed through the published accounts of their exhibits and features in plans and guidebooks. Such institutions have evolved from repositories of new plants for personal or political gain, to scientific institutions for study and research (BGCI, 2009). On the whole though, their core function remains mainly as it has always been, of collecting and exhibiting plants for scientific purposes. This function remains, despite the fact that over the past 30 years the tempo or speed of change has gained momentum with many collections being subjected to the greatest challenges they have had to endure to date. The reason for this is that they have had to focus their emphasis on conserving and adding value to the changing world around their visitors, a task that is becoming even more important to fulfil due to the very real risk of plant diversity itself losing out (Maunder, 2008). Are botanic gardens, as represented in their collection policies and practices, flexible enough to adapt to this ever changing world? If not, should we be surprised then that not all of these institutions are able to demonstrate a fast response to external pressures? After all, such change in the context of living organisms and developing landscape exist beyond the realms of one person's working lifetime.

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Time passes at different rates for plants and people. This is because individual trees can live for hundreds of years and therefore change is often slow to see on the ground. The physical layout of a site filters through slowly, reflecting modifications in the collection management policy made previously, often many years before. Leading up to a development requires a process to start sourcing, propagating and growing-on plants before the physical landscape can be prepared to receive them in order to establish a new exhibit or planting scheme. In this way, physical plantings represent a phase in the position of collection management policy that was agreed at some point in the past. This may be at the core of why many living collections seem fairly conservative in their own development. Indeed, many botanic gardens retain features and collections beyond a time when they have any relevance and their removal would not have any significant implications for research or conservation (Aplin *et al.*, 2008). In essence, collection managers have started to carefully revise what has been called the single most important and fundamental document for governing the development and management of collections, the collection management policy document (Hohn, 2008). This represents a potential dichotomy for collection management and is one that this paper explores.

The dichotomy exists within established gardens. On the one hand there is a need to change to stay relevant to the needs of conservation and to inform and interpret the changing world around them to their visitors. However, on the other hand there is a need to accept that their collections and gardens are difficult to change due to their inherent limitations and historical context. This dichotomy is one that has not been fully explored or resolved to date. While papers have dealt with the fundamentals of determining and planning collection management policy (Cullen, 1976; Leadlay, 1998; Hohn, 2008), little has been written about the provision of flexible collection planning in established living collections where resources are limited in space and labour, or where heritage can curtail new initiatives. This paper seeks to address this issue by providing an overview of one of Europe's oldest botanic gardens as an example of informing the collection policy to provide for greater flexibility to shape the future of the organisation while retaining the spirit of place or '*genius loci*'. The paper provides a framework to help reconsider the context and content of collection themes to provide a sustainable basis that best meets the needs of the current organisation while providing a flexible approach to future collection planning. The aim is to overcome the inherent weakness faced by many formal collection policies and frequently encountered built-in resistance to change in established botanical collections.

INTRODUCTION

De Hortus Botanicus Amsterdam has established a reputation for displaying and managing botanical collections of international standing. This reputation has been built up during a long history of achievement in growing, researching and displaying

the world's plant diversity. Today this can be enjoyed in the 1.2ha Plantage site (Fig. 1), where more than 6,000 plant accessions (more than 4,000 species) grow in the gardens and greenhouses. Visitors can enjoy a core living collection of exhibits and plants that they would expect to find in any modern botanic garden. These are commonly linked to themes based around ornamental plantings, structural (architectural) plant elements, and scientific or educational displays highlighting the diversity of plants and their current or historical uses by man (Leadlay, 1998). In addition to the core themes are the national 'conservation' collections that are linked to previous historical layers of the Garden and cover several notable groups which the specialist can enjoy. These include cycads, palms, South African species (mainly Fynbos habitat and Karoo succulents), carnivorous plants and conservatory (containerised) plants that are mainly composed of shrubby species from Mediterranean climatic zones.

The following paper reflects the discussions that informed the internal process of looking for a new horticultural direction for the gardens during the period 2006–8.

Fig. 1 Plan of De Hortus Botanicus Amsterdam c. 2006. Image: Barbara van Amelsfort.

THE ORIGINS OF DE HORTUS

De Hortus Botanicus Amsterdam dates back to the Dutch Golden Age, a period in which Dutch trade, science, and art were among the most acclaimed in the world (Schama, 1987). Originally created as a medicinal herb garden, de Hortus was founded in 1638 by the Amsterdam City Council. The founding of the garden coincided with the city having experienced a severe Bubonic Plague epidemic which killed many people. At that time, plants were important to the people of Amsterdam as they provided one of the main sources of products to treat medical conditions. The garden was initially established to train pharmacists or 'Apothecaries' in the correct identification and use of plants and to help set and agree new standards for medicinal preparations and prescriptions. At that time, honest and dishonest medicinal plant traders flourished alike without regulation as the plague's mortality enriched apothecaries, doctors, poultry vendors, beccamorti (literally 'vultures' or people who carried the dead away) and greengrocers who sold poultices of mallow, nettles, mercury and other herbs thought necessary to draw off the infirmity. It was because of the need to regulate how people were trained and how they prepared these poultices that de Hortus began.

At first only medicinal plants were grown but very soon other economically and botanically interesting plants began to appear in the collection lists (Bouman *et al.*, 2007). This first phase of the Garden's development saw the establishment of the collection as a setting for training apothecaries. As the collection grew it changed sites several times before settling in its present larger (1.2ha) site in 1682. Again, this move might well have been aided through the impact of a plague outbreak in 1663 in which 50,000 people were reported to have died in Amsterdam alone.

Concurrent with the establishment of the Garden was the development of overseas trading by the Dutch. With the founding of the Dutch East India Company (*Vereenigde Oostindische Compagnie* or *VOC*) in 1602, which had a 21-year monopoly to carry out colonial activities in Asia, there began an important trading concern that existed for almost two centuries. Coexisting with this eastern exploration was the opening of the west via a newly established Dutch West India Company (*West-Indische Compagnie* or *WIC*). It too was granted a charter for a trade monopoly but this time in the West Indies, the Caribbean, (and with jurisdiction over the African slave trade) Brazil, and North America.

This new age of exploration led to an expansion of the collections of de Hortus during the 17th and 18th centuries, fed by the fruits of successful trading and the expansion of the known world. As ships explored the old and new tropical regions of the world, the VOC brought back not only herbs and spices such as pepper for the profit of their sponsors, but also exotic ornamental plants for their amusement and interest. Many of these first made their way to de Hortus. In fact, a few of the Hortus' 'crown jewels' date from that time such as the 300-year-old Eastern Cape giant cycad, *Encephalartos altensteinii* Lehm. (see Fig. 2). This second phase of de Hortus however, was not set to last. The Dutch Golden Age lasted from roughly 1580, when the Dutch

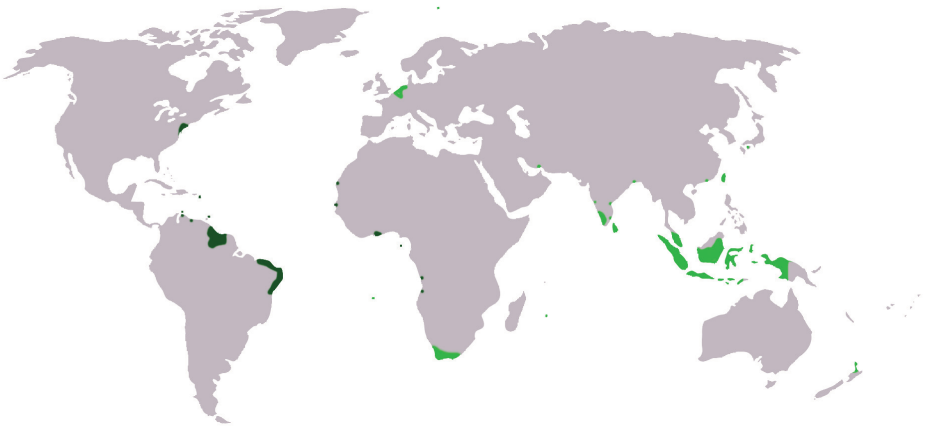

Fig. 2 WIC and VOC trading posts 1602–1800. Map drawn by Kerry Tongue.

proved themselves successful in their fight with the Spanish, to about 1670, when the Republic's economy experienced a down-turn. The last decades of the 17th century were marked by declining production and loss of market dominance overseas. The historical legacy is documented in the plant portraits captured in the Moninckx Atlas and the first four books by Jan and Caspar Commelin who wrote on the exotic plants in the Hortus Medicus of Amsterdam. Watercolours accurately record 420 plants that were introduced into the gardens during the years 1686–1709 by a number of artists, mainly Jan and Maria Moninckx. These works would later be used for, and greatly influenced, the interpretation and typification of plant names published by 18th and 19th century botanists, following the Linnaean system of classification. Interested readers should seek out 'The Botany of the Commelins' edited by D. O. Wijnands for further information on the collection grown at this time which include species of pelargonium, cycad and *Agapanthus* (Wijnands, 1983). The plants described were mainly introduced from South Africa (229 species), Asia (41 species) and America (97 species). Many of the plants described were the first specimens introduced in Europe. The WIC finally stopped trading in 1791 and was followed quickly by the VOC in 1800 heralding the severance of another important link with the garden. De Hortus thus began a third phase in its evolution as it became the botanical department of the University of Amsterdam.

The predecessor of the University of Amsterdam, the Athenaeum Illustre, was founded in Amsterdam in 1632 to educate students in Trade and Philosophy. Lessons were generally given at the professors' homes, as the establishment was not yet a formal university. In 1665 Fredrik Ruysch was appointed as the first professor botanicis to lecture on medicinal plants. De Hortus was at that time an independent institution governed by the Commissarissen. It therefore did not form part of the Athenaeum Illustre and as such de Hortus had its own library. The official incorporation of de Hortus into the Athenaeum Illustre did not occur until 1751 when Johannes Burman, who was then Director of the

Fig. 3 Eastern Cape giant cycad, *Encephalartos altensteinii* Lehm. in the Palm House. Photo: Barbara van Amelsfort.

Amsterdam Botanic Garden, became the Professor of Botany. This was an important time for plant taxonomy but also marked a change in the research use of the collection. Through his excellent connections with the VOC, he provided East Indian plants to the Clifford Collection which was a large and important private plant collection in the Netherlands. This collection formed the basis of Linnaeus' early botanical works, where a newly qualified Linnaeus was introduced to Clifford by Burman. Burman trained medical students at de Hortus, a tradition that continued up until the late 20th century. The connection with Linnaeus was to benefit de Hortus in time as many of those who followed his system of classification, including Carl Peter Thunberg who spent time in South Africa, Java and Japan, collected plants which were sent back to de Hortus.

Education at this time was rather elitist in Amsterdam and the Athenaeum remained a small institution until the nineteenth century, with no more than 250 students and eight teachers. The situation changed in 1877 when the Athenaeum Illustre became the University of Amsterdam (UvA) and was permitted to confer the highest educational degrees. During Burman's time the scientific value of the collection was improved immensely as the garden became a place of primary research and a focus for teaching classification, plant physiology and morphology. This period of the garden's development continued and was further fostered by the research of several notable botanists who worked with, or introduced plants to, the Garden.

Professor Hugo de Vries was one of the most important individuals associated intimately with the garden at this time and is remembered as one of the first geneticists. De Vries was Professor and Director of Amsterdam's Botanical Institute and Garden from 1885 to 1918 and used his position to benefit the Garden financially as terms to keep him in Amsterdam. He is known chiefly for suggesting the concept of genes, rediscovering Gregor Mendel's laws of heredity in the 1890s, and for developing a mutation theory of evolution. The legacy of his time was the structural enrichment of de Hortus where he commissioned many prominent buildings in the Amsterdam School style to train students, undertake research, house staff, and cultivate the important plant collections. During this time the romantic 'English' landscape that forms the backbone of the current Garden was also consolidated.

With the demise of teaching and research in many areas of whole plant botany at the University of Amsterdam in the later half of the 20th century, de Hortus along with many other botanic gardens associated with universities became subject to critical review. The review was based upon the efficacy of maintaining a living collection at a time when student numbers were decreasing and research was becoming more focused at the molecular level. The rationale in maintaining an increasingly expensive living collection to support the training of less undergraduate and graduate botanists became harder to sustain. In the case of de Hortus this eventually led to a formal severance from the University with the establishment of a trust to manage and fund the garden and an end to its formal research and the display of plants linked to research collections at the end of the 1980s.

THE GARDEN TODAY

In 1987 a new phase in the Garden's history began, under the umbrella of a newly established charitable foundation. In order to communicate the value of the collection, a new vision has been created which justifies the maintenance and continued development of the collection. It is a vision that looks beyond the plant collection itself to reach out and establish connections to very different audiences than it had served in the past. The drivers for this were originally financial but have evolved with the awareness that to survive and flourish the garden must be valued by each new generation of visitors. Today, it is much more publically accountable for the collection it presents and it has had to become more effective in managing its resources as these depend upon the relevance made to each and every person who visits the garden.

Since release from the formal link with the University, the Garden has reviewed its place and has sought to carve out a new role for itself based upon the values of its new stakeholders. 60% of its income comes from visitors, either through direct entrance fees or through money spent in the shop or site cafe. A closer alignment to the needs of Amsterdam City Council in providing a cultural heritage site for visitors to seek and enjoy has brought benefits with 40% of the funding coming from this important source. Increasingly, the Garden is becoming relevant to other organisations in helping to communicate their messages. The City Council are partners in communicating messages about sustainability and Agenda 21 issues while they now also help de Hortus provide an educational service to school children based upon introducing common, economically important (food) plants and linking them to their own ecological footprint. Such programmes are now being drawn up with other potential sponsors who share ethical and environmental goals with de Hortus' mission, vision and values. Today, the organisational policy states that all major projects should be funded by external partners in this way. This is one way that the organisation can grow and develop in line with its mission without imposing upon the core funding which is instead used to progress the internal professionalization of the organisation through improving the infrastructure and developing its employees.

The exercise of defining the organisational core values and linking them to collection opportunities has reinforced the importance of the layers of history that have helped to form the present day garden. The Garden has drawn up a list of criteria to use as a framework that can be used to help inform the selection of new collection or exhibit themes (see below). New priorities which have been highlighted in the new mission statement include: sustainability and conservation, which now rest equally beside the more established themes such as science, cultural history, education and amenity. It has highlighted the need to inspire visitors through new plantings, ensuring they bring value to those who visit the Garden. Novel approaches have had to be employed to engage with the visitor as they are becoming less sensitive to, and becoming increasingly removed from, the natural world. When choosing a new project theme for the Garden the following questions are used to help evaluate and provide guidance:

- Does the project help achieve short-, medium- and long-term goals of the organisation and plan for their delivery?
- Does the project promote the historic value of the collection that the curatorial team have inherited, including the history of the city of Amsterdam, the country and peoples of the Netherlands, the unique history of de Hortus and the plants it has introduced?
- Does it highlight current research interests and the interests of current horticultural staff?
- Does it provide a window into the world of plant biodiversity?
- Can the project promote good practice in the sustainable use of plants? An example of this would be displaying species found in local rare habitats or showing the potential benefits of plants in green or biodiverse roofs
- Does the project highlight current issues that impact upon plant diversity?
- Does the project promote the use and value of plants of interest to the public?

The new mission themes are explained below.

Amenity

The approach followed for improving the presentation of the site can be summarised under two main design themes: unity and simplicity. In a botanic garden where so much effort goes into the detail of the collection it is relatively easy to not step back and look at the overall presentation of the landscape. These garden elements are achieved through planting and hard landscape design. Much can be learned from critically reviewing a garden by following some basic garden design rules. See Crowe (1981) for these rules.

If we ask the question ‘what makes a landscape work from a design perspective?’ a short list of criteria can be drawn up. Two of the most important concepts are unity and simplicity. The statement ‘less is more’ is a good principle that summarises this approach. In practice this requires the designer to ensure that the landscape works in a

Fig. 4 The new herb garden in raised beds made with untreated oak, framed in galvanised steel and paths of split stone. Photo: Barbara van Amelsfort.

unified way by employing a simplified palette of hard landscaping materials which can unify the detail of the site from a visual perspective. For de Hortus, a palette of three hard landscaping materials has been drawn up for each surface of the whole site. This is used to inform the brief of every new project where external designers are brought on board. This palette of paving materials, brick samples and wood are examples of materials that are presented together with a short explanation of the unique landscape 'spirit' or *genius loci* of the site. The 'spirit' relates to both the place itself and its wider landscape although it can be difficult to describe and translate into words. However, it has to be captured when describing a new project brief with definable and tangible characteristics. This approach has proved very successful in improving the site's amenity value as seen through the realisation of three large-scale projects at de Hortus in 2006 and 2008 including a new herb garden, large pond and front garden and entrance (Lang *et al.*, 2007).

In terms of planting plans, de Hortus has always had a scientific or collection brief to realise but now it also has an amenity brief which is to ensure that the visitor experience of an attractive and seasonally interesting display is delivered. In this way particular features such as the provision of new focal points to draw people further into the Garden can be made which enhance the overall impact of the site. A masterplan of projects has been drawn up which helps the internal teams to visualise the Garden in 5 years' time

and plan its development in the most efficient and joined-up way while also helping to clarify priorities, avoid missing important points and highlight potential opportunities for new exhibits or projects.

The objectives of the masterplan are to make the most of the space for the Garden's collection and amenity value and to ensure that the Garden can optimise the opportunities for its mission to be achieved. The value of having a masterplan is that it forms the basis of all internal and external communication providing an excellent means to engage with external partners and potential sponsorship opportunities. Once a project is realised, a performance standard is agreed for each area which determines the quality of horticultural presentation in terms of collection brief requirements, plant coverage, vitality and condition of the individual plants. A photographic record is made to help benchmark the optimal standards. These performance measures together with the original brief and subsequent planting plans form the basis of the maintenance plans for Garden areas. While realising new projects each year helps to further the improvement of the site in very specific areas of the collection, it has also been recognised that there needs to be an ongoing system of reviewing and updating the established areas of the collection. In this way the whole Garden will be recorded with agreed performance standards which can be updated and implemented in a systematic manner to benefit the presentation of the whole collection. This balanced approach to site improvement, through new exhibits and reviewing old collections each season, will help to ensure that the overall site does not suffer from a shotgun approach to site improvements.

An amenity focus across the whole site has already enhanced presentation, through increasing seasonal interest and reinforcing the Garden as a year-round visitor attraction. By adopting a mission-led approach the importance of amenity has been highlighted as it helps to draw new visitors in and maintain their interest on-site for longer. This knowledge helps to focus where improvements are required and in which order, with regard to the growth and development of the whole organisation. The potential amenity of the site is therefore being developed in a sustainable way. An infrastructure of flexible hard landscaping is being created to allow for changes to the collection in the future without affecting the overall site's amenity too much. One thing that is certain from the history of the Garden is that change in the collection is a necessary constant, especially as we move to an uncertain time with respect to plant biodiversity conservation priorities (see below).

Education

This provides one of the greatest opportunities for growth in the present de Hortus. Programmes that cut across all age groups, cultural and educational backgrounds are currently being explored. Alongside traditional class-based learning opportunities held in the setting of the palm greenhouse, new programmes are being developed that seek to interpret what visitors see in an interactive and entertaining way. The emphasis is on multi-layered learning opportunities from passive enjoyment of the green space to programmes led by tour guides that focus on specific topics such as evolution or plant

diversity. In this way visitors can choose their own journeys of discovery. Existing programmes introduce familiar products like chocolate and tea and take the visitor on a journey where issues such as where plants originate from, or how far the crop has to travel from its natural distribution to cultivation and then to the market, are discussed alongside how they are grown and what impact this has on the natural world. A full events programme complements the structured learning events through seasonal themes. These include themed seasonal displays such as an exhibit which displayed live butterflies together with their host plants along with paintings by the famous natural history artist Maria Sibylla Merian in 2008. Other examples include events on topics such as stimulating the sense of taste or highlighting the benefits of local food supply chains. These events try to utilise the full potential of the site for the interest and benefit of visitors.

Interpreting the educational mission into an achievable objective is being achieved through focusing on helping visitors see what they cannot yet see, to help them gain new tools to interpret and better enjoy the natural world they see around them.

Sustainability

This is a very important but difficult topic to demonstrate well but is one which de Hortus seeks to address. The idea is to bring this topic to the front of house through promoting and demonstrating good practice in its own operations and through exploring novel links with industrial partners. In this way a bridge can be made between inside and outside the Garden, between the availability and use of basic resources and their impact upon the natural world. Partnerships that are currently being developed promote the work of external organisations that are developing new products or conducting business in sustainable ways which the visitor can then benefit from. On-site this has resulted in de Hortus adopting more environmentally sympathetic ways to conduct its own business while also providing opportunities for new exhibits. New projects include a green roof developed at visitor eye level by building a new structure to cover an existing bee exhibit to show the benefits of this approach to building in cities. The roof was sponsored entirely by an external contractor who makes these structures for its core business. These approaches together with reviewing all the existing systems help ensure that the Garden is operated and resourced in a sustainable way.

The integration of sustainability issues is also being explored in a new nursery complex including glasshouses, laboratory and storage facilities where a project is being developed with a national energy producing company in the core project team. The benefits for both organisations are yet to be fully explored, however, the influx of technical advice has already gone a long way to providing an insight into what the next generation of sustainable glasshouse structures might look like. If successfully realised, the structure will provide an opportunity for the energy company to interpret what is going on in the world of sustainable glasshouse production in which they are a major stakeholder themselves. Modern commercial glasshouses in the Netherlands are also

power generating structures through the use of modern technologies such as combined heat and power plants, installation of photovoltaic cells and the use of aquifers to store surplus heat from the sun which is then used to heat the glasshouse and adjacent office buildings in the cold season. This information is not yet widely known or understood by the public and the Garden represents an ideal way to show this through a novel partnership project.

This example demonstrates the potential for sponsorship, where organisations can align their mission and see mutual benefit from combined projects. However, not all projects can be undertaken in this way and most sustainability tasks will not be sponsored. Instead, operations in the Garden itself can be used to demonstrate sustainability in action through interpreting simple initiatives which the public can adopt, such as using sustainable sources of timber to make a new feature, or making compost on site to use as a garden mulch. In this way, the Garden seeks to showcase what is being done and what can also be done by visitors to support a sustainable approach to living on the planet. The Garden can help the public to make better personal choices about the way they live their lives, recognising that collectively they have the potential to help secure the future of the plant diversity they have come to see in the Garden. In this way the Garden hopes to inspire people to take more positive action in their everyday life.

Conservation

Conservation of native and international red list species that relate to historical collections has also become a focus for the Garden since 2007. De Hortus has recently been working with FLORON and other Dutch nature conservation bodies to coordinate a native species conservation programme which links *in situ* and *ex situ* conservation programmes together. Through using the Garden to explain the work that is going on in the field it is hoped that the visitor will better understand what is being carried out on their behalf. There is much talk about what conservation is and what is going wrong in the world but there is little encouragement given about things that can be improved and this programme helps to address this problem.

Using local conservation stories in the Netherlands, global issues can be explained. Again, using positive messages, the idea is to encourage visitors to support the real *in situ* work going on in the field by others. This model is one used very effectively by Zoos who network well together and promote a coordinated approach to conservation through national and international groups such as the European Association of Zoos and Aquaria (EAZA) conservation programmes for different topics which are changed and run annually (European Association of Zoos and Aquaria, 2008). These programmes have been incredibly successful in raising money for conservation and allow all organisations large and small to get involved in a group campaign and benefit from the achievements of the conservation programme. An example of one of these programmes which includes habitat conservation is the EAZA Madagascar Campaign 2006–7 in

which collaborating European zoos raised €450,635.81 for the benefit of conservation in this important biodiversity rich area. This capacity is being developed while the Garden also takes active involvement in initiatives promoted by Botanic Garden Conservation International (BGCI) such as the Global Strategy for Plant Conservation (GSPC) with its 16 outcome-oriented targets for conservation (many of which are addressed, or hinted at, in the accompanying text).

Cultural history

An important theme for a Garden in the heart of a historical city is to define a sense of place. The garden that people see today is a long way removed from that which grew the original list of 795 plants published by Johannes Snippendaal in 1646 when the first catalogue was published. However, the transition from medicinal collection to one which includes plants with wider economic, botanic and aesthetic interests reflects the degree of change over time. Interestingly, a parallel shift can be traced in the origin of the people who make up the Amsterdam population, with many of the former residents having originated from areas where conditions were more repressive or less tolerant. This trend for Amsterdam to be enriched through diverse people coming to seek solitude and freedom continues to the present day with a diverse cosmopolitan population seeing influxes of new residents from the former colonial countries such as Surinam, Indonesia and South Africa as well as more recent influxes from Eastern Europe, Turkey, and Morocco. This diversity of cultures provides the opportunity to highlight the cultural history of the Garden and make a link to the people of the past while also providing new opportunities to make links with the modern population and a garden for the future.

'An historic collection recently realised' is a project that was completed in 2007 to house the Johannes Snippendaal collection that dates from the first catalogue of de Hortus, published in 1646. The project was technically difficult to realise and is of interest to historians and botanists alike as the plants that were grown in the Garden at the time of Snippendaal were named prior to Linnaeus and so have required detailed research to translate them into modern scientific names. This story of discovery provides a wonderful opportunity to explain the history of the Garden and the history of the classification of plants. In September 2007, a book was published to coincide with the reopening of the Garden and 325 years of the Garden being on its present site. In addition to bringing an historical record alive, the exhibit is being used to teach visitors about the development of the science of taxonomy and it has also resulted in a physical improvement to the site (Bouman *et al.*, 2007).

A proposal that is currently being considered is a project aimed at addressing the need to connect with the modern local people who live and work in Amsterdam. Today, Amsterdam like many modern cities, has some communities that have not integrated fully with others and there is a need to help develop an understanding between different ethnic groups and to foster good relationships amongst them. The Garden is seen as

a neutral space which might be used to address some of these integration issues by using a new project to open up the Garden's collection to groups that are currently under-represented in its visitor base. A proposal has been put forward to develop a new Turkish rock garden in 2011, which will aim to showcase plants from threatened areas of Anatolia and will relate the plants to the expatriated local communities. These areas are mostly elevated and mountainous in nature and so a rock garden is appropriate for this flora. In this way not only is the history of de Hortus celebrated but a new connection is established which will hopefully build links which will grow into the future.

Science

One of the main losses brought about by segregation from the University was the use of the collection for research. However, by retaining the post of Scientific Officer and coordinating external expert support for the de Hortus collection, the collection has been consolidated to provide a collection of plants which has scientific value, much of which was previously latent. A database catalogue of the plants has been established which is updated and maintained regularly. This reference collection and its associated information has been made available for external researchers to use and extends to a well-documented collection of alcohol samples, library of books and a wood sample collection. All this information is catalogued and available in a retain-and-retrieve system that has been on-line since 2008. The identification and labelling of the collection itself is maintained to a very high level, with 80% of the collection correctly labelled and verified by specialists at the time of writing. This year this resource will go on-line and will be made available to the public who will be able to make external searches.

In addition to consolidating the records kept of the collections, a focus has been made on improving the quality of how the living collection is grown and exhibited. Each year new plant material is brought into the collection with a preference to source wild-collected material where possible. Material sought through international seed exchange and through the International Plant Exchange Network (IPEN) forms the bulk of this material which has resulted in an improvement to the quantity and quality of scientific information available to support the collection. Although the conservation benefit of a living collection is limited by the ability to hold limited levels of individual stock (often one or two individual plants being maintained of each species), the improved records and focus on the quality of material being introduced will in time improve the potential value of the plants for conservation purposes. It is through a coordinated approach to collection planning opportunities for *ex situ* metapopulation management within specialist groups such as those employed by de Hortus, that there exists an opportunity to help conserve rare and endangered cycads. Within the Netherlands, pollen of rare cycads is exchanged and the information is recorded in a system like a stud book to ensure that the *ex situ* populations of cycads in the Netherlands retain as wide a genetic base in the future as possible. Cycads are part of the de Hortus specialist collection which is coordinated

and maintained as part of the much larger network of Dutch National Plant Collections (SNP) through the National Botanic Garden Network (NVBT).

Building capacity for science is also an initiative that is actively being encouraged at de Hortus with formal links with Wageningen University recently being established to undertake supervised research as part of a larger group. The current focus is on researching the adaptive radiation and systematics of succulent pelargoniums by the Scientific Officer. This postholder brings this work back to benefit de Hortus and its collection.

CONCLUSION

Old and established botanic gardens have already had several iterations of development as they have progressed on their path as organisations that research, educate and display plants. De Hortus Botanicus Amsterdam represents an interesting model for a garden that has sought to find a new role for itself which builds upon its past while also providing a flexible future. This has been driven by a need to establish a new direction following the severing of long-established links with the University of Amsterdam in the early 1990s. The result has been the development of a working framework that informs the decision-making process when planning the collection based upon core mission themes of what is important for the Garden (its history and cultural diversity), what is needed or can be improved or enhanced (science and education) and where opportunities lie for growth (conservation & sustainability).

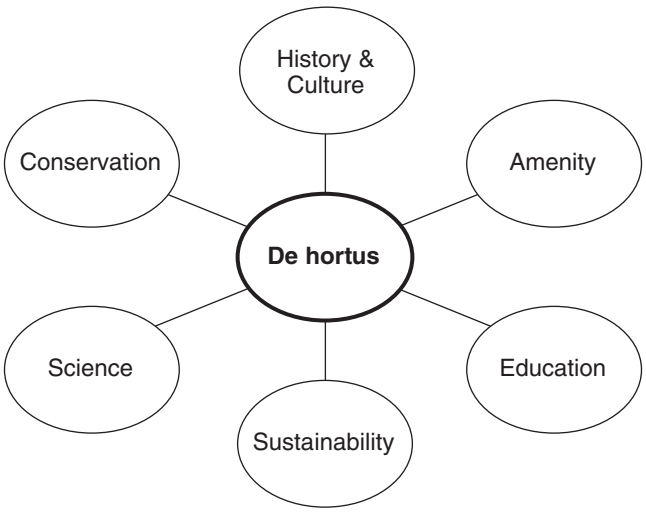

Fig. 5 A schematic diagram of the garden departmental functional areas of work that relate to the new mission of de Hortus. Diagram drawn by Kevin Frediani.

Twenty years after this enforced change, the hard work and wide ranging use of the collection is beginning to pay off. Several new developments have been made using a new format of mission-driven focus. The public's reaction has been a healthy interest in what is being achieved and evidence of this can be seen in the increase in visitor numbers year upon year. The Garden has now agreed a set of outline principles which translate its mission into tangible benefits. Each new exhibit or collection theme aims to demonstrate these principles. Two new exhibits have been realised which help to display and interpret collections to the public, further helping the Garden to develop its educational remit. Interestingly, there may be evidence of a growing interest not only in the finished product but also in the progress of work at de Hortus as seen through the increase in visitor numbers while features are being built. In 2007 while the Garden was under development for 6 months, a record number of visitors, many of whom were local and informed in what was being undertaken, came to see the construction process. This resulted in the largest number of annual visitors to date (136,000). A huge amount of effort went into communicating with all stakeholders prior to and during the development leading up to the celebration of its 325 years at the present site in 2007. The benefits of communicating these changes can be seen in the high level of visitor numbers. This communication also resulted in an improved relationship between de Hortus and the local public.

In considering what can be drawn from looking at long-established botanic gardens, it can be summarised in one or two well chosen words. As the facts drawn from a historical and contemporary review of de Hortus show, long-established and successful gardens have had to be and will continue to need to be flexible and adaptable in what they choose to display and present in their collections. In this way, I propose that modern botanic gardens operate with 'Integrated Sustainability'. 'Integrated' in the way that they use the collection themes to work for the Garden. 'Sustainable' in the way that they create new spaces to house them. Botanic gardens should aim to be more accessible to a public who increasingly need to understand and value plant biodiversity. If they have increased understanding, they can have a voice in deciding how the society they live in should intervene to provide opportunities for future generations. They will also be able to enjoy and utilise the wealth of biodiversity that they themselves inherited as global citizens.

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