ROCZNIK POLSKIEGO TOWARZYSTWA DENDROLOGICZNEGO Vol. 62 – 2014 • 49–57

Historic Tree Collections Management: A New Vision for Old Trees

LAURIE METZGER

The Longwood Graduate Program,
The University of Delaware College of Agriculture and Natural Resources,
Department of Plant and Soil Sciences and Longwood Gardens, USA
Laurie Metzger, M.S., Tomasz Aniśko, PhD, Robert E. Lyons, PhD

Heinrich-Soldan-Strasse 18B, D-91301 Forchheim, Deutschland
E-mail: lmetzger@udel.edu

Received: 30 July 2014, Accepted: 15 September 2014

Abstract: Municipalities and institutions of horticulture maintain large numbers of trees, many of which are in the process of senescing. In a botanical garden, park or arboretum, a collection of historic trees comes with the benefits of shade, beauty and a display of natural history but those benefits come with the challenges of safety, liability, aesthetics and a commitment to environmental protection. As a result, institutions of public horticulture are seeking innovative means of understanding, showcasing, and preserving their historic trees.
This research compared the historic tree collections management strategies being used at institutions of horticulture in the United States with the strategies being used at institutions abroad. It uncovered the existence of management plans specific to historic and aging trees. The research involved collecting the details of those plans, with a focus on the philosophies that govern the decision making processes regarding historic and aging trees and tree collections. The article discusses the history of tree culture, outlines reasons for management planning and highlights current practical techniques being used by experts in the field. Finally, it addresses the terminology being used for historic and ancient trees worldwide and examines ways to combine strategies used in museums and architecture for living collections.

Key words: ancient, arboreta, gardens, parks, planning

Introduction

Prior to the widespread settlement of the Americas, the areas that now make up the East Coast of the United States were covered with vast, diverse forests (Maloof 2005). While trees figured prominently in the culture of the Native Americans, the settlers arriving from Europe found the forests overwhelming, regarding them as mystic, frightful places; either to be avoided or to be conquered (Kellam De Forest 1982). As the settlers established colonies and outposts, they began using wood as a universal building material and as their singular fuel for heating. Very soon trees became their most important natural resource (Rutkow 2012). Whenever possible, settlers cleared the forests for agricultural purposes, and then used the wood to build towns, creating the framework for the future of industry. Wood became a commodity, used for everything from railroad ties to paper. The tree industry in America was born and moved across the country like wild fire, clear cutting and milling as it went. Many of the early colonists immigrated to the Americas in order to have access to wood, which was scarce, especially in England, due to the climate and geology and to earlier deforestation (Rutkow 2012).

Some trees survived the onslaught of the wood economy and grew to achieve giant status. As these trees aged, they functioned as meeting areas, landmarks and playgrounds (Meyer, Sharon 2001). The rural cemetery movement came of age, sacred places for reflection and the enjoyment of nature. The first urban parks were developed. These landscapes became ideal environments for ancient trees and for people

(Vernon 2011). Over time, the general public, horticulturists, arborists and like professionals have come to recognize and value these sentinels eventually inventing measurement tools that estimate tree age without significant damage or destruction.

The tangible account of our history by historic and ancient trees has all the legitimacy and significance of the people, the place and/or the event as found in written accounts. Trees record history in their rings, their appearance only giving us a hint of what they've seen (Wilson 2012). Presently, there are a number of historic trees in the United States; trees that tell our story, trees as symbols, trees as reminders and as teachers (Meyer 2001). The citizens of Cambridge, Maryland treasured their Wye Oak (thought to be nearly 500 years old) until its death in 2002 (Maryland State DNR). Hagley Museum and Library in Wilmington, Delaware still boasts an Osage orange tree (*Maclura pomifera*) thought to be 400 years old. Tyler Arboretum in Media, Pennsylvania and Longwood Gardens in Kennett Square, Pennsylvania both boast acclaimed historic collections, the Painter Plant Collection and the Pierce Collection respectively. Both collections are a testament to longevity, the foresight of the founders and the ecological systems in which the trees are a part. Similarly there are ancient trees located in gardens, estates, parks and forests throughout Europe. Authors Ulrich and Kuehn created a book featuring Germany's 500 oldest trees, most of which are reported to be in excess of 300 years old. The forests and parks of England feature trees believed to be 1000 to 3000 years old. Significantly older than their American counter parts, the ancient and historic trees of Europe have much to offer in insight regarding the way they have been managed.

George Washington, the first president of the United States, was an avid horticulturist, and self-appointed landscape architect. He planted tulip poplars (*Liriodendron tulipifera*) at his estate, Mount Vernon, in the mid eighteenth century. Under these trees he entertained fellow politicians, philosophers and pioneers, Benjamin Franklin and Thomas Jefferson included. These tulip poplars continue to stand today. They are tall and stately, a reflection of America's first president. In what eventually became an opportunity for international collaboration, Washington gave seedlings of the tulip poplar to the Marquis de Lafayette, as a thank you gift to France for their aid to the United States during the American Revolution. These seedlings were planted at Versailles and grew into trees that stood from the late 18th century until a storm in 1999. Because Mount Vernon had begun propagating clones of Washington's tulip poplars, the staff at Mount Vernon was able to donate seedlings from the original trees to Versailles, replacing the trees that were lost (Meyer 2001).

Like a collection of historic objects, trees have value beyond their purchase price; they have witnessed history and have numinous value through associations with people and events (Kellam De Forest 1982). Culturally, trees symbolize survival simply because they remain after a devastating event (Quammen 2012). Trees can be viewed as symbols of hope, and inspiration for endurance (Klingman 2000). Trees have even been likened to cathedrals because they can inspire awe and reverence. They have been called "God's first temples" and a "living witness". Additionally, ancient and aging trees can become valuable hosts for beneficial biological diversity (Lonsdale 2013). These are reasons to manage any collection.

However, a closer look reveals that Longwood Gardens' historic Pierce's Collection has very little interpretation and is in the earliest stages of its management planning. Proper management plans include a strategy for implementation of interpretative material. In addition, language regarding replanting, propagation and care appear in management plans. A comprehensive plan includes protocols for making decisions about prolonging the collection, or not, beyond its natural life. Whether or not the trees will continue making an impact after they decline and die is something that should be decided when management planning begins. Ken Darsney of the State of Delaware's Division of Historic and Cultural Affairs made the need for research clear, saying, "a massive amount of research has been performed by our division on the properties and structures, but very little on the trees and plant material". This, in combination with all that has been written, creates a compelling reason to determine a way to recognize and to preserve historic and aging trees. It's clear that a deficit of management planning strategies may trigger a cultural loss and prevent historic trees from realizing their potential contributions within public gardens. However, at this time, most public gardens lack a comprehensive, widely accepted management theory to generate a plan for their historic trees (Aniśko Tomasz, Longwood Gardens. Personal communication, November 15, 2012).

As public and private gardens, museums and other institutions recognize the historical significance of their trees, questions and concerns arise about their long-term care and management, with special consideration for their relationship to people and the landscape (Darsney Ken, Delaware Division of Historical and Cultural Affairs, Dept. of State of Delaware. Email communication, November 13, 2012). As aging trees decline and die, their stories have to be told in new ways or they will be lost (Aniśko Tomasz, Longwood Gardens. Personal communication, November 15, 2012).

Methods

Data was collected through surveys, interviews and cast studies over an eighteen-month period and analyzed using both qualitative and quantitative methodology. Institutions were included because of their association with historic trees or historic landscapes. This included historic house museums, estates, gardens, botanic gardens, arboreta, city parks and recreation departments, historic trusts, and conservation organizations. Two surveys were distributed. The first survey was general and aimed to reveal a broad overview of management styles at national and international institutions. The survey's purpose was to ascertain the definitions of "historic," "heritage," and "veteran" specifically. Additionally, it addressed the existence of management plans, tree removal, tree planting and propagation efforts. The survey gathered data on relevant fundamental questions and helped to identify case study participants.

Survey I was completed by 194 individuals. Of the 194 completed surveys, 129 recipients agreed to participate in additional research, representing 15 countries, including the United States. Thirty US states participated.

The second survey was distributed only to the 129 respondents who indicated a willingness to participate and that their institution was home to an historic tree collection. The questions were developed to reveal greater details about existing management plans, while looking closely at institutional propagation efforts. Survey II was completed by 76 individuals, representing nine countries including the US and twenty-four of its states.

The first set of case studies were chosen based on their association with historic landscapes and the results from the first survey. The first case studies were in Europe and included the Royal Botanic Gardens Kew, the Royal Parks in London, United Kingdom and with Bernrieder Eichen Park in Bavaria, Germany. All provided perspectives for gardens facing issues of funding, partnerships, mission and succession planning. Personal visits were made to all sites. Questions were developed to probe more deeply into the institution's system of management, funding and long-term planning.

The close of the first survey led to a more critical selection to identify the second set of case studies. This included an additional focus on propagation and stored genetic material. The purpose of choosing North American case studies was to set up a comparison with the European case studies. The second set of case studies included Vizcaya, a historic estate in Miami, Florida; Longwood Gardens, a display garden in Kennett Square, Pennsylvania; and New York City Department of Parks and Recreation in New York City, New York. Personal visits were made to all three institutions. Meetings with the staff members specific to the historic trees and propagation efforts were arranged. Interview questions were developed based on the individual institution's answers to both surveys. Photographs were taken at each site and various materials were collected for better understanding of the site including brochures, maps and management plans when available.

Numerous institutions, outside the case studies, contributed to the research with stories about their trees. They included the Crown Estate and the Chelsea Physic Garden in London, England, the Munich Botanic Garden in Munich, Germany, the Ivenacker Eichen Park, in Ivenack, Germany, Muzeum Więzienia Pawiak, Warsaw, Poland, the Mount Auburn Cemetery and the Arnold Arboretum in Boston, Massachusetts, the Tyler Arboretum in Media, Pennsylvania, and the Morris Arboretum of the University of Pennsylvania in Philadelphia, Pennsylvania.

Additional research explored the existing certification programs used by historic sites and other types of collections. These included the National Park Service's Register of Historic Places and LEED, an acronym for "leadership in energy and environmental design". This certification program focuses on new commercial building projects and is based on a points system. The more points an institution is awarded, the higher their ranking as leaders in environmental sustainability and energy use. Additionally, the research looked at the United States' National Big Trees program. There are large trees that are awarded national champion status based on size and age, in addition to a similar version of the program specific to the individual states. The purpose of this exploration was to discover whether or not the creation of a certification process would be effective in identifying and protecting trees or tree collections in lieu of statutory requirements, which for the most part do not exist in the US.

Results

Eighty-five percent of the individuals who responded to the first survey reported having historic trees on their property. Sixty-six percent of those institutions indicated that they do not have a written management plan for their historic tree collection and 90% of those individuals reported that having a plan would benefit their institution. Fifty-seven percent of those institutions with historic trees do not consider their historic trees an official collection. While nearly fifty percent of institutions use the wood from fallen historic trees to make objects, sixty-nine percent of those do not consider those objects a part of the collection, yet sixty-three percent reported displaying the objects. Only twenty-eight percent of respondents with historic tree collections save or store vegetative stock from their trees. However, 61% of those who do save genetic material consider the genetic material a part of the collection.

Seventy-five percent of institutions with historic tree collections do not label their historic trees. Yet, 100% of those institutions that reported not having historic trees, indicated that it is important for historic trees to be labeled.

The majority of respondents indicated that the value of their historic trees is based on the fact that the tree creates significance of place or understanding of place. Almost all respondents took the opportunity to write the story of a memorable tree in the comments section. This interest in the understanding of place, in the labeling and the stories of the historic and aging trees indicates an opportunity for institutions to create further engagement with visitors by telling the stories of their trees, allowing the trees to become more beloved to their communities.

The Ancient Tree Forum, an organization in the United Kingdom, dedicated to "Championing the biological, cultural and heritage value of the UK's ancient trees", has published eight guides and most useful for this research was their recent publication, "Ancient and other Veteran Trees: Further Guidance on Management". The publication covers the practical details of caring for and prolonging the life of ancient and aging trees. The last chapter focuses on what should be included in a management plan for an ancient tree or tree collection (Lonsdale 2013).

Much of the results were in the form of interviews with case study participants. On the whole the European case study sites indicated a reliance on the Ancient Tree Forum's publications, while the North American case studies indicated generally that they either had not heard of the Ancient Tree Forum or that they had not seen the publications. Aside for story telling opportunities, it appears that there is an oppor-

tunity for an international conversation and the exchange of information especially across the Atlantic Ocean. Generally there was more mention of biological diversity as an institutional priority at the European case study sites. In these cases biodiversity also provided an opportunity for partnerships for the creation of interpretation and programming.

Many practical methods were collected for the preservation of historic and aging trees. These included simple yet creative mulching techniques. One such technique was used at the Royal Botanic Gardens Kew. Kew uses soft, fluffy mulch under each ancient tree all the way to the drip line

Fig. 1. Soft mulch to deter walking on the root zone, paired with hard wood much to encourage visitors to walk towards the interpretive signage at the Royal Botanic Gardens Kew, London, United Kingdom (photograph by L. Metzger).

(Fig. 1). This mulch is difficult to walk on and designed to deter visitors from walking underneath, whereby over time the roots of the tree will become damaged and soil compaction will occur. This technique allows for the termination of mowing on or around the ancient trees. In cooperation with the soft mulch is a visible path of hard wood mulch, leading to an interpretive sign about the tree. This technique encourages visitors to stay out of the root zone without utilizing signage that is prohibitive.

Where there once was frequently mowed lawn under the ancient trees, a number of gardens, specifically Royal Botanic Gardens Kew and The Royal Parks (Fig. 2), are now planting meadow grasses that do not require mowing, managing the land in a more natural way. The Royal Parks also allows fallen trees to lie where they fall when possible, leaving dead wood to contribute to the surrounding ecosystem. Namely, in Richmond, one of the more rural of the eight Royal Parks, there is a fallen *Tilia* ×*europaea*. The old trunk lies where it fell, some of the roots are still in the ground and now look almost sculptural. Because not all the roots died, three new trees sprouted and are growing from the old trunk, now at about a sixteen centimeter caliper (Fig. 3).

Numerous types of wooden fences are being used to deter visitors from walking on the root zone or putting themselves in danger of a falling branch. Signage is being used to communicate stories of trees, along with useful facts about the tree and its stage of life. This was especially true at Ivenacker Eichen Park in northeastern Germany, where an artist created a replica of the tree's trunk so that visitors could digest the girth of a 1000 year old oak without putting themselves or the tree in danger (Fig. 4). The staff at the New York City Department of Parks and Recreation discussed their future plans for interpretive signage at one of their 5000 parks, this one in Flushing, Queens, NY. The park is on the site of an old nursery and even 100 years later, it is still obvious that at one time the trees were planted out in rows, for sale. They have now grown together and make an interesting landscape for the community to enjoy (Fig. 5). The stories of these trees and the history of the land could be useful for future community engagement and support.

Retrenchment pruning is a technique that was highlighted in the United Kingdom. This is not just structural pruning, although it maybe referred to as crown reduction. The technique mimics the natural aging process of the tree (Fig. 2). At a certain age the tree engages in trying to shorten its root to shoot distance. The highest part of the tree's crown begin dying back and the tree begins more vigorous growth creating a new crown underneath the original, sometimes significantly lower on the tree. Arborists can mimic this technique over a period of years. In some cases retrenchment pruning has prolonged the life of the tree by a decade or more.

An integral part of management planning is succession planning. The mission at Bernrieder Eichen Park in Bavaria, Germany is to maintain the original landscape. To achieve this, the staff at Bernried plants a small tree near each ancient one. The ancient one is allowed to senesce in its natural time, however eventually, the small tree will take its place in maintaining the landscape (Fig. 3). Natural fracture pruning or coronet cutting is another technique recommended by arborists in the United Kingdom to increase new growth and biodiversity. This technique involves mimicking the way fractures naturally occur in aging trees. The natural jagged surface that is created, unlike the flat unnatural surface made a regular chain saw cut, encourages re-growth and creates habitats for microorganisms. Speculation does exist about the possibility of a relationship between the microorganisms and the longevity of the tree (Fay 2002).

All six case study institutions were asked to rank the following priorities: aesthetics, safety, prolonging the life of old trees, minimizing risk of litigation, displaying old trees, education, and biodiversity. In general institutions that ranked aesthetics highly, ranked biodiversity and preservation lower. For five institutions, safety was the number one

Fig. 2. Lapsed pollard at Richmond Park, Greater London, United Kingdom. Retrenchment pruning was utilized here and meadow grass allowed to growth (photograph by L. Metzger).

Fig. 3. The fallen linden at Richmond Park, Greater London, United Kingdom (photograph by L. Metzger).

Fig. 4. Ivenack, Germany: An artist's replica of the 1000 year old oak trunk. Fencing utilized as a deterrent, and signage for storytelling (photograph by L. Metzger).

Fig. 5. NYC Department of Parks and Recreation, New York City, NY, USA. The site of this park has the remnants of an old nursery (photograph by L. Metzger).

Fig. 6. Bernrieder Eichen Park in Bavaria, Germany: A younger tree of the same species planted adjacent to the ancient one. Succession planting at work (photography by L. Metzger).

priority and for four of the institutions minimizing risk of litigation was the second priority. These peripheral concerns that have little to do with the collection itself and more to do with visitors can be a large roadblock in achieving the other priorities of preserving and displaying historic and aging trees. These priorities highlight the need for management planning not only to protect visitors and staff but to protect the collection itself.

The survey data indicated that size is not a limiting factor when engaging in management planning. Institutions of all sizes indicated that they engage in planning, do not engage in planning and/or have an interest in management planning.

The discussions regarding certification programs and ancient trees yielded numerous suggestions that included mimicking a program initiated by writer, and staff member from the public school system in Philadelphia, PA, Edward Embree Wildman. He introduced this program in 1932 as a way to celebrate the 250th anniversary of William Penn's arrival in America (Wildman 1933). The trees selected to be part of this program were trees that, after meeting the proper criteria, were believed to have been standing in 1682. The program involved school children and other citizens, raising awareness of American history, science, forestry and horticulture. There are numerous William Penn trees still standing too. These trees are have become well-known and beloved by the surrounding communities. As a result of being recognized, many have been protected and preserved.

Discussion

The literature, especially the works of Rutkow and Wilson, elucidate the reasons for the initial lack of tree conservation. Both author's work aid in the understanding of wood as an economic commodity, wood's role in human survival, and forests and their historical relationships to humans. The survey research showed that much could be learned by the initiation of conversation on this topic between institutions in the United States and in Europe.

The survey data matched the ideas voiced in early interviews with case study staff and other experts. Many gardens and arboreta do not have tree management plans specific to their historic collections. From a perspective of health and safety, the necessity for written management plans and detailed record keeping is essential. The research, especially according to the case studies, showed that those institutions utilizing management plans can keep their trees in a generally healthier state through management of their collections

including monitoring and preventative maintenance. When compared with an institution utilizing only remedial maintenance. This indicates that tree management plans are necessary, not just to avoid litigation but to avoid the situations that would lead to litigation. This perspective benefits both the tree collection and the institution, not to mention the visitors. On the other side, plans are necessary so that all the aging and ancient trees are not lost due to human interference, so that national treasures are preserved.

Based on interviews, examples of current tree management plans, and anecdotal evidence presented at case study sites, it is clear that the management plans created for historic and aging tree collections are generally focused on human and institutional safety as opposed to the trees' safety. The current plans are more concerned with the needs of those visiting the trees than the trees themselves. Collections policies are interested in keeping a neat and tidy setting and dispensing with the trees when they no longer meet the criteria for the collection.

However, the effective management of a historic or aging tree collection is a task that works best from a holistic perspective. A perspective that sees the trees as lead performers in the existing environment instead of seeing the trees as sculptures placed in a static gallery that happens to be outdoors. The curator of such a collection should be an observant advocate for the trees, a stage manager of sorts, who can be a caretaker of all the parts (Leopold 1987). It would benefit the collection if the curator engaged in conversation with other institutions boasting similar collections in order to make the most of the collection. Awareness and communication are key aspects of being effective in this regard. Practical tree work should reflect the age and stage of the trees. Methods for aging trees should be applied. This is consistent with the recommendations included in the Ancient Tree Forum's publications.

The priorities of the institution are reflected in the tree collection. If a change in management style or practical technique is desired, the institution must make the collection a priority. The mission and priorities of the institution must match up with the mission of the collection. The administrators, arborists, curators and horticulturists must be working together in unison.

It is clear that nomenclature should be standardized. Consensus regarding terminology and definitions has been created through literary resources, interviews and surveys. "Historic and Heritage" can be used as synonyms, always referring to trees that are associated with a cultural or historic figure or event, regardless of age. "Ancient and Veteran" can also be used synonymously and are related to trees of a certain age for their species. These trees may also be hosts for biological diversity.

While there are aging or historic trees at institutions that may not meet the current standards for beauty, they may provide other relevant qualities for the collection, including biological diversity and opportunities for education. Bringing the multi-leveled benefits of aging trees, their ecological systems and their stories to light could allow the historic tree collection to become the centerpiece of the horticultural institution. Further, this refocusing could allow the collection to redefine the accepted standards of beauty where aging trees are concerned, deepening and enriching the public's understanding of the aesthetic. In this way, institutions of horticulture could contribute to the ongoing conversation about beauty in our society at large.

The research found that institutional priorities rule when it comes to tree care and that the issues competing for priority include safety, minimizing risk of litigation, and overall aesthetics. This proved the need for a written policy designed to prioritize the historic collection. Additionally the research indicated that sometimes for fear or lack of knowledge, administrations judge too harshly, cut too easily and focus too closely on one specific priority. The trend is that institutions are reactive as opposed to proactive in the treatment of aging trees. However, with information from institutions worldwide, creative, yet simple philosophies and practical methods were revealed for prolonging the life of ancient trees and building meaningful historic tree collections.

Overall, the management of the historic tree collection cannot be viewed in vacuum because it is clear that the trees in the collection are part of a functioning ecosystem, just as the collection is a part of the institution. The research showed that there exist under-utilized resources, and revealed a treasure trove of opportunities for institutions in the United States and abroad. Further, the research affirmed that the historic collection is collaborative by nature. Like the trees in concert with their environment create the collection, the collection can connect the institution to the world at large.

Recommendations for Historic Tree Collections Management Planning

- Determine the purpose and uses of the historic and aging tree collection.
- Define criteria for historic and ancient trees specific to the institution.
- Determine whether or not the historic tree collection is meant to last in perpetuity. If so, adopt or create methods for succession planning.
- Adopt terminology that is consistent across the field.
- Work incrementally where interpretation is concerned.
- Take small steps, interpreting one portion of the collection at a time so that the public can begin to appreciate and engage with the collection.
- Interpretation should be simple, informative and personal to the institution or collection.
- Signage in general should be informative more than prohibitive in tone.
- Consider methods for integrating the historic tree collection into the educational and programmatic framework of the institution.
- Engage in collaborative partnerships with surrounding institutions to achieve goals.
- Look outside the immediate area for insight and expertise.
- Apply practical arboriculture methodologies specific to historic and ancient trees. Include information about these methods in messaging, providing another opportunity to engage with the public.

- Consider benefits and characteristics that are specific to aging trees when making decisions about the lifespan of the tree, and the way it is presented. Opportunities for engagement in a larger context exist. Use these opportunities to make the institution and the collection relevant to the surrounding community and the world at large.

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