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CLIMATE ADAPTATION FROM THE GARDENERS PERSPECTIVE

A Comparative Study between Sweden and the United Kingdom

Emma Grönlund

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Climate Adaptation from the Gardeners Perspective: A Comparative Study between Sweden and the United Kingdom

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Supervisor: Joakim Seiler
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UNIVERSITY OF GOTHENBURG http://www.conservation.gu.se
Department of Conservation Fax +46 31 7864703
P.O. Box 130 Tel +46 31 7864700
SE-405 30 Gothenburg, Sweden

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Author: Emma Grönlund
Supervisor: Joakim Seiler

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ABSTRACT
This thesis presents a comparative study into the practices and perspectives of 19 heritage gardeners across nine gardens in the United Kingdom and Sweden, focusing on their responses to climate change. The study encompasses interviews with six gardeners from England, working at— Aberglasney Gardens, Beth Chatto's Plants and Gardens, Cothay Manor, Iford Manor Estate, Hestercombe House and Gardens, and the Japanese Gardens at Kew—and three in the greater Gothenburg area of Sweden: The Botanical Garden of Gothenburg, Gunnebo House and Gardens, and the Garden Society of Gothenburg. Through semi-structured interviews and participant observations, the study addresses the questions: (1) How do gardeners in heritage gardens cultivate both natural and cultural heritage? (2) How do contemporary trends and norms, such as sustainable and ecological practice, rewilding and naturalistic gardens impact the work and methods in heritage gardens? (3) How can cultural ecosystem services improve the multifunctionality of ecosystems in heritage gardens?

Employing the *Cultural Ecosystem Services* framework and *Natureculture* as theory, the study identifies eight major themes divided into conservation of cultural and natural heritage. Key findings highlight the impact of norms on pesticide use, strategies for water and drought management, the shift towards peat-free horticulture, and promotion of biodiversity. The gardeners' emphasis on education, authenticity, and the integration of new ecological trends illustrates the dynamic interplay between tradition and innovation in heritage garden management. This research underscores the importance of an integrated approach to heritage gardening, and showcase how a lack of understanding for the interaction between gardener and "the more-than-human" hinder visions, management, resources and funding to be planned in a manner that is culturally, naturally and economically sustainable.

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I first came to the garden with practicality in mind, a real beginning that would lead to a real end: where to get this, how to grow that. Where to get this was always nearby, a nursery was never too far away; how to grow that led me to acquire volume upon volume, books all with the same advice (likes shade, does not tolerate lime, needs staking), but in the end I came to know how to grow the things I like to grow through looking– at other people's gardens. I imagine they acquired knowledge of such things in much the same way– looking and looking at somebody else's garden.

from The Garden I have in Mind by Jamaica Kincaid

Acknowledgement

With the deepest sense of wonder and gratitude, I extend my thanks to the gardeners who breathed life into this project. To Claire Greenslade, who found me adrift among the Camellias– being a typical Swede who'd rather walk than figure out the labyrinth of British public transport– where my journey's seed was first planted. To Steve Lannin, who welcomed me and Rasmus into the embrace of Iford Manor, guiding us through a mystical garden under the spell of the pouring rain. To Jake Davies-Roberts, who met me amidst the tempest and shared a cypress shelter until we were both drenched, our spirits high despite the rain.

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In the realm of Swedish gardens, my gratitude blooms for the team at the Garden Society, especially Malin Löfstrand, Stephan Hammar, and Emmelie Georgii, who shared their time and wisdom, and managed to surprise me with how little I knew about the garden I used to serve.

At the Botanical Garden of Gothenburg, I was honoured to work alongside and interview the visionary director Hanna Tornevall, and the gifted gardeners Marika Irvine, Lena Benjegård, Maria Sjöstedt, Åsa Kullin, Mikael Peterson, and Anna-Carin Ek. Each one, a custodian of the craftmen secrets.

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1. Introduction

One is often led to think of the garden industry as something different than an industry at all, it is a pastime or a hobby. Yet the garden industry is a massive consumer of economic resources such as land, labour and money, and has been for many centuries. It's also an unusual industry because many of its customers are also its workers, designers and entrepreneurs. In 2019 the annual UK expenditure on nurseries and garden centres as well as on landscape contractors was over £11.4 billion. This was excluding the amount spent on gardeners (Floud, 2019). *'For centuries we have been spending, and continue to spend, far more on our gardens than almost anyone realises.'* (Floud, 2019, p.13).

There are different ways to finance a heritage garden. In many countries, it is common to have an entrance fee to visitor gardens. This is uncommon in Sweden but can be found in a few places, e.g. Sofiero Castle and Gardens. It is more common, in Sweden, that the gardens or parks are funded by the municipality, e.g. The Garden Society of Gothenburg.

Without financing, it is hard to maintain the cultural value of a garden. Gardens need constant maintenance, without it plant materials outcompete each other and succumb to the weeds, while important axialities and beautiful views disappear behind unkept hedges and trees. A kitchen garden grows over in less than a season. Even under constant surveillance, there is always a race against time, a balancing act of what to prioritise first. Therefore, the salary of the garden team that tends to the gardens will always be the largest expense. Unfortunately, most stakeholders do not account for the cost of maintaining a garden when they budget to design and plant a new garden. It cannot be compared to the cost of readapting or reconstructing a built cultural heritage because it can't be given a final price tag.

This thesis stems from my experience as an intern and gardener during the last few years. Many questions arose from spending time in different teams and realising how they have different missions and use a broad range of methods to work with climate change, resilience and authenticity. I also have had the privilege to see the difference as you move over geographical distances and between different eras in heritage gardens. The extreme drought of 2022 followed by the extremely wet 2023 also played a part in my choice of topic. This showed how gardeners need to be equipped against both extremes, often within very short time frames.

I've worked with this question previously during my master's, resulting in a longer visit to the U.K. where I explored the same theme, which eventually led to the paper I wrote together with Joakim Seiler '*Negotiating Authenticity and Climate Change in Heritage*

Gardens' which we presented at the Biannual International Convent for the Craft Sciences in September 2023. In this paper, we argue that the traditional gardening practised before the advent of power tools, plastic, peat issues, and uninformed transportation can be part of the solution to the loss of biodiversity and climate change. This paper identifies some of the obstacles encountered in relation to negotiating questions of authenticity and climate change in heritage gardens (Grönlund and Seiler, 2023). This master thesis will explore these issues further through comparative studies of Swedish gardeners' methods, goals and norms. In ten years we'll know the answer to whether our efforts are enough to save the environment and the Swedish natural heritage and cultural heritage. Regardless of the outcome, I hope this documentation can show why we make certain decisions today and what we can do to help each other better implement the goals for sustainable historical and contemporary parks and gardens in Sweden.

2. Background

2.1 Heritage Gardens

In 1982 ICOMOS passed the '*Florence charter'* which officially acknowledged gardens as "living monuments" (ICOMOS, 1982). Since then the general and academic interest in preserving, maintaining and restoring historic gardens has increased, and over the last forty years, new garden management methods have evolved to match the goals of safekeeping the heritage.

The concept of sustainable development is generally regarded as the need to achieve sustainability across environmental, economic, and social dimensions (United Nations, 2002; Stephenson, 2008). The convergence of the need to sustain both cultural and ecological diversity becomes apparent in the '*World Heritage Convention'* by UNESCO (1972) and the "Protected landscapes approach" proposed by Brown et al. in 2005. These efforts underscore the inclusive approaches taken towards identifying and safeguarding landscapes that possess both cultural and natural significance. An 'ecological systems' approach to cultural sustainability proposes that sustaining a landscape's contribution to culture requires a nuanced understanding of its specific values. Decision-makers, whether at local or national levels, must delve into the intricacies of these values and their role in supporting or hindering cultural identity and diversity. This approach necessitates a departure from generic conservation strategies to site-specific considerations, recognising the uniqueness of each landscape and its cultural significance (Stephenson, 2008). Illustrating this point, the

Australian '*ICOMOS Charter for the Conservation of Places of Cultural Significance'*, known as the '*Burra Charter'* (ICOMOS Australia, 1999), defines cultural significance broadly. According to this charter, cultural significance encompasses aesthetic, historic, scientific, social, and spiritual values for past, present, and future generations.

Joakim Seiler (2023) recounts how traditional garden craft became protected and seen as cultural heritage in his essay *'Trädgårdshantverk som kulturarv'*. In Sweden, the Open-Air Museums played an important role as one of the first platforms for garden conservation, and another was historical gardens connected to historic manors and castles. Nature reserves and protections through declarations of historical significance of buildings and nature in the 20th century contributed to the preservation and maintenance of historical gardens, but mainly as a side effect. In Sweden the Environmental Code *(Miljöbalken)* was adopted in 1998, as a compilation of environmental laws, introducing a new category of protection for gardens and landscapes: the Cultural Reserves (Riksdagen, 1998). This was a national result of an increased understanding of cultural values in and the preservation of landscapes. The Cultural Reserves were designated to landscapes or areas with a rich cultural history consisting of landscapes, gardens, and built remnants (Joakim Seiler, 2023).

Furthermore, Seiler argues that Swedish cultural heritage conservation has evolved from being focused on objects and monuments to being more process- and experience-oriented. The concept of intangible cultural heritage, which recognizes heritage that is not of a material nature, have challenged the old definition of cultural heritage (UNESCO, 2003). Flinck has also emphasised that change itself is part of the inherent nature of green cultural heritage. (Flinck, 2013, p. 18) These forms of heritage are not frozen in time in archives and museum displays but growing and evolving together with living tradition bearers and a living, nature-bound, cultural heritage (Joakim Seiler, 2023). Gardens also undergo change during the season, making them worth visiting many times during a year. When producing a cultural heritage garden choices are made to emphasise certain aspects of the gardens practises, plant material. Memories or tradition to profile the garden. This process of prioritisation and enactments are important to place the gardens in a larger context, where they are important for local and regional tourism and identity (Saltzman, Sjöholm, and Westerlund, 2024, p. 116).

Another significant shift is the increased understanding and collaboration between nature conservation and cultural preservation. This is evident in concepts such as natural cultural heritage and cultural ecosystem services that unite the two (Seiler, 2023).

There are two main types of historic gardens. The first one is created by restoring a garden to a certain age, e.g. the early 19th century as we can see at Gunnebo Castle and Gardens. The restoration of the garden at Gunnebo is based on clues from the past such as plant material, maps created by the architect, sketches made by John Hall who was the son of the first owner, and the paintings of J.F. Wienberg who created multiple paintings between 1795-1823, but could also use modern technology to excavate root material to find the plant material that has been lost since the garden's glory days. These gardens are time capsules of a single age and ideal which they focus on showcasing and teaching their visitors about.

The other type of historic garden are historical botanical gardens. According to Botanical Gardens Conservation International, the definition of botanical gardens are "institutions holding documented collections of living plants for the purpose of scientific research, conservation, display, and education." (BGCI, 2022). To fulfil the purpose, further the research, and conserve the atmosphere of a botanic garden they must be more open to evolving and introducing new plant material over time, all while preserving the history of the gardens.

Gardens are in essence man-made landscapes which provide a place for relaxation, physical exercise, educational visits, beauty and inspiration. Historic gardens hold additional educational values, these are places where we can learn about our national identity and heritage, craft skills and natural values such as gene diversity (MA, 2005; Everard, 2017). The biological cultural heritage in a park can tell us many things. Trees are usually the oldest survivors in gardens. They carry scars from pruning, in alleys we can see where trees needed to be replaced, and if the park was expanded the difference in ages between the trees can give hints of what sections were planted when. The biological heritage tells us not only of the garden but also the history of the surrounding landscape. Over time the trees have been colonised with wild species of insects, larvae, fungi and moss which previously lived off old trees and deadwood in the surrounding landscape. By making inventories of the garden's inhabitants we can examine what the surrounding landscape used to look like before we "cleaned it up" (Tandre, 2014).

Historically, gardens' main purpose was to enrich the lives of their owners and visitors with their beauty but also serve as an educational space, especially the English landscape parks which offered glimpses of other cultures to inspire conversation (Hobhouse, 1992). Over the last decades, there has been a notable increase in extreme weather events globally, resulting in a substantial number of individuals directly experiencing the effects of this climate change phenomenon (Steffen et al., 2018; Kron et al., 2019). The risk of extreme

weather poses new challenges for gardeners in all types of gardens as the plantings need to be resistant to both severe drought and extreme wet conditions.

Facing these challenges, the professional gardeners of today need to mitigate the cultural and natural values of their gardens for a sustainable future.

2.2 Sustainable Practice and Climate Studies

There are three related main phenomena that one needs to consider when reviewing the potential effects of climate change on gardens. These are climate change, natural disasters, and human activity (Bisgrove and Hadley, 2002). Heritage is a fragile and non-renewable resource (Farrar and Vaze, 2000), and heritage gardens are especially sensitive to climate change. The significance of the climate impact on each garden is due to their characteristics and where they are situated. Gardens on hilltops are likely to have to deal with drought while gardens in valleys will be affected by flooding (Bisgrove and Hadley, 2002).

The 'climatic world' in which many of our botanic gardens and landscapes were created is already gone and profound challenges confront us in the future. It has been estimated that *'in the next 50 years, 20-50% of plants in botanic and urban landscapes will face temperatures never experienced before'* (BGCI, 2024).

The environmental sustainability question needs more public recognition. There are a plethora of ways to create biodiversity and help your local species in a garden. Pollinator-oriented flowerbeds, restoring old meadow landscapes, and leaving old trees to house fungi and insects as habitat piles are a few examples. Environmentally conscious gardeners turn to more traditional and ecological methods such as keeping water butts, making compost, and mulching (Bisgrove and Hadley, 2002).

Joakim Seiler writes in his doctoral dissertation that "*there are at least two operation strategies: one is to develop methods to handle climate change and the other is to be more proactive and look for management methods that minimise the contribution to climate change. One thing that is clear is that climate change, biodiversity, and cultural values need to be handled simultaneously and negotiated in relation to each other.*" (Seiler, 2020, p. 34).

Webster et al., (2017) wrote the important report 'Gardening in a Changing Climate' commissioned by the RHS. As the global climate changes rapidly as a result of greenhouse gas emissions there are already consequences, such as more frequent and intense rainfall in combination with rising temperatures. These climate changes will keep compounding as long as human activities continue to emit carbon and other polluting compounds. As populations

grow and urban areas become more dense, gardens play a crucial role in providing health and environmental ecosystem services that were once offered by natural environments (Webster et al., 2017).

Jan Woudstra writes on the topic of climate change in relation to heritage gardens. According to Woudstra, parks and gardens play an important part in slowing down climate change, by creating sustainable and carbon neutral spaces (Woudstra, 2019). According to Woudstra, while there is a strong recognition of the health benefits of green spaces and the cultural significance of period gardens, rewilding and native plant advocacy have gained traction, prompting shifts in planting priorities towards environmental sustainability. This shift has led to the acknowledgement that certain plants may no longer be suitable for cultivation, prompting a call for planting more native trees and shrubs rather than exotic species. However, there are arguments against this approach. Parks and gardens historically featured exotic plants, which may exhibit greater resilience to climate change. Moreover, Woudstra says the idea of native plants is complex, as humans have long influenced flora, and the debate continues on whether this manipulation is a natural process or a cause for concern. Nonetheless, the selection of plant species remains crucial, as each contributes to narratives of resilience.

Similarly, there is a case to be made for preserving historic planting in parks and gardens, as historic varieties may thrive under different climate conditions, providing benefits for conservation and society. These plantings offer insights into their environment and enrich native flora rather than falsify it. Amidst evolving understandings of sustainability, there is a need to reassess priorities and recognize the value of historically informed planting schemes in fostering biodiversity and resilience (Woudstra, In press).

While gardens are undoubtedly cultural creations, they hold significant ecological importance and serve as vibrant expressions of novel ecosystems. Gardening involves not just the creation but the careful curation of specific local ecologies, varying in size, that interconnect with neighbouring gardens, parks, and streetscapes, forming networks of biodiversity corridors within the urban landscape. Regardless of their level of maintenance or neglect, all gardens have something to contribute to the wide array of species living by our side (Moore, 2022).

In England alone, residential gardens cover a vast expanse of 633,000 hectares (1.5 million acres). Although the distribution of gardens is not always equitable across socioeconomic or ethnic lines, the majority of households have access to some form of

outdoor space. Despite their significance, the importance of gardens to biodiversity was often overlooked until the latter part of the twentieth century.

Pioneering work in garden ecology was conducted by academic zoologist Jennifer Owen in Leicester over three decades, beginning in 1972. Through meticulous observation of her garden, Owen unveiled its richness as a thriving biodiverse environment. She recognized that while gardens are artificial environments consciously designed by gardeners, they harbour a unique value termed "contrived diversity." This diversity arises from the deliberate decision of gardeners to cultivate a wide variety of plants, both native and alien, within a confined space.

Owen also highlighted the importance of unintentional plant species that find their way into gardens and thrive under favourable conditions. Inspired by Owen's research, the Biodiversity in Urban Gardens study (BUGS), led by the University of Sheffield, conducted a comprehensive examination of gardens, focusing on plants and other forms of biodiversity, which corroborated many of her findings. The study, spanning from 2002 to 2007, revealed that gardens host remarkable levels of floristic diversity, surpassing other types of landscapes. Approximately 30 percent of species found in gardens are native, while the remaining 70 percent are introduced. This abundance is attributed to the vast pool of plants available to gardeners and the active management and maintenance practices that enable garden plants to persist even at low population sizes. Furthermore, gardens exhibit greater heterogeneity compared to semi-natural habitats, with individual gardens varying in characteristics such as openness, grassiness, or shade. Larger gardens may encompass a combination of these habitats, further enhancing their ecological complexity (Thompson, 2007; Moore, 2022).

The reasons for conserving biodiversity can be divided into three main categories: ethical reasons: for the sake of survival of the species, ecological reasons: for the sake of nature, and economic, aesthetic, and cultural reasons: for the sake of human experience and well being (Henriksson and Johansson, 2007). Human impact on ecosystem dynamics through alterations in organisms' habitats has often resulted in a negative effect on biodiversity and its ecosystem services (Molander, 2008).

Dearborn and Kark (2010) write that as more than 50% of the world population lives in cities we need to consider motivations for protecting and benefitting biodiversity in urban areas. The seven motivations they propose are: *preserving local biodiversity, creating stepping stones to nonurban habitat, understanding and facilitating responses to environmental change, conducting environmental education, providing ecosystem services, fulfilling ethical responsibilities, and improving human well-being* (Dearborn and Kark,

2010). Each of these motivations could be carried out in varying degrees in both urban and countryside gardens.

As heatwaves and drought become longer and reach higher temperatures cities become especially vulnerable due to the urban heat island effect. Infrastructure such as buildings and roads absorb and re-emit the sun's heat more than natural landscape. In urban areas where built structures are concentrated and green areas scarce, the temperature gets higher than in the outlying areas. This is the urban heat islands effect (United States Environmental Protection Agency, 2024).

As research reveals, the ecological management of gardens is an important tool that can be used to increase biodiversity and ecosystem functions in the face of the climate crisis.

2.3 Rewilding and Naturalistic Gardens

One of the main problems gardeners in historic gardens face is the issue of what we plant in our gardens. There are many parameters to account for, you need to balance the cultural heritage aspect such as authenticity, historic value and educational value with the broader issues of visitors' experience, as well as ecosystem values and biodiversity.

In recent years the design trends have changed the way we are using plants both in how we arrange them and the purpose we give them. Today we have started to consider other values than beauty such as pollination and habitats as equally important parameters. Plants that are seen as weeds in one spot might be a wildlife habitat in another, for example, stinging nettles which are habitats for the small tortoiseshell butterfly (*Aglais urticae*) and many other moths.

Private gardens, public gardens and parks, as well as corporate landscapes, have all started to create and support the use of wildflower meadows, prairie plantings and perennial and ornamental grasses in “naturalistic plantings”. Sometimes these succeed in recreating what we would see in our local countryside, other times it looks more like a conventional garden. Grasses and annuals that were previously seen as too modest for ornamental borders are now the main components of the naturalistic garden. In these gardens flowers with understated colours and shapes are preferred and the plants are packed close together, leaving no bare soil. There is a general feeling that the new style is somehow more sustainable, better for the natural environment and wildlife and of lower maintenance (Kingsbury and Takacs, 2022) (Hitchmough, 2017).

Rewilding, or simply wilding, gained wider public recognition with the publication of Isabella Tree's book '*Wilding: The Return of Nature to a British Farm'* in 2018. Since then it has been widely featured in popular media such as Gardens Illustrated and Country Life.

Rewilding is a conservation approach aimed at restoring ecosystems to their natural state by reintroducing native species, revitalising habitats, and promoting biodiversity. It's a proactive strategy that seeks to undo human-induced ecological damage and foster sustainable coexistence between wildlife and humans.

The Oostvaardersplassen nature reserve in the Netherlands serves as a notable example of rewilding and the inspiration for Tree's farm Knepp Estate. Oostvaardersplassen was initially created as a buffer zone for a nearby city; the area has been left largely untouched by human intervention, allowing for the spontaneous development of diverse ecosystems. The presence of large herbivores like Konik horses and Heck cattle has contributed to the creation of dynamic landscapes resembling the time before human intervention.

Rewilding principles can be applied to gardening practices, promoting the creation of biodiverse and ecologically resilient landscapes even in urban or suburban settings. By incorporating native plant species and creating habitat features such as ponds, hedgerows, and log piles, gardeners can attract a wide variety of wildlife, from pollinators like bees and butterflies to birds and small mammals (Tree, 2018).

Though some may reject the idea of a wilder garden. Nassauer (1995) introduces the concept of "Cues to care" in her article '*Messy Ecosystems, Orderly Frames'*. Nassauers research shows that in urban and countryside landscapes people tend to associate landscapes with high biodiversity as messy, weedy, and unkempt. This creates the misconception that biodiversity and heterogeneity features in urban contexts are a sign of a lack of care (Nassauer, 1995, p. 163). As a way to show people that the ecosystem is not abandoned, Nausseur advocates for leaving cues in the landscape, for example; mowing a strip along/ or creating a human walk path, choosing plants and trees with eye-catching flowers, producing wildlife feeders or birdhouses to show that an area is a wildlife habitat, or putting up fences or other architectural structures that give a shape or frame to the area (Nassauer, 1995, p.167-168).

Positioning and Aim:

It is important to note that I am both a gardener and cultural heritage professional. My goal in this study is to conduct a bottom-up study, exploring how gardeners' practical knowledge

shapes sustainable development in the field and its impact on natural and cultural heritage. This will be explored by looking at how each gardener uses their expertise to make informed choices in the face of financial and climate changes to best serve the heritage as they see it. While the need for environmental change is widely acknowledged, resources– financial and sustainable options– are lacking. Additionally, as gardens are public spaces, there's a continual need to educate visitors and shape norms.

Research questions:

- How do the gardeners in heritage gardens cultivate natural heritage and cultural heritage?
- How do contemporary trends and norms, such as sustainable and ecological practice, rewilding and naturalistic gardens impact the work and methods in heritage gardens?
- How can cultural ecosystem services improve the multifunctionality of ecosystems in heritage gardens?

3. Theoretical framework

3.1 Natureculture

Harrison (2015) reports that significant shifts have occurred in our understanding of heritage, challenging previously established notions. The once widely held heritage discourse and universal principles outlined in Western charters and conventions has been disrupted by various challenges, undermining the idea of heritage as singular and universally agreed upon. Additionally, the traditional dichotomy between natural and cultural heritage, which separated these domains based on perceived differences in value by emphasising the division between nature and culture, practice and thought, tangible and intangible, has proven to be unsustainable. Harrison argues that if *"cultural" heritage issues are connected with "natural" heritage concerns, "the environment" comes to be seen as a "social" issue as much as it does a "natural" one."* (Harrison, 2015, p. 32).

In our current era, environmental concerns stemming from human activity have taken centre stage in both media coverage and contemporary political discourse. Issues such as climate change, land and soil degradation, species extinction, pollution, overpopulation, and the depletion of energy resources exert a profound influence on the lives of all beings inhabiting our planet. Harrison highlights the significance of the concept of sustainability in

expanding the scope of environmental considerations to encompass a broader spectrum of economic, social, political, ecological, and cultural factors. Moreover, the notion of connectivity ontologies prompts us to extend this framework even further, acknowledging not only the sustainability of our species but also that of various non-human actors within our shared environment (Harrison, 2015).

In navigating this expanded field of heritage, it is crucial to reframe our understanding of "heritage" itself. Rather than viewing it solely through a lens of the past, we must recognise that heritage encompasses practices that are fundamentally oriented towards shaping the future. Heritage involves the intentional utilisation of both tangible and intangible remnants of the past to actively reconstruct ourselves and our world in the present. This process anticipates outcomes that will contribute to specific social, economic, or ecological resources for the future (Harrison 2013; Holtorf 2013; Holtorf and Fairclough 2013; Holtorf and Högberg 2013).

Embracing the "new heritage" paradigm (Holtorf and Fairclough, 2013; Harrison, 2015), we acknowledge that heritage is not static or inherent but rather emerges through ongoing dialogue among individuals, communities, practices, places, and objects. It's produced through discussions about what holds value from the past, yet its assembly occurs exclusively in the present, representing a simultaneous act of reflection on the past and commitment to shaping the future (Harrison, 2015).

As the term natureculture is gaining traction, it is slowly gaining footing in the garden sciences. Eric A. de Jongs article in Bulletin för trädgårdshistorisk forskning no. 35 *"Sites of Contested Meaning, Gardens and the Anthropocene"* explores the future of the study and integration of heritage gardens. De Jong argues that relying solely on a historical exploration of successive styles falls short of truly understanding the historical and current reality of gardens. Instead, he suggests widening our perspective to embrace the dynamic aspects of garden and landscape culture. In his view, it is necessary to shift our focus from stylistic evolution to a more comprehensive understanding of the garden's ontology. This means recognizing the collaborative efforts of both human and non-human entities—soil, water, plants, animals, air, microbes, trees, insects, and climate—all contributing to the garden's evolution as a living entity (De Jong, 2023, p. 9-12).

Drawing inspiration from Donna Haraway's concept of "natureculture" (1991) De Jong encourages us to investigate how nature and culture intersect to shape the garden into a unique, living entity. This exploration extends beyond the individual garden to consider its role in the broader urban landscape. Haraway's framework prompts us to consider not only

how the garden has evolved but also how it functions as a dynamic entity influenced by both natural and human forces. De Jong asks us to question how gardens tell their life stories, shaped by the intricate interplay of nature and humanity. Gardens become spaces where nature and man intersect, collaborate, diverge, coexist, and influence each other. By delving into the biography of the garden as a natural cultural space, we gain insights into its past, present, growth, decay, and culmination. De Jong contends that comprehending the garden as a natureculture enables us to perceive it as embodying both nature and humanity, transcending traditional dualistic frameworks. Importantly, this exploration goes beyond historical analysis; it serves as a foundation for shaping the future of gardens (De Jong, 2023).

Futures are not abstract, unknown realms beyond the temporal horizon; rather, they are firmly grounded in everyday practices, intricately woven into the fabric of our existence (Haraway, 1991). By understanding the elements that contribute to a garden's identity and trajectory, we can make informed decisions to ensure its continued vitality and relevance (De Jong, 2023).

3.2 Ecosystem Services

In 2005, the UN-led '*Millennium Ecosystem Assessment'* (MA) defined 'ecosystem services' as the benefits derived by people from ecosystems. These services encompass the diverse ways in which the natural environment sustains human well-being. The term 'well-being' encompasses various facets of human life, including health, happiness, prosperity and security, experienced from individual to national scales. In the context of ecosystem services (ES), this encompasses the health and functionality of supporting ecosystems. Consequently, ecosystem services bridge and interconnect ecology, economics, and societal well-being. They elucidate how ecosystems and their functions serve as the foundational, yet historically undervalued, resources upon which human quality of life depend. The ecosystem services received from healthy ecosystems are broken down into four categories: supporting, regulating, provisioning and cultural. Supporting services include primary production, nutrient cycling and soil formation. Regulating systems manage climate, purification of air and water, decomposition and pollination. Provisioning includes the supply of food, materials, medicinal resources and energy. Culture seeks spiritual, educational and aesthetic relationships with ideas of nature, as well as recreational and physical engagement in nature (MA, 2005; Everard, 2017).

Darryl Moore (2022) debates the topic in his influential book '*Gardening in a Changing World'*. Moore states that the concept of ecosystem services, initially conceived to integrate previously overlooked natural impacts into economic decision-making, has encountered challenges. While well-intentioned, it has reinforced the prioritisation of the economy over ecological concerns. Unapologetically human-centred, it perpetuates the division between humans and the rest of the natural world, emphasising human superiority.

Moreover, this system creates a hierarchy among ecosystems, placing higher value on those directly benefiting humans. Consequently, certain diverse and functioning ecosystems are overlooked because they offer limited perceived utility, disregarding their interconnected effects within a broader networked perspective (Moore, 2022).

However, the Millennium Ecosystem Assessment (MA) highlights a critical oversight in landscape planning and management: the undervaluation of cultural services and values. There exists a significant opportunity for improvement by comprehending how societies interact with ecosystems and linking these dynamics with cultural, spiritual, and religious belief systems. The MA also underscores that an ecosystem approach inherently acknowledges the significance of a socio-ecological system perspective. Accordingly, policy formulations should prioritise the empowerment of local communities to engage in natural resource management within cultural landscapes. This necessitates the integration of local knowledge and institutions, fostering a collaborative approach (MA, 2005; Tenberg et al., 2012). This is further expanded upon by Wu and Petriello (2011) who report that local and traditional knowledge is often underutilised in decision-making about landscape and ecosystem management, which may contribute to the loss of heritage values and cultural landscapes (Wu and Petriello, 2011; Tenberg et al,. 2012).

The concept of ecosystem services concerns everyone and transcends the boundaries that often exist between different sectors and interests in society. In Sweden, various entities such as authorities, municipalities, businesses, and organisations are now working in different ways to incorporate the concept of ecosystem services. This aims to improve decision-making regarding the management of ecosystems in a more sustainable manner (Lindblad, 2019). Heritage within the context of the Ecosystem Services (ES) framework, remains a complex and elusive concept. Fredholm and Frölander (2021), delve into the multifaceted nature of heritage within Swedish ES policy and practice, shedding light on parallel discourses that coexist within the framework. The most commonly stated notion of heritage in relation to ES is biocultural heritage, defined as ecosystems, habitats, and species that have originated, developed, or been favoured by human utilisation of the landscape by

the Swedish National Heritage Board (RAÄ, 2014; Fredholm and Frölander, 2021). The long-term persistence and development of biocultural heritage are dependent on or favoured by effective management. The National Board of Housing, Building, and Planning underlines the importance of urban green heritage, particularly emphasising historically significant elements.

In a report from the Swedish Environmental Protection Agency, ecosystem services are defined as utilitarian (anthropocentric), arguing that ecosystem services exist only if there is demand, explicit or implicit, from individuals or the community. The agency refrains from predefining categories for cultural ecosystem services, allowing relevant stakeholders to determine the value of specific landscape benefits associated with particular ES, such as biological heritage. This aligns with the argument that understanding cultural ecosystem services is enhanced by studying the actions and perceptions of local people.

Fredholm and Frölander also conclude that heritage professionals have a potentially vital role in advancing methodologies that better integrate biodiversity and cultural landscape management. They can also contribute to establishing participatory governance of natural and cultural heritage. However, the study notes limitations in the ES framework for conventional heritage management professionals to shape and influence the ES process in Sweden. The framework is heavily influenced by historically endorsed professional roles and responsibilities in land-use planning, featuring a distinct political division between nature and culture management. This division challenges the progressive role of heritage professionals in the ES framework (Fredholm and Frölander, 2021). The identification of Cultural Ecosystem Services (ES) poses a distinct challenge due to their intricate nature, often resulting in ambiguous nuances that hinder decision-makers' considerations. These 'shades of grey' complicate their precise delineation, leading to a lack of scientific rigour in research studies focusing on their identification and evaluation (Blicharska et al., 2017; Fredholm and Frölander, 2021).

When we alter an ecosystem to optimise a specific ecosystem service, such as creating monocultures in agriculture or forestry, it often comes at the expense of other services. These changes impact the multifunctionality of the ecosystem, reducing biological diversity and diminishing the range of ecosystem services available (Lindblad, 2019). By turning this statement around, this thesis will investigate whether continuous effort toward benefiting cultural ecosystem service can impact the multifunctionality of the ecosystem in a positive manner in the context of heritage gardens.

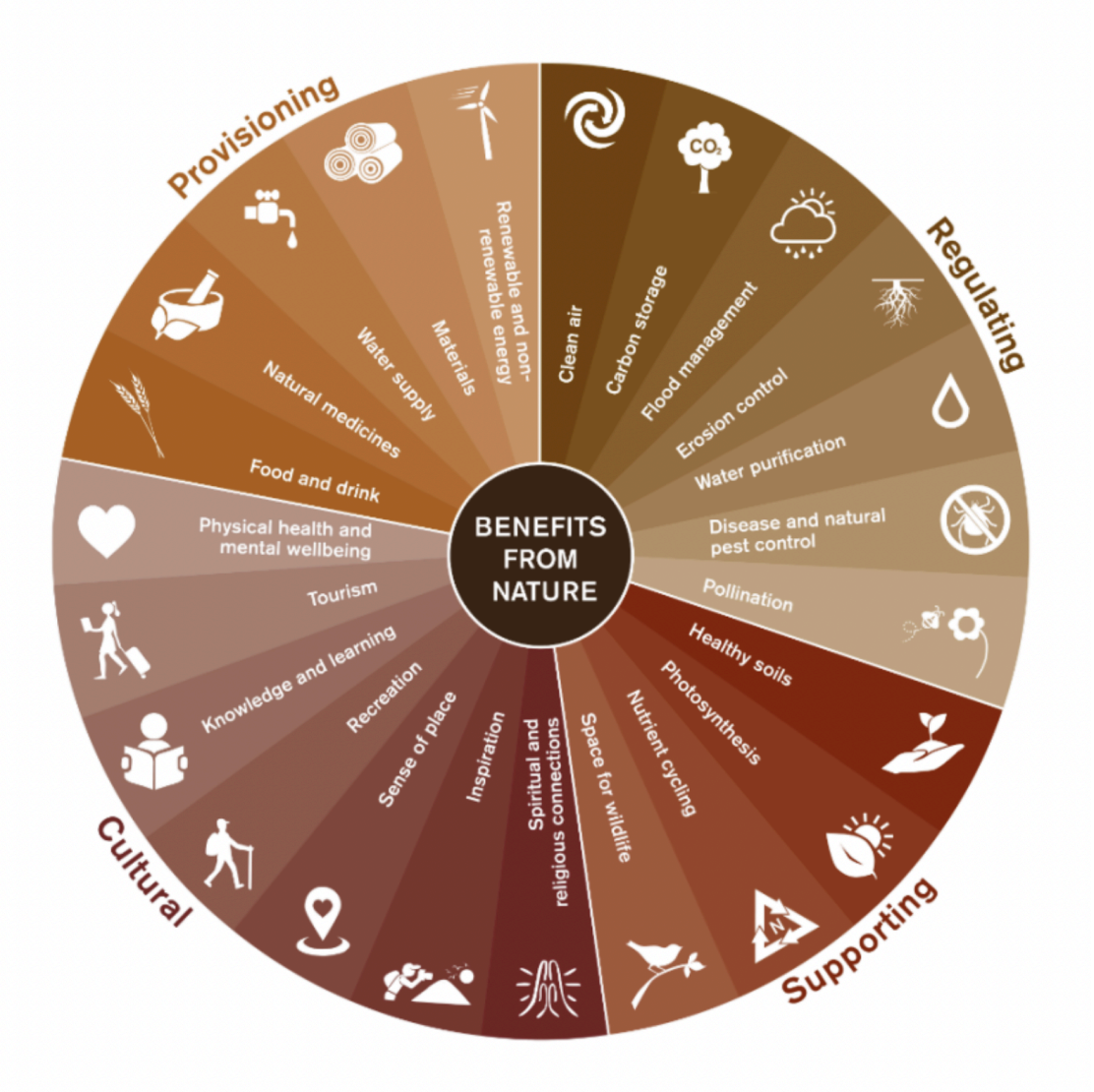

Figure 1: *Ecosystem landwheel describing the benefits derived from nature. Courtesy of NatureScot.*

The Ecosystem landwheel adapted by *NatureScot* shows which ecosystem services each of the four categories provide. In the discussion we will look at how gardeners can work with enhancing and safeguarding the cultural ecosystem services in their garden and whether this benefits the other categories. The thesis will also explore how applying these two main frameworks shapes the way we think, our choices and therefore how we practise gardening.

4. Method

4.1 Craft science

Craft research serves as a broad term encompassing studies about, through, and within the craft, sharing common ground with research in artistic creation and "konsthantverk." In the field of craft science, we adopt an approach that emphasises the "inner logic" formed by the interaction between individuals and their environment in practical situations. The core idea here is that knowledge about the craft should remain closely connected to the processes involved (Almevik, 2017).

Bengt Molander, in his work ‘Tankens frihet och längtan efter verklighet’ describes craft research texts as having a narrative structure. These narratives take readers on a journey, often involving travel, and provide insights into the historical background, heritage, development, and recent changes of the subject of interest.

In cultural heritage studies, a prevalent approach involves making systematic comparisons to identify typical or common "human expressions" across different times and places. The more we learn and develop comprehensive knowledge about entities like gardens and events, the more valuable they become. Practical knowledge, which is crucial for achieving specific goals such as honing craft skills, is rooted in action and includes various abilities, dexterity, and competence for carrying out procedures.

Craft science, bridging craft and science, explores craft through established scientific disciplines like ethnology, art science, and history. While the craft enables us to produce, present and demonstrate, scientific areas built on practical knowledge require broader concepts to express theories and knowledge. Craftsmen engaging in research draw from their own medium, experience, and craft sense. It is important to note that, similar to research, craftsmanship is characterised by thoroughness and methodical precision (Molander, 2017).

In 2003, the Convention for the Safeguarding of the Intangible Cultural Heritage was established (UNESCO, 2003). This convention identifies craftsmanship as potentially intangible cultural heritage, meaning that certain crafts may qualify as cultural heritage. In the convention on intangible cultural heritage, craftsmanship is presented as an end in itself, with intrinsic value, whereas in Swedish cultural heritage legislation, craftsmanship is at best described as a means (Seiler, 2023). In this study ethnographic methods such as participant observation and interviews were used to document the craftskill of the gardeners.

4.2 Ethnology

This study has breached the gap between the natural science part and the humanistic part of my degree through exploration through interviews and the ethnographic method: participant observation. In ethnology, the common goal is to produce a lot of data on a singular event or phenomenon. This provides a deeper understanding and data that shows what makes the phenomenon unique. *Fieldwork* as an ethnological term is distinguished as taking place in social and physical spaces where the researcher finds the practitioner or activity they are interested in. Another characteristic trait of fieldwork is that the same researcher or group carries out the whole study, from start to finish (Kaiser and Öhlander, 2011). This study is ethnographic in the sense that the gardeners are seen as belonging to one connected culture, regardless of geographical distance (Van Maanen, 2011). The study takes place in the naturally occurring environment work environment of the gardeners, where the fieldworker experiences the environment the same way the participant does and I aim to represent the findings as close to 'real life' as possible.

At the gardens Aberglasney, Cothay Manor, Gunnebo House and Gardens, the Garden Society of Gothenburg and the Botanical Garden of Gothenburg, I had the opportunity to carry out participant observation, where I was kindly allowed to be part of the garden team for varying depths of time. This process allowed me to work with and discuss the garden with both the complete garden team and visitors, which guided me in the final interviews which result is presented in this paper.

The interviews were carried out in all of the gardens selected for this thesis: Aberglasney, Beth Chatto's Plant Nurseries and Gardens, Cothay Manor, Gunnebo House and Garden, Iford Manor, Hestercombe House and Gardens, The Royal Botanical Gardens- Kew, the Botanical Garden of Gothenburg and the Garden Society of Gothenburg.

4.3 Interviewing

As stated in the introduction and background section the thesis aims to address the knowledge gap on how heritage gardens are affected by climate change and document the expertise of heritage gardeners working to counter climate change and change dated norms in the public and within the gardener community. By picking gardens in the U.K. and Sweden gave the opportunity to look at whether norms are different in the two nations and how trends affect said norms. Further, the geographical distance plays a role as both countries have seen different effects and have different issues to handle in their garden due to climate change.

For this study I chose gardens of historical significance, the oldest dates back to the 13th century while the newest only started being developed in the 90s. It was also important to pick gardens with different types of funding, for example entrance fees or regional funding, to investigate to what extent this affects the resources available to each garden. Another distinction was between Botanical and Heritage gardens, as these two forms of gardens provide different educational values due to their different main missions.
The reason behind it only being three Swedish gardens but twelve gardeners, but six british gardens and head gardeners, is due to the difference in hierarchy and organisation between the countries. Unlike the U.K. where one head gardener overlooks and is the decision maker of the gardens, most Swedish gardens lack this structure and instead have different gardeners in charge of different missions or parts of the garden.

There are many things to prepare and take into consideration before conducting an interview study. Choosing and contacting the person you want to interview, preparing questions and buying a voice recorder. Once the interview is finished it needs to be transcribed and presented.

The question all researchers who work with interviews need to handle is how to cover all bases during the interview. How much pre-knowledge should I have to ask the right questions? And how unknowledgeable should I be to gain new information through the interview? (Ehn, 2014).

Furthermore, how do we share our knowledge with each other? In Tim Ingold's "Making" he shares the sentiment that he learnt throughout his life in different situations where he's been a novice that "...the only way to know things - that is, from the insides from one's being - is through a process of self-discovery. To know things you have to grow into them, and let them grow into you, so they become part of who you are." (Ingold, 2013, p.1). Information in itself, on paper or explained to you, holds no guarantee of understanding. Ingold further argues that it is through actively paying attention: watching, listening and feeling, that we learn. Furthermore, Ingold describes the difference between a theorist and a practitioner as "One makes through thinking and the other thinks through making". He argues that craftsmen are allowing knowledge to grow from one's experience, where practical and observational engagement shows the way. To develop craft skills we need to go through the process of doing, making the choices and going through the actions.

Ingold argues that we can tell what we know through practice and experience because telling is an action that doesn't need specification or articulation. Furthermore, *to tell* has two meanings. It is both to be able to recognise subtle cues in the environment and respond to

them, as well as telling someone else of our experiences. These forms of telling are related because for those who listen, watch or read, telling is the act of tracing a path that others can follow. Stories provide a medium for practitioners to tell what they know without specifying it. They aren't instructions but rather pointers of what to look out for (Ingold 2013).

The work of Les Back's "The Art of Listening" (2007) explores listening as a method and craft, in which Back describes the method as an ascending journey. By practising "active listening," we integrate all senses into our thought process, enabling a deeper understanding of our surroundings and opening the door to exploring the many layers of our existence. A powerful method to enhance our listening ability is to direct our focus toward marginalised narratives and emphasise how forgotten details can act as carriers of the previously unsaid and overlooked. Back also emphasises that within the sphere of cultural studies, it is important to document and listen to what is otherwise overlooked; "the sociologist can still pay attention to fragments, the voices and stories that are otherwise passed over or ignored." (p. 1, Back, 2007).

During my interview with the gardeners, several methodological and ethical considerations arose regarding the use of the interview as part of my upcoming thesis and its potential future publication. One of these questions was whether or not to anonymise the participants, which is common practice in ethnological studies. All the gardeners already hold positions as prominent figures within the gardening industry. Each of the gardeners have given me permission to use their name in the study and an agreement was reached where the gardeners were given the opportunity to review and raise objections to the transcribed interview material if inaccuracies were detected.

In preparation for the interview, I also had the opportunity to reflect on my own position, biases, and their potential impact on the research. This involved being aware of my own cultural background and its potential influence on the interpretation of collected data. Despite my education and experience as a gardener and academic in sustainable gardening, it was necessary to actively listen and take a step back to allow for new knowledge and a reassessment of my preconceived notions. Along the way, it became very apparent that I initially needed to narrow down my discussion topics to process the interview material within my set categories of interest. Furthermore, it became very clear how much I take for granted when interviewing gardeners in the gardens where I have previously worked, such as Aberglasney Gardens and the Garden Society of Gothenburg, and how easy it is to steer the conversation away from the depth and miss questions due to a preconception that only reveals its incompleteness during transcription. Fortunately, all the gardeners have been helpful and

understanding, allowing me to follow up with questions via email or phone calls after the interviews.

For the transcription the AI tool Whisper was used, suggested and approved by the PIL- unit at the University of Gothenburg.

5. Case studies

5.1 Case Studies from the United Kingdom

In the spring of 2023, I travelled through the United Kingdom, interviewing head gardeners in heritage gardens of various ages and forms of funding. These interviews will be used for comparison and discussion. A brief historical background of each of the gardens and their head gardeners will be presented below:

Aberglasney Gardens

Carmarthen, Wales

Aberglasney Gardens was made famous by the BBC television series "A Garden Lost in Time" that followed its restoration. Today it is considered one of Wales's finest gardens. Especially famous is the fully restored Elizabethan Cloister Garden is the only surviving example of its kind in the U.K. today. The garden is surrounded by a three-sided arcaded walkway of large slabs which offers a view of the Welsh rolling green hills as well as the walled garden and the pond garden. It is believed that the Cloister garden was built during the 17th century during Bishop Rudd's time at Aberglasney. Aberglasney Gardens are 10 acres in total and houses many different garden styles (Aberglasney Gardens, 2024).

At Aberglasney Gardens I interviewed Joseph Atkin who was the previous head gardener, from 2011-2023 (Atkin, 2023).

Beth Chatto's Plants and Gardens

Colchester, England

Beth Chatto is one of Britain's most well-known plantsmen. From 1977 Beth Chatoo and her stand of "Unusual Plants" won ten consecutive Gold Medals at RHS Chelsea. Beth Chatto's first book, The Dry Garden was published in 1978. She wrote eight books in total, gave lectures around the world and wrote for magazines, newspapers and online. During her long life, Beth Chatto achieved the highest horticultural feats, including her Chelsea gold medals and an OBE. Beth Chatto died on the 13th of May, 2018 (Beth Chatto's Gardens, 2024). The gardens are informal historical gardens and have a National Heritage grade II listing. The plant nursery produces approximately 100,000 plants each year. The gardens themselves cover 2.8 ha (Gardens Illustrated, Feb 2023).

At Beth Chatto's I've interviewed Åsa Gregers-Varg who is the first ever head gardener, taking over from Beth Chatto herself (Gregers-Varg, 2023).

Cothay Manor's Gardens

Somerset, England

Cothay Manor is a grade I listed heritage house and garden on the National Heritage list for England. The house was built around 1480, and is listed as "an unusually well-conserved neat collection of buildings before 1500 in England". In 1920 the gardens were planned and laid out by Lieutenant-Colonel Reginal Cooper D.S.O. One of Cooper's largest projects was to move the river Tone to save his favourite Pine trees from erosion. The gardens make out about 4.9 ha and are divided into many rooms, connected by a 200m long yew walk. In the 1990s the gardens were gutted and relaid by the last owners Alastair and Mary Anne Robb, after the original plans by Lieutenant-Colonel Reginal Cooper D.S.O. The restoration of the gardens is an ongoing project. Cothay is predominantly a summer garden, but in the spring a thousand white tulips bloom to welcome the garden season (Country Life, 2020).

At Cothay I interviewed a former university colleague of mine. Rasmus Myr has a bachelor in conservation of garden and landscape craft from the University of Gothenburg. Myr has been the head gardener at Cothay since September 2021 (Myr, 2023).

Iford Manor Estate

Wiltshire, England

Iford Manor Garden is a grade I listed historical structure. The gardens were mainly designed by Peto who lived at Iford between 1899 and 1933. Peto designed gardens for royalty and aristocracy around the world. He was trained as an architect and worked in partnership with Sir Ernest George. When they were undertaking work at Gravetye Manor, home of one of Peto's great idols William Robinson, Peto discovered a passion for plants. Peto learnt about gardening directly from Robinson but also travelled to Japan, Canada, America, Egypt and across Europe. During his travels, he studied gardens and garden design and brought back plants from all over the world. Peto was a lover of Roman, Italian and Japanese design and promoted the Renaissance period in his work. He had a strong influence on the Arts and Crafts period, admired and praised in writing by garden icons Gertrude Jekyll and William Robinson. Peto strikes a balance between formal and informal gardening, creating soft plantings and hard structures.

Iford is a garden that continues to grow and expand while preserving the heritage of the main garden. During the last 55 years, the current owners have restored the garden which once was thought “lost” after WW2 (Iford Manor, 2024).

At Iford I interviewed Steve Lannin who took over the role of head gardener from Troy Scott-Smith in 2021.

Hestercombe House and Gardens

Somerset, England

The gardens were designed and developed by three influential landscape designers over the course of several centuries. The first designer was Coplestone Warre Bampfylde, who designed the landscape in the 18th century. Bampfylde was heavily influenced by the principles of the English Landscape Movement, which emphasised naturalistic design and the creation of picturesque vistas. The gardens were later redesigned in the early 20th century by Sir Edwin Lutyens and Gertrude Jekyll. Lutyens was a renowned architect who worked closely with Jekyll, a prominent garden designer, to create a series of formal gardens and terraces around the Hestercombe House. Jekyll's signature style emphasised the use of colour and texture to create dynamic planting schemes.

During World War II, Hestercombe House was requisitioned by the military and used as a barracks. After the war, the estate fell into disrepair and was eventually sold to the Somerset County Council in 1951. The gardens were restored in the following decades and were opened to the public in 1978.

Today, Hestercombe Gardens is a popular tourist attraction and is widely regarded as one of the finest examples of garden design in England. The gardens are divided into three distinct areas: the Georgian Landscape, the Victorian Terrace, and the Edwardian Formal Garden. Each area showcases a different style of garden design and offers visitors a unique and memorable experience (Greenslade, 2023).

I have interviewed head gardener Claire Greenslade who has worked at Hestercombe since 2008.

The Japanese Garden at Kew Gardens

Greater London Area, England

The Japanese garden at Kew is built around the Chokushi-Mon (Gateway of the Imperial Messenger) which is a near replica of the Gate of Nishi Hongan-ji (Western Temple of the

Original Vow) in Kyoto, Japan. The Gateway was built for the Japanese-British exhibition in White City 1910. The Gateway is built in the architectural style of the late-16th century Momoyama (or Japanese rococo) period.

The Japanese garden at Kew was designed by Professor Fukuhara of Osaka University and laid out in 1996 following the restoration of the Japanese Gateway. The garden is meant to present different Japanese garden styles and be an educational place as well as a beautiful garden (Kew Gardens, 2024).

At Kew Gardens I interviewed Jake-Davies Roberts who was formally in charge of the Japanese garden but today is forman for the arboretum.

5.2 Case Studies in Swedish Heritage Gardens

During the spring of 2024 I conducted interviews with three major historic heritage gardens in Västra Götaland.

The Botanical Garden of Gothenburg

Västra Götaland, Sweden

The Botanical Garden of Gothenburg was inaugurated in 1923 as part of Gothenburg's 300-year jubilee exhibition. The garden is located in Änggården, one of the features that make the garden unique is its topography and enormous arboretum. In the Botanical Garden 20 ha is cultivated and an additional 55ha arboretum.

The Botanical Garden is divided into many different areas where you can find the different plant collections such as the greenhouses, where you can find the famous Dionysia, bulb and corm collections. There is the Rock Garden which has an American, Asian and European section, the Japanese and Korean glade, the herb gardens and school gardens. (Botaniska.se, 2024).

The garden has been under the jurisdiction of Västra Götalandsregionen since 1998. The Botanical Garden of Gothenburg has been part of BGCI, Botanic Gardens Conservation International since 2018 (Tornevall, 2024).

The garden is popularly called Botaniska in Swedish, a nickname I will use to help differentiate between The Botanical Garden of Gothenburg and the Royal Botanical Gardens, Kew.

At the Botanical Garden, I interviewed director Hanna Tornevall, and gardners Marika Irvine, Lena Benjegård, Maria Sjöstedt, Åsa Kullin, Mikael Peterson and Anna-Carin Ek.

Gunnebo House and Gardens

Västra Götaland, Sweden

Gunnebo Castle is an 18th-century estate that has undergone extensive development since 1995 with the vision of "Back to the 18th Century." The garden is under the jurisdiction of Möndal municipality. During this period, the site has been characterised by numerous reconstructions and restorations of buildings, gardens, and to some extent, the landscape. The reconstructions have not only focused on the objects themselves but also on the original processes and methods employed. The guiding question throughout has been: *how was this done in the 18th century?* (Gunnebo, 2024)

Through reconstructions using traditional craftsmanship methods, Gunnebo has evolved into a knowledge centre for traditional crafts over approximately 25 years. The site has consistently served as a platform for learning, a classroom, and a laboratory for practising and teaching traditional craftsmanship, particularly within the gardening domain (Seiler, 2023).

At Gunnebo House and Gardens I interviewed the gardeners Viola Johansson and Daniel Lundberg and a written interview with Head gardener Joakim Seiler.

The Garden Society of Gothenburg

Västra Götaland, Sweden

The Garden Society of Gothenburg stands as one of the best-preserved 19th-century gardens of its genre. Founded and spearheaded by civic-minded citizens, it played a pivotal role in shaping the evolution of Gothenburg and its surroundings. The development of the garden commenced in 1843. The whole park spans an impressive 7,5ha even though it is situated in the very heart of Gothenburg.

During its zenith, spanning the decades surrounding the turn of the 20th century, the Garden Society enjoyed widespread acclaim, not only within the national borders but also across international horizons. Right from its inception, the facility garnered widespread attention and admiration from the citizens of Gothenburg.

The management of the facility falls under the jurisdiction of the City of Gothenburg, which, since the 1980s, has made substantial investments in renovating the park's structures and modernising its amenities. The Rosarium, a globally recognized attraction, now takes centre stage, along with various summer events, in drawing the largest crowds to the Garden Society (Länsstyrelsen, 2006).

The largest iron-cast greenhouse to ever be built in Sweden was the Garden Society's Palmhouse. It was inspired by the Crystal Palace that was built in Hammersmith, London, for the first World Exhibition. The Palmhouse was finished in 1878 and spans over a thousand square metres (Löfgren, 2023). The Palmhouse was "byggnadsminnesförklarad" in 1985 and the garden in its whole during 1992 (Länsstyrelsen, 2006).

At the Garden Society of Gothenburg, I interviewed three different gardeners, Emmelie Georgii with a focus on the rose garden, Stephan Hammar with a focus on the palmhouse, and Malin Löfstrand with a focus on the historical garden.

6. Result

6.1 The Natural Heritage

Pesticides, Herbicides and Natural Alternatives

At the Botanical Garden of Gothenburg, they don't use any pesticides or herbicides in the garden. Instead, the gardeners employ ecological methods such as weeding manually with Dutch hoes or process the gravel with a harrow attached to an electric car to disturb the small weeds. They use ecological agents such as soap (Grönsåpa), Sense, Vital, Trico Garden and Snigelfritt (Benjegård, 2024; Ek 2024; Irvine 2024; Sjöstedt 2024; Peterson, 2024).

Kullin shares that in the tropical greenhouse both ecological and chemical methods are used. It is important to start with ecological approaches and try to prevent pest outbreaks by continuous examination and use of the correct biocontrol agents such as nematodes and predator wasps. Kullin says there is a strong correlation between how large the staff is and the likelihood of using chemical sprays, as a small team is less likely to find the pest in time. When the new greenhouses are constructed there will be a runoff system to allow for the water contaminated with chemical spray (for example from cleaning the spray nozzle) to go to a biobed. There will also be a quarantine room for incoming plants, where there is room to spray if they should be contaminated (Kullin, 2024). Irvine affirms that the correct use of pesticides as a last resort is not the main contributor to chemical leaks into nature, but rather the home use of over-the-counter bought glyphosates (Irvine, 2024).

Finally, Kullin says it can be more expensive to use biological pest control in monetary means. However, she believes that if you consider the personnel costs and the staff's anxiety and discomfort, chemical control is outrageously expensive (Kullin, 2024).

At the Garden Society, sustainable methods of tending to their natural heritage have been implemented for as long as even the most seasoned gardeners can remember. The gardeners agree that the change to eco-friendly methods was led by Peter Svensson, Head Gardener from 2000-2007 (Georgii, 2024; Löfstrand, 2024). The rose garden has been managed traditionally with herbicides and pesticides since it was planted in 1978. When it was still managed conventionally they sprayed it in full safety gear in early mornings and late nights. According to Georgii, once Svensson received the command he decided that he didn't want to keep working with pest- and/ or herbicides and suggested to tend the rose garden ecologically, and even though not everyone believed it would work well no one contested his decision.

Ecological care of the rose garden includes companion planting to not leave the soil bare and uses pollinator-friendly and ornamental plants like *Salvia*, *Tagetes* and *Digitalis*. The gardeners spray the flowers with Trichoderma, a fungi solution that inhabits the roses and protects them from other fungal diseases like rose rust and black spot disease. The Trichoderma also benefits the root growth and symbiosis with the soil. The recommendation by the company selling trichoderma is to spray the roses every two weeks, which is hard to make time for, so this year the team are experimenting with blending the Trichoderma with the soil mix which is added in spring and autumn to see if this is an option to not have to spray as often during the summer months.

Georgii shares that pruning is an important method to cultivate strong and more resilient roses by opening them up in the middle to enhance the airflow. In the rose garden two employees spend most of their time, all year around. The rose garden is in total 1030 m^2 of which 800m^2 is the rosarium. The maintenance of the rose garden is high and time consuming, in the summer the season-gardeners help in the rose garden too. Still, Georgii estimates that they spend equal amounts of time with the roses as a garden working with conventional methods and chemical sprays. Another plus is that they can spray while the visitors are in the park without harming themselves or the visitors. They also have a very high maintenance level due to wanting a high quality and international standard. They want a long and continuous flowering and therefore spend a lot of time deadheading the flowers (Georgii, 2024).

The readjustment of management in the rose garden also spills over into how the whole garden is managed. The entrance section of the garden is called the English landscape park, after the style the garden was first made in and still exhibits clues of. The main garden also houses subcategories such as the playground, the 19th-century grove and different woodlands. The gardeners working in other parts than the rose garden soon followed the initiative of Svensson and stopped using pesticides, herbicides and artificial fertilisers. Instead, the gardeners manually pull the weeds in the borders, in the gravel they use dutch hoes and a weed burner that uses propane.

At the Garden Society, the lawns surrounding the Palmhouse hold important functions such as serving as meeting places for outdoor games, and recreation like yoga, picnics and sunbathing. Further, the lawns hold large concerts and the Walpurgis Night Celebration, to be able to withstand all this the lawns are deep aerated (Löfstrand, 2024).

In the Palmhouse the gardeners use biological pesticides, mainly soap to combat aphids, thrips and mites, as well as, use biocontrol agents for pest control. Artificial fertilisers are used to NPK fertiliser all the plants as they stand in pots or beds ingrained in the floor. Hammar has looked into switching to ecological fertiliser but currently there are no good options on the market as the current products smell too bad for indoor use which would contribute to a negative experience for the visitors. The gardeners are still hoping for more organically certified options. The Camellia fertilisers are organically certified while others like Crysan are not yet developed. The gardeners stay hopeful and keep their eyes peeled for new options to try (Hammar, 2024).

At Gunnebo House and Gardens the garden itself is organically certified since Joakim Seiler became Head gardener in 2004. Therefore only organic options are allowed to be used and the garden team uses manual labour such as dutch hoes and a wheel hoe from the brand Svea Redskap (Lundberg, 2024). The strongest substrate that’s allowed to be used in an organic garden is Raptol, which is used for pest control in the orangery (Johansson, 2024). Lundberg says that there is a scheme for spraying with vinegar and burning the weeds with propane. For best results, the propane burner is used every two weeks, but it works poorly on larger grasses and therefore is complemented with vinegar. Lundberg shares that he experiences the garden's visitors as open and interested in sustainability questions and doesn't mind a few weeds here and there. The main focus is to keep the straight lines and sharp edges between grass and gravel clean (Lundberg, 2024).

In the U.K. the head gardeners report a different view on the necessity of chemical sprays (Atkin, 2023; Greenslade, 2023; Myr, 2024; Lannin, 2023).

At Aberglasney Gardens, Joseph Atkin emphasises the importance of aligning gardening practices with the client's expectations, which is a beautiful weedfree garden. While everyone wants to be organic it may not be possible to use organic practices while staying within budget, according to Atkin. Atkin has carried out trials with his garden students that show that one hour of chemical weed control is equivalent to between £500 and £1000 in manual labour, depending on the skill of the team. According to Atkins, we need to change the way we garden to not require pesticides because we can’t only stop using pesticides and keep gardening the same way we always have and expect the same results (Atkin, 2023).

Rasmus Myr at Cothay Manor takes a similar stance. Each year around a litre of glyphosate is used to spray the paths and a selective broadleaf herbicide on the lawns to uphold the British standard. If the garden was to be maintained environmentally friendly you

would need more gardeners, time and money. Myr raises the question of the gardener's role in the whole picture. Cothay is surrounded by agricultural land which is sprayed with glyphosates during the crop rotation. In comparison, the one litre he uses to create a beautiful environment seems like a drop in the ocean. Myr points out that the legislation of glyphosates is much more rigid in Sweden and hopes that the U.K. will eventually change their legislation. Myr pose the question of whether it is the individual gardener's job to save the world or whether it is our governmental bodies that should drive the change (Myr, 2023).

Further Myr points to the recent shift in visitor opinion. His experience is that COVID-19 helped sway the public in what is sustainable practices. During lockdown only a few of the gardeners were allowed to tend the garden and the gardens lost all their entrance income, when the visitors returned the gardens were in a much less pristine condition and there was a chance for the gardens to rethink their practices (Myr, 2023).

Claire Greenslade at Hestercombe Gardens showcases a conscientious effort to minimise herbicide and pesticide use. While not strictly adhering to organic practices, Hestercombe engages in targeted spot spraying with herbicides, trials with a flame gun, and an evolved approach to bramble clearance. Historically the gardens employed 17 gardeners year-round who could pull the weeds manually, today there are only seven gardeners who can’t keep the same level of neatness (Greenslade, 2023).

> “We will just spot spray what needs to be done, which is a big change for us. For example, when we used to clear brambles in the woods, they used to spray the whole thing and let it go black and horrible. So now instead we strim it, rake it off, and then when the shoots come up, we can spot spray and it doesn't look awful. And it is not as invasive. Does it work well? Does it look as spotless? No. And actually, that's one thing I'd say when you look at the old photographs of Hestercombe in 1904. Yes, it is so sharp. [...] then you look at the old pictures, they were immaculate. But then there were 17 gardeners just weeding.”

At Iford Manor, Steve Lannin takes a firm stance against herbicides, prioritising eco-friendly alternatives within their designated area. The emphasis here is on manual excavation to preserve soil health and minimise potential hazards associated with herbicide use. Manual weed removal is seen as an investment in preserving the natural niches created by various plants. Lannin prioritises manual weed removal even though it is a time-consuming task.

> “And moss that sort of coat things, and if you're spraying it, you lose all of it. And so it's quite nice to go through it and to be selective. And sometimes I'll let sort of weeds grow for a bit until they look a bit rough or a bit much, and then they can come out.”

At Iford they also employ the occasional use of a paraffin-based flame gun, however with the dryer summer climate in the U.K. the flame gun becomes a fire hazard and can’t be employed, Lannin also found that it consumes more paraffin per use than he’s happy with. Despite challenges such as paraffin consumption and weather dependencies, the focus remains on preserving the garden's unique aesthetic. Lannin's approach at Iford Manor exemplifies a commitment to biodiversity through organic pest management methods. Furthermore, one of the big pest issues at Iford is the box moth, a common adversary, is made with careful consideration of its limited host range, mitigating potential ecological concerns by using pheromone traps and a biological spray (Lannin, 2023).

> “That sort of feels like a choice we had to make, because we've got a lot of box here. We've basically got a box woodland on the hill. So the garden is not defined by the box, but losing a great chunk of the box would really change the feel of the garden for quite a long time.”

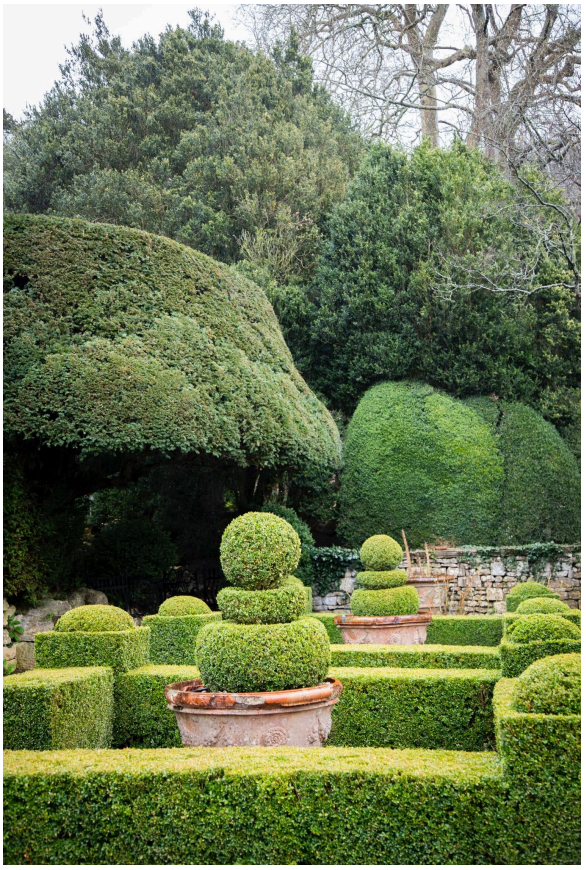

Figure 2: *Buxus terrace at Iford Manor.*

Water Use and Drought Management

In Gothenburg the summer of 2023 started as warm and dry during May and June, followed by an extreme rain period for the rest of the summer and autumn. The last few winters have also been quite mild and wet. At Botaniska, Irvine shares that when she started in 2004 there was no proper drainage installed. The garden is situated on an incline as part of Änggårdsbergen and some areas become low points where the water collects, one of these is the Rock garden. Irvine shares that everything would be damaged and move around due to the heavy rain which led to continuous repairing of the paths and plantings throughout the summer. In 2013 the process of installing a proper drainage system was started, financed by their property owner Västfast, it has gotten much better but the process of installing it is not yet finished. They have also built a delay reservoir where they can store 1,5 cubic metres of water to be used by the waterfall and brooks instead of municipal water. During extreme heat periods, the garden is not too hardly affected as it is built on 20-25 metres of clay soil. Irvine also shares that with good management and restrictive watering, drought is not a large issue as an experienced gardener can tell what needs to be watered and have strategies for smart watering. Lawns are not watered (Irvine, 2024).

The new greenhouses at Botaniska will collect rainwater to store in two water reservoirs which will hold 80 cubic metres. For most of the year the rainwater is expected to supply all compartments of the greenhouse with water, with a small percentage of municipal water added. But in case of drought when incoming rainwater is limited, orchids and carnivores will be prioritised (Kullin, 2024).

At the Garden Society, Georgii shares that the wet summer and autumn have led to trouble with autumn plantings as the groundwater is 20 cm below the surface in places. In the rose garden, they have started constructing raised beds for their most delicate rose cultivars to combat this problem (Georgii, 2023). In contrast, during drought periods the majority of the garden stops being watered, for example the grass areas during the summer, though the potted plants such as the laurel tree which are significant elements at the Garden Society and other rare plants will be watered as it would be more energy costly and unsustainable to replace them by buying or importing new ones (Löfstrand, 2023). Automatic irrigation systems are used for the borders where watering is needed, the watering takes place during night to minimise evaporation (Georgii, 2024).

At Gunnebo, the drought has affected trees standing on heights with poor access to water, for example the old oak on Floras hill (Johansson, 2024). Lundberg says that they have

investigated if there are trees that are better suited for the drought. However, the County Administrative Board is trying to protect the biodiversity and thus wants the trees to be replaced with the same species, which means the gardeners can't experiment with planting southern native oaks such as *Quercus fratnietto*, *Q. cerris* or *Q. castaneifolia* to investigate wheter they are better suited the extreme weater. Due to the status as a significant area of interest for oaks it needs to be *Q. robur* or *Q. petraea* (Lundberg, 2024; Seiler, 2024).

Gregers-Varg articulates that the garden team at Beth Chatto's are trying to take precautionary measures against future climate change, yet the garden faces many challenges. The last few summers' heat waves have been drier than before, with no rainfall at all, and the temperature has been higher and holding around 40°C for multiple days which the garden team isn't used to handling.

The gravel garden and scree garden both have very drought-resistant plants, but even these parts won't be in full bloom during extreme drought mirroring the natural Mediterranean landscapes. *"It dries out, and the colours fade. But with more rain and cooler temperatures, many of the plants come back."* (Gregers-Varg, 2023).

Figure 3: *The gravel garden at Beth Chatto's Plants and Gardens.*

Moreover, the exceptionally warm summers are contrasted with particularly wet winters. The majority of the Beth chatto's garden is planted in well-drained soil, which fortunately mitigates any significant issues. For example, other local gardens situated on heavy clay soil face much more severe challenges, including flooding. This past winter, numerous locations suffered considerable plant losses due to a cold spell that occurred just before Christmas, lasting for a couple of weeks. As the situation is different for each garden Gregers-Varg says she's sceptical of the notion that Mediterranean plants offer a universal solution. The Royal

Horticultural Society (RHS) advocates for the adoption of these species, while such plants may be suitable for Beth Chatto's conditions, particularly in summer, they are unlikely to survive the winter in gardens with clay soils.

At Beth Chatto's they have lost multiple large and old trees in the woodland garden and shade walk due to the drought. Because the original trees were planted tightly by Beth and Andrew it was hard to establish younger trees under them. There is not enough room to propagate and grow new trees in the garden, instead, Gregers-Varg buys trees for replacement. However, it's harder to establish bigger trees when there is drought, instead younger trees are bought which creates timelayers without any old trees. This means that parts of the garden need to undergo change, for example the hydrangea in the woodlands will have to move to an area with more shade and damper soil.

Previously, the garden was irrigated during extreme heat, however, this practice was discontinued in 2022. The garden has its own well for water but the gardeners need to prioritise the water for the plant nursery where all the plants are in pots (Gregers-Varg, 2023).

At Iford Manor the garden rooms that were designed only ten years ago for the English climate at the time are no longer sustainable if the U.K. keeps facing heatwaves in the summer and mild winters such as the last few years. Lannin is facing the question on whether he should adapt the garden to be more sustainably kept by enhancing its drought and flood resistance or try to preserve the original garden plan for the sake of authenticity (Lannin, 2023).

> "…the way it was replanted a decade ago was presuming it will be watered pretty much every week in summer. And that's not something we want to carry on. So we're changing the planting, to cope with drought. But in actual fact, Petos garden was supposed to feel Italian, which are generally hot and dry gardens. So the style of planting that you want to put in, if [it's] not the same, are recognisable within the same kind of genre"

Soil Health

At the Botanical Garden of Gothenburg, the outdoor part of the gardens is self-supporting in terms of compost. Anna-Carin Ek is the gardener responsible for the compost area, where the gardeners collect all green waste material from the garden. The green material is first separated from sand and gravel which hinders the decomposition of the waste and instead put in a separate pile. The green material is further separated from branches which are put in its own pile. The compost piles are actively turned for approximately 7–10 months until they are mature. In the beginning, the piles are turned weekly, and later at longer intervals. During this process, the piles are also run through a crusher bucket and fresh wood chips are mixed in. Regular turning ensures that all parts of the pile reach the highest internal temperatures, which is crucial for sanitizing the compost by eliminating weed roots and diseases. The piles may also require watering during the process. Once mature, the compost is screened through a sifter to produce a more uniform final product. Temperature checks are carried out weekly between March and October while the composting process is ongoing. It takes approximately nine months for the process to take place. Once the compost piles start reaching this age they harrow the soil and start germination tests to see if the soil is mature. Ek says that at this point a mature and immature soils can look very similar so it's important to make the germination test and mark the different piles (Ek, 2024). Botaniska uses the soil mix created from their compost throughout the whole garden, both outside, and inside the greenhouses (Benjegård, 2024). It is also possible for other garden teams to visit the compost and get a guided tour, Ek believes it's important to share the knowledge so that more gardens can reuse their green waste, which is lower cost in both terms of money and CO^2 release from transportation (Ek, 2024).

While there are mixed approaches and views within the garden organisation consisting of 25 year-round gardeners, peat is used at Botaniska in the greenhouses, for sowing annuals and vegetables. It is also used in the garden, especially in the woodland areas, where the peat is combined with the garden's site-made compost. Marika Irvine, head gardener for the cold greenhouses, says that she thinks the debate is missing in Sweden and that the previously broad selection of peat has vanished overnight. The options of packaging and fractions of peat has considerably diminished. It is no longer possible to buy non-fertilised rough blocks of peat which is what's been traditionally used as growing substrate, unless you buy 12 cubic metres. Irvine says that the new alternatives such as

coconut husk or wood fibre from the forest industry are neither comparable in capacity nor from an environmental standpoint if it needs to be shipped from the other side of the world.

Irvine has reached out to Hasselfors Garden AB which previously was a Swedish firm but is now part of the Finnish Neova group, a large soil and peat-mining company. Irving found that less peat is farmed every year than is natural re-growth. Further, in Sweden, we have nature conservation legislation concerning the use and restoration of wetlands (Irvine, 2024).

At the Garden Society, they have started to look for peat-free soil and compost, however, the demand and assortment are low in Sweden as there is no peat legislation. The gardeners have requested a soil mix consisting of biochar and pumice stone which they hope will help improve their water-holding capacities during warm summers as well as provide a good soil structure and counteract the effect of high standing water during the consistently wetter winters. Because of the few alternatives, the garden network turns to each other to learn, plant nurseries are also part of leading the change, experimenting with biochar and sphagnum to create new mixes. Because the garden has too limited space to compost and create their own soil there needs to exist good options on the market. The gardeners at the Garden Society see it as part of their mission to identify knowledge gaps and request new and sustainable substrate options from the garden-connected soil and peat industries (Georgii, 2023).

At Gunnebo, the garden is in a transitional phase. Peat-based substrates are still in use, however, Johansson has started to look at new alternatives, for example by partaking in the Nätverk för Historiska trädgårdsmästares meeting in Mariestad 2023 where peat-free soils and compost were discussed. Now Johansson has started a leaf compost and is experimenting with soil mixtures to eke out the peat-soil (Johansson, 2024).

In the U.K the gardeners have had to respond to the national peat legislation, banning peat from horticultural use. The legislation is set to stop the distribution of peat in bags and soil mixes by 2024 (Atkin, 2023; Greenslade, 2023; Gregers-Varg, 2023; Lannin, 2023; Myr, 2023).

Atkins' approach to peat is that instead of finding alternatives to peat, we should find ways to grow with soil without compost mixes from the store. Either by creating compost in the garden themselves or by eco-friendly alternatives. Atkin elaborates that when he's been searching for alternative substrates previously the options such as coconut husk seem eco-friendly but need to be imported from the other side of the Atlantic which feels lika a

poor replacement because of it's long transportation. Atkin stresses that the alternatives need to be locally produced to make a real impact (Atkin, 2023).

At Beth Chatto's plants and gardens, Gregers-Varg has been testing peat-free soil for many years, even before the peat legislation was introduced. Regarding potted plants, Gregers-Varg ensures they are peat-free. However, seeding has posed a significant challenge. The garden team has developed and works with at least ten different variations. The current main soil contains only about one or two percent peat. The goal is to achieve complete peat-free cultivation. However, finding the right soil is critical. Due to the diverse range of plants under cultivation, their response to different soils varies greatly. While some plants flourish in one type of soil, others wither. This variability raises questions about whether using ten different soil types for different plants is practical. The financial aspect adds complexity; purchasing smaller quantities of various soils can be more expensive. Additionally, tracking which soil works best for each plant adds logistical challenges. With governmental pressure to adopt peat-free practices, larger soil-selling companies are now compelled to find suitable alternatives. Initially, slow progress may have led companies to accept subpar solutions. As a Swede, Gregers-Varg wonders why the discussion seems to be absent in Sweden saying that she experiences a big disparity when reading Swedish and British garden blogs or magazines.

In the garden, they use Green Council waste to mulch and improve the soil. In this system, almost every resident has a brown garbage bin where garden waste can be deposited, which the municipality collects weekly. Some residents pay for this service, while others do not yet require it. The compost is put on enormous heaps where it can decompose. Then Gregers-Varg purchased the final product as mulch. The quality of the compost can vary, depending on the materials added to the heap in recent months. However, the municipality diligently removes glass and plastic to the best of its ability (Gregers-Varg, 2023).

At Cothay Manor, Myr has decided to change the growing substrate for their annuals and sown plants to SylvaGrow (Myr, 2023). SylvaGrow is "A unique blend of fine bark, wood fibre (by-products of sustainably managed forests) and coir (from known, ethically-approved sources)". It contains balanced nutrients sufficient for the first 4 - 6 weeks of growth and is endorsed by the RHS (Melcourt.co.uk, 2024). Myr says that the gardeners he knows in close-resident gardens all use this substrate. At Cothay they have a tradition of planting a lot of pots with spring bulbs, therefore it was important to find a new good medium to carry on the tradition. All annuals and bulbs are sown and cultivated in the garden itself (Myr, 2023).

At Hestercombe Gardens they have made the choice to neither buy nor grow plants in peat-based substrates. Greenslade describes a dilemma on the Victorian terrace with 19th century annuals in annual carpet beddings. Each year 4000 annuals are needed for the designs. A local nursery has previously been commissioned for the flowers. The plant nursery grows mainly annuals which respond very well to peat, the plantsmen also argue that peatless substrates need more water to stay damp. They have decided to continue with their old practice and use peat until the legislation goes into action as they figure they will have retired by the time. Another problem is that carpet beddings are unfashionable and therefore there are no younger plantsmen available to grow the type of plants needed for tapestry borders. Greenslade is approaching the idea of creating planting schemes with a longer lifespan consisting mostly of perennials, changing the bedding every five years instead. However, Greenslade finds it tricky to find plant material that looks good year round, but feels confident in finding a solution soon. *"Peat has only been used in horticulture since the 30s. So surely if they did it, so can we!"* (Greenslade, 2023).

At Iford Manor the garden team has an onsite propagator who works with propagating plants with seeds or cuttings in the garden's compost mix. Because there is such a small amount Lannin is not worried about buying or importing plants grown in peat, he chooses to focus on what can be improved onsite (Lannin, 2023).

Biodiversity

At the Botanical Garden of Gothenburg, biodiversity takes centre stage. Tornevall states that their main mission is cultivating their plant collections. This is the conservation of biodiversity on a global scale—a reservoir for plants at risk of disappearing or having disappeared elsewhere. The conserved living material can be utilised for replanting efforts, making it an integral component of conservation work. This aspect defines the garden as one devoted to cultural preservation. In this manner, it becomes intertwined with our cultural heritage.

The collection encompasses both native Swedish flora and from nearby latitudes. Tornevall says they hope to expand the Swedish part of their collection. Overall, the garden boasts approximately 20,000 different plants. More than half of the collection comes from 130 different countries around the world. The Botanical garden still collects plants from the wild to continue discovering and safeguarding species. These travels are often done in collaboration with other universities and botanical gardens to preserve the species in multiple

gardens. Some of the species in their collection such as the famous easter island tree have died out in nature and the garden has then been able to repatriate and reestablish the tree in its home region (Tornevall, 2024).

One unique aspect of the botanical is their large arboretum where they can grow multiple of each tree species to see which tree best handles the Swedish climate and then select and clone the best individual for future use (Sjösted, 2024).

Irvine shares that the approach for wild collection has changed since the publication of Convention for Biodiversity (CBD) in 1992, and further since the Nagoya-protocol was ratified in 2014. These protocols regulate wild collecting to be more sustainable and the legal process calls for collaborations with the country of origin. Additionally, the new practices have led to a strong collaboration between Botaniska and other large botanical gardens such as Kew and American Botanic Gardens.

Botaniska also collaborates with the county administrative board to protect endangered local flora, for example, due to land exploitation. Irvine shares that as a recent example, they have collected seeds of weasel's snout *Misopates orontium* from Varberg's old railway yard, and grown them at Botaniska. Now the next step is to reestablish them in a new area in collaboration with the County administrative board and Trafikverket (Swedish transport administration). Other plants Botaniska have collected and grown on behalf of the County administrative board include oysterplant *Mertensia maritima*, lady of the snow *Pulsatilla vernalis*, westcoast rose *Rosa inodora* and northern dragonhead *Dracocephalum ruyschiana* (Irvine, 2024).

In the tropical greenhouse at Botaniska Kullin shares that there is a plant record database, Iris BG, where all Botaniskas plants are documented and inventoried. The database is regularly backed up against BGCI online platform for documenting the botanical collections globally. She says that this creates a way to connect the gardens and promote collaboration by exchanging plant material such as pollen, DNA-samples or seeds. To Kullin the collaboration brings hope and ambition by seeing which other gardens hold the same species and adds pressure to the conservation cause (Kullin, 2024).

Petersson is responsible for Smithska Dalen at Botaniska where he aims to create a woodland that feels more like a forest than a garden. Petersson works with mosses, ferns and leaves lying on the ground to create this atmosphere, this approach also benefits the microorganisms living in the ground which get plenty of greenmass to decompose.

Smithska Dalen holds part of the Rhododendron collection, some of them dating back to 1930 when they were collected in China. Some of them are starting to die and therefore

need to be propagated by cuttings to ensure the cultivar and gene diversity can remain in the garden (Petersson, 2024).

Petersson also leaves dead heartwood in sunny spots to provide habitat piles for insects and fungi. In the garden, there is a conflict of interest. Because it is a botanical garden the superintendent for the trees and shrubs wants the collection to be prioritised and therefore fell surrounding trees to allow for more sunlight, Petersson however believe they need to take care of the original tree material as well which is also biologically important and carry the gardens history. As a compromise an old oak standing too close to a tree in the botanical collection may be turned into a monolith (Petersson, 2024).

The Garden Society is a garden located in the centre of Gothenburg, surrounded by heavy infrastructure such as the central train station. The garden contains multiple areas developed to benefit wildlife and biodiversity. As such the garden is a haven for the more-than-human. The most easily recognised is the Butterfly Hill. Here the gardeners have created a garden consisting of drought-resistant, colourful and nectar-rich species. Further, they have created habitats, provided water, and planted host plants for native species. The old wooden houses in the garden, such as Lagerhuset also play a part in creating habitats for the carpenter bees who lay their eggs in wood structures. The garden has been inventoried to decide which plants should be kept or dispersed to enhance the garden for the insects. The butterfly garden was inventoried by the Natural History Museum of Gothenburg which found 46 different species in 2023, with another 18 being reported in the Swedish University of Agricultural Sciences web page the Species Observation System. The team have also planted the host species to attract the Apollo butterfly *Parnassius apollo.* Recent inventory shows that the butterfly hill is a good habitat for wild bees such as the solitary yellow-face bees, *Hylaeus,* miner bees, *Andrena,* and potter bees, *Anthidium.* The team hope that the next inventory will show that their work with creating sandbeds will result in a higher population of solitary miner bees. Similar methods are used to attract wildlife throughout the garden, for example in the rose garden, the rose hips are left through the winter to provide food for the birds.

These are modern additions to the garden, as part of the municipality of Gothenburg the garden is politically influenced as the municipality has wishes and visions for the city as a whole. This year (2024) Gothenburg municipality invests extra in developing biodiversity and sustainable practices throughout the city which influence the garden (Löfstrand, 2023).

The Garden Society is the host garden for the POM (Program for Cultivated Diversity) clone archive for roses from West Sweden. These rose cultivars are old rose hybrids safeguarded to preserve gene diversity (Georgii, 2023).

Figure 4: *The Butterfly Hill.*

Figure 5: *Rosehips saved as winter food for birds.*

In addition to the gardens at Gunnebo House and Garden, they manage a cultural reserve which spans over a hundred hectares. The County Administrative Board has determined the cultural reserve as a core area for biodiversity connected to the oaks, due to its large amount of valuable oaks and close. Naturvårdsverket defines a core area as "*A continuous natural area with significant ecological value due to its current natural state. Core areas typically contain key elements that support rich biodiversity. The size of these core areas may vary."* (Naturvårdsverket, 2017). Currently, the garden team collaborates with the garden students at Gunnebo to exempt the oaks by ringbarking the surrounding trees and clearing undergrowth to allow sunshine to reach the oaks so that they will have less competition and reach the standing deadwood (Lundberg, 2024). The oaks they are focusing on protecting are broadcrowned oaks, dead standing oaks, and large successors. These trees tell of a historic landscape where the ground was used for grazing (Seiler, 2024). In Västra Götaland there are 21 areas of significance, which are landscapes with notably high ecological conservation

values. Gunnebo is part of the area: Southern Gothenburg Forest (Skogsprogrammet Västra Götaland, 2022).

Furthermore, the garden team acknowledges the importance of habitats in the cultural reserve and works by leaving deadwood and habitat piles for insects and microlife. Lundberg says that as a public garden, you have to find the right balance between being tidy and leaving enough material for the wildlife. If a tree is windfelled a good compromise is to build a fauna depot but move it out of the way and arrange it in a good-looking structure (Lundberg, 2024). However, not all oak living creatures can fly, therefore you must be mindful of where you move the material. The closer the better but 250 metre maximum is a general rule of thumb (Seiler, 2024).

Figure 6 and 7: *The oak forest cleared from other trees and shrubs to restore the historic grazing landscape.*

In the kitchen garden Johansson works with enriching the environment for biodiversity by planting a rich and varied flora that stretch over the whole growing season from early spring to autumn. Another approach is using companion planting such as buckwheat with broad beans, and sweet alyssum with the artichokes, to benefit insects that eat aphids (Johansson, 2024).

The meadows are also biodiversity hot-spots. The traditional method of scything meadows at Gunnebo follows an old European tradition, using the scythe called a "peening scythe" because the blades of the nordic counterpart ‘sliplie’- scythe that is sharpened on a grindstone- are scarce nowadays. Learning to use the peening scythe is quicker and more reliable than sharpening blades individually. There are challenges when gardeners sharpen blades differently, making it harder for others to use the scythe. To use sliplie at Gunnebo, each gardener would need their own scythe and blades, which would complicate teaching sessions (Seiler, 2021). Today traditional craft is seen as intangible cultural heritage in itself as described by UNESCO (UNESCO, 2003).

In managing traditional landscapes like pastures or farmland, modern methods like machine mowing might not always be practical due to terrain or drainage issues. Thus, it's essential to preserve the knowledge of traditional scything for times when modern methods aren't feasible or cost-effective. In smaller reserve areas, traditional scything might be the best approach.

Scything helps maintain plant species that thrive in low-nutrient environments, supporting biodiversity. Restoring meadows requires regular scything and removing the cut material for several years to deplete the soil gradually. It's crucial to remove the cut material promptly to prevent nutrients from returning to the soil. Meadows can be established quickly by scraping away soil and planting ready-made seed mixtures, but this method doesn't support local species as effectively.

Meadows provide habitat for various plants, insects, birds, and rodents, with roadside meadows also supporting reptiles. Maintaining meadows is crucial for preserving biodiversity and supporting species that rely on these habitats (Seiler, 2021).

Furthermore there is underlying motivation of creating a pleasant visitor experience, silent management techniques add to a historically authentic soundscape. Using traditional methods also creates the opportunity of showing sustainable methods to the visitors and teaching the craft to the public through courses (Seiler, 2024).

At Aberglasney Gardens Atkins has worked extensively with removing the standard amenity grass areas by creating other kinds of plantings with minimum maintenance requirements. Atkins has created two different types of meadows. First, a spring-blooming bulb meadow where crocus, fritillaria, narcissuses and camassia bloom in succession underneath decorative malus trees. Additionally, a wildflower meadow has been created in the dryer conditions at the top of the garden. Here Atkins sees the true extent of his

biodiversity efforts as mice and rats love to live amongst the tall grass which, while a nuisance, attracts barn owls to the garden balancing the ecosystem.

Atkins advocates for the creation of wild meadows in more gardens, citing their cost-effectiveness and ease of maintenance as significant advantages. Moreover, Atkins reveals a clever strategy to enhance the aesthetic appeal of these meadow areas: trimming a single mower's width along the paths to forge a subtle transition and maintain clean edges. This technique not only improves the visual presentation of the meadows but further demonstrates a thoughtful approach to integrating wilder, naturalistic planting schemes within more traditionally manicured garden landscapes.

Furthermore, Atkins has redesigned areas of amenity grass with borders of beautiful blooming shrubs that have low maintenance costs but high pollinator value (Atkin, 2023).

At Beth Chatto's Plants and Gardens, the majority of the plants for the garden and for sale are produced in their nursery. The nursery team propagates most plants themselves as it's much more expensive to import plants and substrates from the EU since Brexit. The nursery does however buy some bare root plants and plants that have "breeders right" meaning they aren't allowed to propagate the plants for sale. Gregers-Varg says that the goal is always to produce as much of their plant material as possible.

Gregers-Varg elaborates that one competing force they face is gigantic chains of garden centres, that produce thousands of each plant and can thus push down their prices. Moreover, Gregers-Varg believes in producing a diverse range of plants, albeit in smaller quantities, ensuring that the plants are of high quality and reliability, capable of thriving in gardens for many years. She often finds that when people visit garden centres, they end up paying for large pots that contain relatively small plants. Alternatively, some plants are grown rapidly in plastic tunnels, compromising their ability to survive transplantation. Many garden centres prioritise offering the latest hybrids with vibrant colours, which may not be long-lasting. This approach benefits the manufacturer, similar to selling appliances that don't last long, prompting customers to make repeat purchases.

In contrast, the philosophy of Beth Chatto's plants and gardens emphasises quality. Gregers-Varg insists on trailing plants before selling them to ensure their viability and longevity (Gregers-Varg, 2023).

At Cothay Manor the garden team works actively to reduce the negative effects of gardening on the local environment and wildlife. Myr says that it's important for him to stay humble about the fact that gardens are artificial environments and to keep looking at their carbon footprint and how to reduce it. Myr draws the parallel to agricultural farms where you

have to continuously report your carbon footprints and wish for something similar in the garden context. He gives the example of a newly planted flowerbed, even though you tend it ecologically in the garden you have to see the whole picture:

- Where did the soil come from?
- Was the bag recyclable?
- How was the plant grown?
- Were the plants grown with artificial fertilisers and pesticides?
- Did it come in a one-time-use product such as plug plants?
- How far were these things transported?
- How much water was used?
- How long will the border survive?
- What happens when it is out of season?

Like Atkin, Myr says that a garden must be allowed to have another main purpose, which should be to be beautiful. Finally, Myr says we need to take accountability and be aware of the greenwashing that takes place in the industry (Myr, 2024).

At Kew, the organisation at large is in the process of discontinuing buying plants, instead returning to the practices the gardeners used at Kew 30-40 years ago, such as growing from seed, using cuttings and collecting material from the wild, though modern restriction on import and export of seed makes collection from the wild more complicated. Davies-Roberts says the garden and propagation team collaborate to plan ahead more nowadays to have time to propagate, as it may take three years before the plants requested are ready to be planted in the garden.

As a botanical garden part of their official mission is to safeguard the gene diversity of species, protecting the historic flora from disease or climate change. One example of safeguarding biodiversity at Kew is the Prunus Tai-Haku (The great white) which has a famous backstory. The Tai-Haku cherry blossoms faced extinction in Japan due to a disease, resulting in the loss of the species. Collingwood Ingram, an English cherry expert, began collecting various prunus species in the United Kingdom. During his travels, he encountered a nurseryman in Japan who presented him with a painting of the Tai-Haku cherry. Recognizing it as a variety that thrived in his native Sussex, Ingram embarked on a project to repatriate the Tai-Haku to Japan (Davies-Roberts, 2023).

6.2 The Cultural Heritage

Education and Influence

The Botanical Garden of Gothenburg does not want to be identified as a historical garden because it is a garden that is always evolving and expanding. They want to be able to move the collections of plants around and build new houses, for example, the new greenhouse and they want to be part of the development of new modern methods for collecting and protecting plants.

However, the Botanical Garden of Gothenburg is still a cultural heritage preserving garden. Tornevall shares that the garden's main mission is to keep their collections alive and traceable in their databases so that it will be possible to research them. The other part of the mission is to showcase and educate the public about their collections (Tornevall, 2024).

> "I often say that we are cultivating a garden with deep roots in history, at the same time we maintain a steadfast commitment to ongoing development"

The Botanical Garden also has a large arboretum as part of the nature reserve Änggårdsbergen where they have the unique opportunity to carry out large-scale experiments and research. For example, after the invasive art *Lysichiton americanus* took over the North American arboretum they remodelled the area and planted collected seedlings of North American trees to test them for hardiness and suitability as new city trees in Sweden.

The organisation has a professor, five scientific curators and three educators. Each part of the garden has an assigned gardener and scientific intendand in charge. The Botanical Garden also has the mission to reach all youth and children in Västra Götaland and reach 10,000 individuals through different activities each year, and host over 650 thousand visitors in the garden in 2023 (Tornevall, 2024).

Kullin shares the example of the different exhibitions and guided tours that Botaniska shares during the year, an important part of the garden's mission to educate the public on natural values and the Swedish green heritage. This year they are reinstating the apple exhibition to highlight the values of Swedish apple cultivars and the craft surrounding the harvest and storage. Other examples of events hosted at Botaniska include the mushroom exhibition and hanami (Kullin, 2024).

Irvine emphasises the significance of encouraging visitor engagement and inquiry during public viewings of the *Dionysia* collection. By providing access to her workspace and encouraging open dialogue, she facilitates an environment for learning and debate. This

approach frequently engages valuable educational exchanges and discourse among visitors, affording Irvine the opportunity to confer pivotal elements of Botaniska's missions, such as sustainable practice and wild collection (Irvine, 2024).

In April Botaniska hosts a Hanami festival every year. It is the most popular out of the events. It attracts visitor groups that normally don't visit the garden, such as the Asian community, a younger audience of martial arts and cosplay interests. The garden arranges different events during the day such as a bonsai exhibition, a tour of the Japanese garden, origami workshop, dance and music. It's a day where inspiration and education are combined in the garden. This year, 2024, was the Hanami festival's tenth anniversary and a big success with sunny weather and around 18,000 visitors (Sjöstedt, 2024).

Figure 8 and 9 : *Hanami festival 2024 at the Botanical Garden of Gothenburg.*

The Garden Society of Gothenburg hosted 1.8 million visitors during the year of 2023. The gardeners here realise that spreading knowledge and inspiring the visitors of the garden is of the highest importance, a task they work on both onsite and on their digital platforms such as Instagram, Facebook and their webpage (Löfstrand, 2024).

A significant part of their job as gardeners is to answer questions and educate. Georgii experiences that the questions she receives have changed in the last few years and are more climate change and biodiversity-oriented than previously and that the visitors are asking how they can contribute with their home gardens. In response, the garden team experiments to create inspiring garden visuals or methods that do not require big efforts. For example, while few homeowners may be keen to bring out the scythe, a bulb meadow could be created over time using the leftover bulbs from urn plantings as demonstrated in the rose garden where there previously was amenity grass.

Another important part of their job is the guided tours. In the summer months, the gardeners host daily walks discussing the rose garden and the history of the garden society, throughout the year they also have tours with specific themes such as the Palmhouse, the trees in the garden and pollinators (Georgii, 2024).

The collection in the palmhouse is educational on multiple levels. Hammar shares that apart from their large collections of camellias, Mediterranean plants, palms and tropical plants there are a few notable collections. For example one of the largest collections at the palmhouse consist of bromelias in various sizes and colours. There is also a collection of a different kind: all of the plants that were introduced to Sweden for the first time through the Palmhouse. In this collection, there are common home plants such as the *Monstera* and *Epipremnum* as well as tropical plants such as cacao, *Theobroma,* and the huge Queen Victoria's water lily, *Victoria Amazonica* which dates back to 1852 at the Garden Society and lived in the Victoria house until the construction of the Palmhouse. There are a few signs that tell the story of the plants and the collection but Hammar says that if there was more time he would like to find new ways to convey all the secrets and facts about their plant collection, one idea he has is to create an Instagram update with a palm-profile every week.

Hammar further reflects that the Palmhouse is an important part of the garden's identity. Many of the older visitors who visit ask about the birds and butterflies that lived in the Palmhouse when they were young. Today all animals have been moved to other gardens as a result of harder regulation after the avian influenza in 2006.

Another topic Hammar discusses is that of the age of the visitors to the palmhouse, which is mainly visited by families with younger kids, elderly people or tourists. Hammar is trying to think of themes that could attract the age group 20-45 years. One successful example of this was the Chili-show that was held in 2009 to showcase 60 different species of chilli which attracted other age groups and food interested people beyond the garden enthusiasts (Hammar, 2024).

> "You don't need to know the language to experience the smell, colours, the volume of the house, or its architecture. It's heartwarming when grandma comes with her little grandchild. There are so many beautiful encounters, bridging people and cultures. If you're from a different culture or country than Sweden, you might find plants from your homeland here. It creates a special connection. I see this often, and it brings me joy."

Gunnebo House and Gardens is part of the Swedish craft skill canon. Few Swedish Gardens have provided as much insight and development of traditional craft practice. When the EU project to restore Gunnebo back to the 18th century started in 1996 there was an interest in the traditional craft methods. Across the wide scope of curators, architects, garden architects and professional craftsmen of different trades that worked together to reconstruct Gunnebo the guiding question was *"How was this done in the 18th century?"*. This process is known as "processual reconstruction" where you gain knowledge by working with historic methods.

Lundberg shares that the garden has occasionally turned into a hands-on laboratory, allowing for continuous practice and investigation of traditional craft methods for gravel, hedge and lawn management. A majority of what is written about the garden is research-oriented and the garden team at Gunnebo are active in both current research, such as the Erasmus + project Craft Skills for Garden Conservation (Garden Conservation, 2024), and the Swedish historical garden network, eager to both share and learn from others (Lundberg, 2024).

Seiler shares that when he came to the garden in 1996 there was a newly founded workshop. There were masters with 63 apprentices within fine carpentry, textile, log building, black smithery, gardening and masonry among other crafts. After almost 30 years of accumulated knowledge and practice of traditional craft it can be considered a centre for craft knowledge and research. Furthermore, Seiler says that *"We use traditional craftsmanship because we believe that we can learn from how things were done in the past. Historic craft methods are still relevant and can help us learn about sustainability, additionally traditional crafts sometimes offer solutions to contemporary problems and challenges."* (Seiler, 2024) Today Gunnebo is still a meeting place for garden crafts. The garden hosts a two-year vocational school to educate gardeners. Additionally, it hosts longer study visits from the University of Gothenburg and vocational education opportunities such as the meadow and slow flowers course (Lundberg, 2024).

The garden team work together rooting their ideas and crafts in the garden keywords craft skills, historical credibility and sustainability. Johansson shares that she let these words guide her in her area of responsibility, cultivating flowers and leading the slowflower course as well as being in charge of the kitchen garden.

Johansson shares that the garden has a policy of not wearing headphones or sunglasses to be easily approachable for the visitors. She expresses it as part of establishing Gunnebo as a historic visitor garden, together with the historic tools and outfit, being present to answer questions about why traditional methods are used and how it affects the sustainability and biodiversity of the garden (Johansson, 2024).

Atkins states that the gardener's most important job is to create something beautiful. He does however believe that the public has a higher tolerance for tall grasses and weeds than ten years ago. Today the public perceptions have evolved from dismissing naturalistic elements like long grass as unkempt to appreciating their ecological significance. He highlights the shift from traditional expectations of garden aesthetics to a broader appreciation for biodiversity and sustainable practices. Atkins critiques the misleading simplicity of creating wildflower meadows as often depicted in media, emphasising the intensive labour required, particularly in challenging environments like West Wales where rich soils favour less desirable plants over delicate wildflowers. Through this narrative, he underlines the vital role gardens play in educating visitors about the balance between aesthetics and ecology. Atkins firmly believes in the power of gardens to change perceptions, teach the importance of biodiversity, and demonstrate the hard work behind sustainable gardening, all while striving to meet aesthetic expectations (Atkin, 2023).

At Beth Chatto’s Plants and Gardens, the education and sharing of knowledge is at the core of the gardens’ mission statement. Gregers-Varg sees this as their most important task. The garden and the plant nursery both have many full-time students and trainees, as well as part-time students, for example from the WRAG-Scheme which stands for “Women returning to agriculture” for people who want to change careers or who've been at home sick or raising kids. Outside the garden and nursery organisation, there is a separate organisation called the “Beth Chatto Education Trust” that Chatto started at 91 years of age. Chatto had been a school teacher until she married her husband Andrew Chatto but at the time you were not allowed to keep teaching as a married woman. Beth Chatto was always a keen educator and wanted to keep teaching others, which she also did in terms of the books she wrote and through her gardening, and eventually led to the trust. The Education Trust holds all the courses and works a lot with school kids, especially in poorer areas, they can for example

sponsor the bus ride so that the children get to visit the garden and learn about nature. Gregers-Varg further shares that they work together with the mental health organisation Mind. One part of the garden is dedicated to be a classroom for different courses, such as willow weaving or painting, but with a garden theme (Gregers-Varg, 2023).

Authenticity, Restoration and Re-adaptation

At the Botanical Garden of Gothenburg, they are currently building new greenhouses for their large collections of tropical, desert and alpine plants. The collection includes over 4000 different species, including Sweden's largest orchid collection, carnivorous plants, cacti, Dionysia and the Easter Island Tree which has gone extinct in its original environment.

The original greenhouses were built by Carl Skottsberg in the 1920s to accommodate the original collection, the greenhouses have been renovated a few times over the years, lastly in the 1980s. While the collection has grown considerably there are still cultivars of orchids from the original 1920 wild collection.

The new greenhouses are also built to better showcase the plant material for the visitors. This is a project where the gardeners and scientific curator Åsa Krüger work closely together to create exciting, beautiful exhibitions where the visitors get to learn more about the plants and the environment they are from. For example, the cacti room has the theme “Desert and Fire”, in this exhibition the visitors will learn about fire-adapted plants which either have the ability to quickly regenerate after a fire or through adaptations that allow them to survive fire events, as well as about climate change and how fires are naturally occurring and part of the ecosystem of some landscapes (Kullin, 2024).

Benjegård tells me about a recent visit from the ambassador of Chile who came to visit the Easter Island Tree, to him it would be like seeing a tree only out of myth. In this way, the tree is important in creating connection and sense of place (Benjegård, 2024).

Sjöstedt shares that as a result of the new greenhouses the part of the garden called Stallbacken had to move and was redesigned to “Kulturträdgårdarna”. Here Landeriträdgården was built in 2003 to be a garden for perennials of historic significance to showcase what the historic manor gardens of Gothenbrug might have looked like. As this garden was removed there was an overall feeling amongst the team of losing the more formal stylized flower borders and tapestry beds. It was therefore decided they would create a new garden with historically significant flowers and focus on traditional garden craft. decided to

save these plants and move them to The new gardens are called Kulturträdgårdarna, and designed by Maria Sjöstedt, Erik Vidstige and Einar Hessman Larsson.

The new gardens were developed by continuous workshops but rather quickly, it was important to make room for the POM -perennials, -vegetables and -hops. There is also a re-adaptation of the tapestry border but in the form of a parterre to keep the expression but minimise the management. The stable was also moved and renovated with traditional methods.

The Dahlia border has always been popular amongst the visitors, therefore the Dahlias were included in the new design, in a spring and summer blooming pathway.

In the back of the garden, Sjöstedt wanted to have a fruit garden to inspire and teach the visitors about a large selection of hardy fruits. However, it was found that the ground was contaminated with lead and the project had to be stopped. Now Botaniska is running an experiment to see if the ground can be purified by phytoremediation. At Botaniska the process involves growing plants with large green masses that can bind the lead which is then cut and removed from the site. It may be a long and slow process which involves sampling and monitoring the soil which is expensive, but if it's successful it is a great ecological and non-invasive method. Kulturträdgården is an example of readaptation as a way to safeguard and educate the visitors about plants that are historically interesting or plants with other values such as pollination, variation or food (Sjöstedt, 2024).

At the Garden Society, two larger restoration projects have been carried out recently. The first is the 19th-century grove. This part of the garden runs along the canal by the main entrance in Bältesspännarparken. The goal was to restore the English landscape garden atmosphere by replanting and shaping this part of the garden. To reconstruct the lost atmosphere the garden team collaborated with the municipality landscape designer who looked at historic photos and plant catalogues from the time. The middle of the area is a meadow surrounded by woodland, it is too cold and windy for most pollinators but a habitat for other insects. Some of the lime trees were veteranised and made into monoliths were blackbirds nests. This process of abandonment and reconstruction has together led to a higher biodiversity (Löfstrand, 2024).

The other main project is the restoration of the Palmhouse. The Palmhouse building has been listed by the County Administrative Board since 1976 which gives it protection from tearing down or reconstruction but solidifies the need for continuous care and renovation. The Palmhouse is being renovated to look like it did when it was built in 1878

and painted with traditional linseed oil paint, bringing back the original colours which had been lost over time.

Hammar has many new plans and ideas that can be carried out with the new technology. The irrigation system will be more advanced and lead to better control of the air humidity in each room. New shade cloths will keep heat during the winter months and minimise energy loss. With the new humidity regulators, the environment will be more even which allows for the cultivation of more tropical orchids, and ferns from the anthurium family. Hammar believes it will help combat the type of pests that prefer humid climates such as spider mites. The new irrigation system will save the gardeners a lot of time, today the gardeners manually mist plants such as the camellias two times a day which will become automated instead (Hammar, 2024).

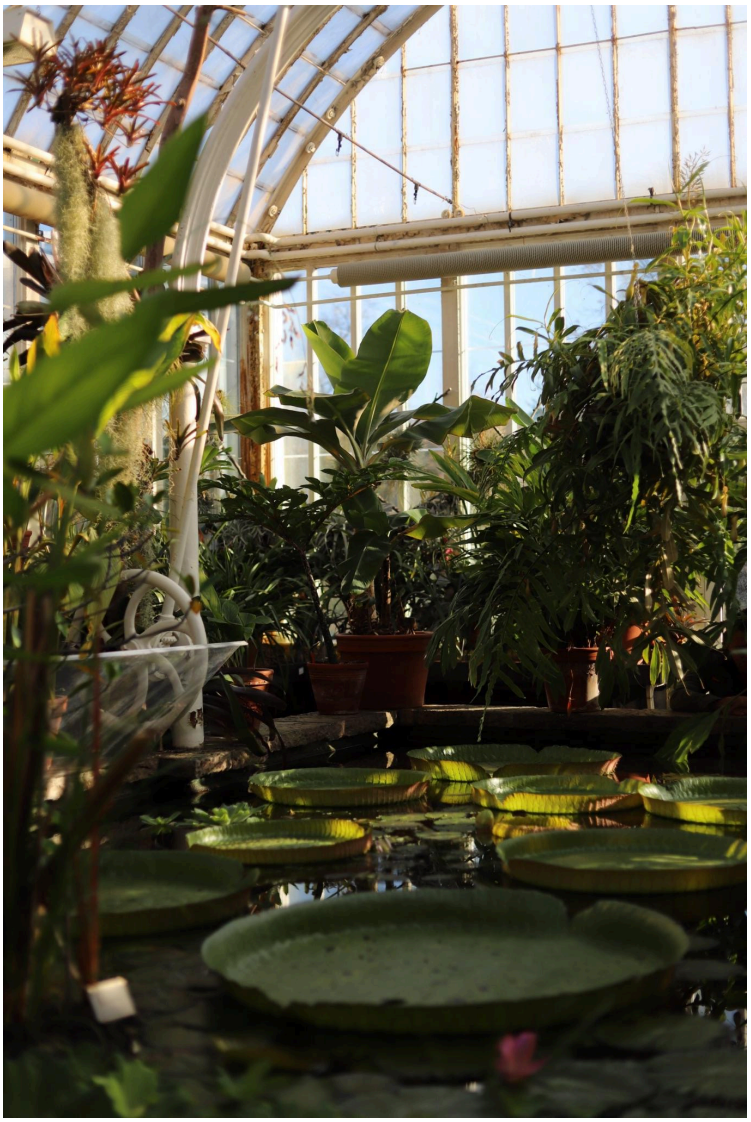

Figure 10: *The water room in the Palmhouse before the restoration.*

In the rose garden one continuous problem is the lifespan and sustainability of the hybrid tea roses. The hybrid tea roses are the oldest form of modern garden roses, these roses have been selectively bred for a long time and some have a shorter lifespan and are more susceptible to disease. Therefore a lot of the cultivars can't survive the ecological approach in combination with our climate. So the rose team has chosen to grow less of them. In the original collection hybrids teas were grown in most of the beds in the rose oval, today it is only six of the beds. The gardeners do not want to accumulate the hybrid teas just for the sake of the collection, which it was traditionally. Today they don't want to exchange the flower annually, it would be misleading to the public to have it look as if they can grow a very hard to grow cultivar year after year by conducting shovel pruning. The gardeners have made the conscious decision to not continue the historical practice in favour of more sustainable ones. Occasionally visitors will ask about a specific rose cultivar that is no longer grown in the garden, and while the visitor may be disappointed Georgii believes it is more important to be honest about the rose not thriving in our climate and share why they've chosen to not grow it (Georgii, 2024).

A simpler change the rose garden team is doing this spring is moving the POM roses to the main rose garden to better highlight their importance as heritage cultivars and educate the visitors on gene diversity. This area of the rose oval will go through a re-adaptation with three main purposes; (1), to create a tree curtain to lower the street noise to improve the visitor experience, (2) to expand the area with pollinator habitats by letting the rose garden and Butterfly hill grow into each other and (3) to showcase the wild roses and their cultural heritage (Georgii, 2024).

At Gunnebo, the original architectural plans for the house and garden were found during a renovation of the house in the 19th century. This allows the gardeners to restore lawns, hedges, fencing and paths to precise measurements. The original architect Carl-Willhelm Carlberg was a fortification engineer and constructed large robust paths in the garden and landscape park which survived the abandonment of Gunnebo and are reconstructed or mapped out today. Lundberg says while plants and trees may have been exchanged the underlying structure was always intact. This makes the pleasure garden surrounding the house an authentic 18th century garden.

There have been many large restoration projects at Gunnebo in an effort to restore the 18th-century garden. The formal garden, the new and old kitchen garden with the hothouse, and the orangery, as well as renovating Gunnebo House. There is a long history of restoring

Gunnebo to the 18th century (Lundberg, 2024). The care and restoration of Gunnebo started in the 19th-century. However, the most active periods were when Möndal municipality bought Gunnebo, 1949-1953, and when Sweden joined the EU and received funding for the project “Gunnebo– back to the 18th century”, 1996-2024 (Seiler, 2024).

The most recent addition is the orangery for the Pomerance trees. It’s been a massive project, combining the expert craft skill of many disciplines, from gardening, bricklaying, carpentry and a wood sculptor. The orangery was documented in paintings and plans from the 18th century. The first step was to make an archaeological excavation as the land had been used as a potato field in the 1950s. The remains of the foundation were found and the gardeners had the chance to help with some digging. The project started in 2013 and the orangery was inaugurated in 2022. Lundberg says *“It completes the garden, without it something was clearly missing”* (Lundberg, 2024).

Working in the orangery comes with new challenges, the gardener has the approach to not employ any modern technology until they have tried how well the 18th century methods work. Built as in the original architectural plan there are no automatic ventilation hatches, radiators or extra lighting. In the winter the orangery is warmed by tile stoves (Johansson, 2024).

Figure 11: *The reconstructed orangery at Gunnebo House and Gardens.*

There are lists preserved of the trees and bushes grown in the orangery from 1810. For example citrus fruits, mulberry trees, almond trees and tulip trees. In the restored kitchen garden it was harder to find exactly what was grown. Johansson has found through old letters that they grew gooseberries and asparagus. What they grew from year to year must have depended on crop rotation and trends. There are no written sources from Gunnebo but Johansson has studied written materials, price currents and paintings from other 18th- century gardens in Sweden. The flowers are especially hard to find exact cultivars of, instead Johansson looks at the expression of the flower (if painted) and tries to find a similar cultivar that meets modern criterias, is healthy and works in flower arrangements. According to Johansson the important historical value is that it is a working garden that actually produces fruit, vegetables and flowers for the restaurant and house (Johansson, 2024).

Finally, Johansson shares that when the garden teamwork new projects head gardener Joakim Seiler always asks the question *"Are we representing the history of Gunnebo or could this be any garden? Is this Gunnebo specific?"* (Johansson, 2024).

At Aberglasney Gardens head gardener Josef Atkin insists that the heritage aspect is paramount, particularly within the garden rooms which show a unique historical style or story, where adherence to historical context influences gardening approaches. As you move away from these "heritage zones" – say, from the cloister garden surrounded by historical walls that represent a certain style – there's more leeway to adapt, innovate and expand. However, Atkin points to the difficulty of mediating the purpose and ideals of the 16th-century gardeners while adhering to the regulations as the garden is listed and protected as a grade II on the *Cadw/ICOMOS Register of Parks and Gardens of Special Historic Interest in Wales* (Atkin, 2023).

> "What were the gardeners thinking in the 16th century? They were innovators, they were always looking for new things! So it's certainly in the Spirit of gardening at that time and so on. It is totally inappropriate historically, but is that the only conversation?"

Atkins shares that other challenges come with the changing climate. As the world heats up, species migrate northward. Aberglasney Gardens has been troubled by the fungal disease box blight. In the Hobhouse Gardens, the box made out the framework for the garden as a parterre around the main planting. During the summer of 2022, the box was replaced with a *Rhododendron micranthum* 'Bloombux', a flowering miniature rhododendron. This decision was due to the nature of box blight, which can be managed but not entirely eradicated by pesticides. The most effective strategy often involves uprooting affected box plants, as the persistent nature of box blight makes prolonged chemical treatment challenging and uncertain. In this case, Atkin had no other option than to adapt as the original plant material no longer is a good option. While this altered the visual experience of the garden Atkin is pleased with the outcome and advocates for exploring alternative plant options over persisting in prolonged and uncertain battles, prioritising the garden's vitality over historical reverence. Atkin doesn't believe this affects the authenticity of the garden or makes it less of Penelope Hobhouse's, he explains;

> "…the garden was Penny's idea. The exact plant in which spot is not that important. It's the idea and the spirit of the place and the idea of having that Celtic circle that could be viewed

> from the top, from all those different angles. The sightlines which aren't quite there, and centre and stuff like that. That's what Penny's garden is."

Ultimately, the goal remains a thriving and aesthetically pleasing garden, says Atkin (Grönlund and Seiler, 2023).

Figure 12: *Celtic circles late summer, Buxus September 2021*

Figure 13: *Celtic circles April, 'Bloombux' April 2023*

Beth Chatto's Plants and Gardens is a garden with a special connection and history tied to Beth Chatto herself, in 2023 Beth would have turned one hundred. Gregers-Varg shares what it has been like to develop the garden. She started gradually as the first head gardener while Chatto herself was in charge and together changed parts of the garden. In the last five years of Chatto's life, we significantly redesigned portions of the garden.

> "Beth always emphasised that the garden was like a living organism, not a static painting on a wall. She believed in the "right plant, right place" approach, stressing the importance of adapting plant choices to local conditions."

Gregers-Vargs says that a common misinterpretation of this approach is to think that "if I want a white garden, white plants are the right choice". But it's about harmonising with nature, looking at what can be done with the local conditions, rather than imposing preferences.

For instance, in dry, sunny conditions, we avoid planting water-demanding species like Rhododendrons. Instead, Chatto prioritised plants based on form, texture, and foliage,

with no emphasis on flower colour or themes. Gregers-Varg says the garden team aims for a natural, cohesive look, maintaining the garden's original atmosphere.

Furthermore, Gregers-Varg admits to some challenges. The garden is ever-changing and over its 60-year history, trees have grown, altering light and water conditions. The past cannot be replicated, instead, the team aims to preserve the garden's essence and continuity (Gregers-Varg, 2023).

At Cothay Manor authenticity has proved to be a complex issue. The house itself is mediaeval but during this time period, the grounds were farmed. The original garden dates back to 1910-1920s when it was designed by Lieutenant-Colonel Reginal Cooper D.S.O, however, only the yew walk and layout of the garden rooms are intact from the arts and crafts time. Gardens created during the same time by Lieutenant-Colonel's friends, such as Sissinghurst created by Harold Nicholson and Vita Sackville-West and Hidcote Manor designed by Major Lawrence Jhonston have been safeguarded and unchanged. Myr attributes this difference in attitude to the importance of the designer and their "person value".

At Cothay the plantings were remodelled in the 1980-90s by Alister and Mary-Anne Robbs and in many ways their life's work. The parts of the garden which are famous today, such as the unicorn walk were designed by Mary-Anne Robbs.

Without clear guidelines it's up to the gardeners to make the decisions for themself of what should be safeguarded. Currently head gardener Myr and owner Roy Sebag are in the middle of deciding how to replace the dying Robinia trees in the unicorn walk. Myr has had the opportunity to ask Mary Anne Robbs why she chose Robinias in the first place, to which the simple answer was *"they were the cheapest ones I could find"*. As Robinia trees have a lifespan in the U.K. of only 30-40 years it would be unsustainable to replace them with the same species therefore the gardeners will find a hardier replacer in the spirit of Mary-Anne who always sought to improve the garden and would not have made the same mistake twice.

Finally, Myr says that it is the responsibility of him and his garden team to carry on Mary-Anne and Alistair's legacy as they are the last gardeners who have been able to meet her and ask questions (Myr, 2024).

At Hestercombe Gardens and House Greenslade also work to secure the historic park's educational cultural values. Since 2020 Greenslade has led the work of rebuilding the lost Elizabethan water garden. This massive project was a collective effort of the gardeners, Hestercombe's on-site antiquarian and external landscape company. They first found evidence for the water garden on old maps; it looked like a very square pond with a very square island. Then they brought in the landscape company to do a feasibility study, who

brought in an archaeologist and a hydrologist to map it out. Meanwhile, the archivist looks for evidence and eventually, they build a picture together. The Elizabethan garden is one of a kind and offers the visitors new knowledge on their heritage and a beautiful sight, while recreating a habitat that had been filled in and grown over, for water-living species. Greenslade acknowledges that it is rare for gardens to have their own antiquarian on site and that while many historic gardens may restore garden features it is rare to completely rebuild a lost structure as it takes massive research. However, this rebuilt water garden adds to Hestercombe's history and educational values (Greenslade, 2023).

The garden at Iford was never fully completed during Peto's time. One example is the Japanese garden that Peto started but John kept developing since the 80's. Peto decided to create the Japanese garden because he found a stone that reminded him of Mount Fuji, during his time it was a dry garden but eventually John found the stream which has been incorporated as water is such an important feature in Japanese gardens.

> "If Peto was to walk back I think he'd recognise his garden. And I hope he'd recognise the fact that the major planning decisions are made with respect to what Peto was trying to create."

At Iford manor estate, the plant material is in focus. While precise historical plant species may remain unknown, the onsite propagator works to protect the remaining plants associated with the original owner and gardens designer Harold Peto (1854-1933) to ensure their legacy endures and as well as protecting genetic variation. This allows for the replacement of ageing or lost plants while maintaining historical continuity and biodiversity. Recognizing plants' finite lifespans, the current custodians balance honouring the garden's history with adapting to modern needs. Lannin estimates that they propagate 85% of the plant material through cuttings and seeds, resulting in a lower carbon footprint as they neither import nor use peat-based soil. As Iford Manor Gardens evolves it aims to bridge the past and present, preserving a story transcending generations.

At Kew, they have multiple missions to tackle. Their mission is to represent and safeguard the heritage values of a different culture while fighting the climate struggle of the British climate. Davies-Roberts reflects that the British summers are getting warmer and drier while the Japanese islands still have quite a high rainfall. In the summer of 2022, the weather in London was extremely dry, it was around 42 degrees for multiple days and they had to water substantially which is not sustainable and not something they want to keep on doing.

Davies-Roberts says they will eventually have to readapt the garden, however with respect to the Japanese customs.

> “So there will be some redevelopment, but the bones of the garden will stay the same, for example the rocks. In the Sakuteiki, which is the oldest manuscript about Japanese gardening, the first paragraph is "a garden starts with stones." So when this garden was built, the rocks went in first and then the plants went in around them.”

While the garden's plant material will change, the atmosphere and educational purpose of the garden will remain intact (Davies-Roberts, 2023).

Tools: Traditionality, Green Energy and Craftsmanship

At the Garden Society, they have completely turned to electric tools, both for handheld machines and the vehicles such as the wheel loader and flatbed car. The choice to go electrical comes from the city planning office as Gothenburg city’s agenda for 2023 (Löfstrand, 2024).

At Gunnebo House and Gardens the gardeners have investigated how they can incorporate traditional Swedish 18th century craft skills. Methods for management of lawns and hedges have received the most attention. Lundberg shares that if they find traditional tools and know that it’s been used traditionally the garden team makes an effort to investigate and learn the craft. He credits this to the strong belief that the gardeners of the 18th century were masters of their craft and that an experienced craftsman could compete with modern tools in terms of efficiency.

Lundberg is working on establishing a hedge of *Tilia* along the north entrance that will be the right proportions for him to cut with a pruning hook which allows for large swipes like a scythe.

> "I think it's quickly done to make a pass with a pruning hook that reaches from 0 to 3 metres high. Maybe you take 5-10 cm deep cuts at a time, times 3 metres then. Each cut takes one second, then it takes two seconds to recharge, then you take the next cut."

The craft of using pruning hooks for hedge cutting is slowly dying out in favour of manual and mechanical shears. Seiler shares that he met a gardener at Ulriksdal in Stockholm who used the pruning hook until a falling accident in 1984. There are a few gardeners who still use it who could teach the craft before it disappears completely. The craft is known to have been

practised in Sweden between 1648-1984 (Seiler, 2024). Lundberg affirms that learning the craft involves trial and error but believes it possible to learn a dead craft. While some trick for it may be lost it leaves more room for place-specific adjustments.

Figure 14: *Pruning hooks with different types of hooks and handles.*

Gunnebo also works with restoring the meadows as part of the cultural reserve, Lundberg says that it's been an educational journey. While they tend it with 18th century methods Lundberg says he wishes the biodiversity would be improved. In the 18th century there would be neighbouring estates or farms to trade seeds with, but today these options are limited as the meadows are fewer. However, since two years back there is a Swedish scythe network and over time this community could provide the solution by collaboration. For now, Lundberg is happy that *"Gunnebo is creating space where flora and fauna could arrive"*

The care of traditional craft is also part of the garden's trademark, to create a cohesive and authentic 18th-century atmosphere, which also forms the basis for discussion and inspiration to the visitors (Lundberg, 2024).

Johansson is responsible for the planning and care of the kitchen gardens. She remarks that since 2011 their methods have changed drastically. Before they would double

dig the beds in the kitchen garden, but today the garden staff is too few so they have rationalised and use a broad fork to cultivate the topsoil by adding manure and compost. This practice is both less time consuming and more sustainable but not historically correct (Johansson, 2024).

> "Mulch cultivation wasn't done this way in the 18th century, probably due to limited green waste, likely fed to animals. You have to be a bit pragmatic and acknowledge the reality of the situation."

Myr has decided to invest in electric tools for the garden team at Cothay Manor. However, the driving factor has been that electric tools are lighter and therefore more ergonomic and save him time as he doesn't have to spend time refilling petrol as his tools have a long enough battery time. A few tools are still petrol-driven but for these Myr opts to use ASPEN, a cleaner alternative of petrol fuel without ethanol, which he used while he still worked in Sweden for the Swedish Church but which he experienced that few British gardeners have heard about and use (Myr, 2023).

At Hestercombe they still use petrol-driven tools. Greenslade says they look every time they need to swap out a tool for an electric counterpart, but so far the electric tools are not strong enough for all-day everyday use, especially as they have a lot of woodland and work with heavy-duty machines and tools such as chainsaws and strimmers. Instead, the garden team employs traditional methods such as coppicing hazel for plant staking and constructing dead hedges which provide wildlife habitats for insects and smaller animals while the nutrition from the brash goes back into the ground. Once a year they collect all the softwood they have felled during the season which are then burned to make charcoal. The charcoal is then sold to the local community to cook with. Greenslade is not sure how ecofriendly the process is but they choose to continue this practice to keep the traditional woodland management of the local area alive (Greenslade, 2023).

Daveis-Roberts says that at Kew Gardens they try to use the traditional Japanese tools that correspond to each of the crafts they are trying to represent. For example, for their cloud-pruned trees, they use specific pruning scissors, and for the gravel raking, they have a heavy wooden rake that's made as a replica of a Japanese one. They also use the garden machete, which is a large serrated sickle for bamboo and grass, which also has become popular with the gardeners in the grass garden at Kew. For time reasons they also use the battery-driven hedge trimmers when it is possible. Davies-Roberts also uses the Japanese

toed climbing shoes when he climbs the pines, as thin rubber soles don't hurt the bark. Davies-Roberts also reflects that the Japanese tools have influenced the garden world as a whole, with the tripod ladder and hori-hori, Japanese digging knives, being increasingly popular.

Kew Gardens aims to be carbon neutral by 2030 and is currently switching out all its petrol tools for electric counterparts. Davies-Robers is optimistic about the future of electric machines which he believes will make the garden even more pleasant as the electric machines are close to silent.

Naturalistic Gardens and Modern Methods

At the Garden Society, they have worked slowly with cutting back for as long as the gardeners can remember. They cut down the things that look bad and leave seed heads as winter food for the wild animals and winter beauty for visual interest. The plants are mainly cut down during January and February depending on the weather to make sure the ground is bare in time for the early flowering spring bulbs (Löfstrand, 2024).

In the rose gardens, they make sure not to deadhead the single-blooming roses too late in the summer to produce rose hips for the birds to eat during the winter, the beautiful red fruits are a bonus for the visitors to enjoy during the autumn and winter (Georgii, 2024).

At Gunnebo House and Gardens Johanson has worked with developing sustainable growing of cut flowers, looking at organic growing, following the season and arranging them without plastic cores. Johansson underscores that until the 50s Sweden had a large force of national growers of cut flowers and potted flowers, which disappeared and were outcompeted by the global import market. With the loss of the cut flower producers, the knowledge was starting to fade which Johanson wanted to change, over the last years the community and interest in locally produced cut flowers have started to gain traction. In 2019 Johansson co-founded the cut-flower organisation *Snittblomsodlare Sverige* and hosted the first meeting at Gunnebo. Today the organisation has around 180 members.

At Gunnebo, all the cut flowers are grown onsite and used for weddings, memorials, in the restaurant and castle. The flowers are also used for the slowflower exhibition and course. The slowflower course is offered both as an onsite and distance course, furthermore it collaborates with the traditional florist education in Gothenburg. Johansson observes that the whole cut-flower industry is going through change to be more sustainable. Finally, Johansson

shares that the interest is larger than she can accommodate for, therefore the course exists in a pre-recorded digital form (Johansson, 2024).

At Aberglasney Atkin has embraced the trend by creating meadows where they previously had short-cut lawns. Atkin has planted one bulb meadow that flowers in early spring and two wildflower meadows. Additionally to providing more food and habitats for the pollinators it also saves the heavy work of pushing a lawn mower on slopes for the gardeners. One problem is that mice and rats thrive here, which is great for the barn owls in the garden but less appreciated by the visitors. Atkin also reports a shift in public opinion over the last ten years, experiencing a higher tolerance of "messiness" today as the public got more educated on the topic of biodiversity and climate change (Atkin, 2023).

Figure 15: *Camassia blooming in the bulb meadow. Courtesy of Rasmus Myr, 2021.*

At Beth Chatto's Plants and Gardens they have not worked actively with naturalistic gardens or rewilding, says Gregers-Varg. She doesn't believe in the recent trend of favouring only native British species but rather to have a large selection of plants and not keep the garden and nursery "too clean". Of course the cultivars are not invasive species that may spread out into nature and compete with the natives, though Gregers-Varg points out that hybrids with double flowers and no nectar can be just as harmful as they do not provide any food for the birds and insects.

Further, the rewilding trend has many nice aspects but can't work in a small garden like this one, in that case Beth's garden would disappear, but the garden has adapted some ideas such as not cutting back too early in the season (Gregers-Varg, 2023).

At Hestercombe, a shift in winter garden maintenance practices has occurred. Previously, the herbaceous borders were mulched in October and left untouched until spring. However, due to the garden being open year-round, continuous care is now necessary. Today the gardeners prefer to keep seed heads in the borders for visual appeal, gradually removing them as they begin to decompose.

Additionally, the impact of the COVID-19 pandemic on their gardening practices is noteworthy. During the pandemic, with no visitors and only two gardeners present on-site, less time was available for each task. Consequently, the gardens appeared less tidy, but this unintentional change resulted in an increase in wildlife activity within the gardens. Greenslade has decided to embrace this going forward and is optimistic about the general public following their example:

> "There's an initiative in the UK called No mow May, and we have turned that into check it off June and just do not bother July. So we now decide that some bits do not need to be mown every week."

Iford stands out as a garden that always had a certain wilderness to it. To Lannin gardens, by their nature, are intricately controlled spaces, distinct from wild landscapes. However, this doesn't negate the possibility of gardening in a way that harmonises with nature, focusing on soil health, supporting invertebrates, and adopting a relatively holistic approach while preserving habitats. Yet, it is crucial to note that a garden left entirely to its own devices ceases to be a garden, as gardening inherently involves human intervention. Gardens demand intensive management. For instance, a significant amount of time is devoted to selectively weeding paths to maintain specific desired weeds while eliminating others. This level of attention to detail might seem excessive, aiming to create a pathway that appears untamed and less meticulously maintained. Still, it balances the regulating and cultural ecosystem uniquely, benefiting both (Lannin, 2023).

Figure 16 and 17: *The art of subtle weeding. Leaving moss and creeping vegetation.*

Kew Gardens show an excellent example of bridging the gap between nature conservation and gardening by veteranizing old trees, Davies-Roberts think this is a great method as trees are close to people's hearts and the visitors often get upset when they have to fell very old trees in the garden. By veteranizing the tree they do not pose a threat to the safety of the visitors as well as serve as a wildlife rescue for insects, birds, fungi and lichen.

7. Discussion

We can see both differences and similarities in how heritage gardens in the U.K. and Sweden approach their natural and cultural heritage. The head gardeners discuss authenticity and sustainability in relation to the topics of pesticides and herbicides, water use and drought resistance, soil health, biodiversity, education, restoration and re-adaptation, tools, and modern methods. The result attests to the current societal changes such as changes in norms, economic and political fluctuations, and the resulting change both the cultural heritage and horticultural industry are undergoing in response.

In this chapter, I will analyse the result using my two main theories: Cultural Ecosystem Services and Natureculture.

7.1 Natureculture

While the term natureculture is not widely spoken of, the mindset it embodies is not something distant or foreign for the gardeners. Through my interviews, I hope to make clear that the Gardener is, like all other craftsmen, a highly skilled and knowledgeable person, observing climate change and the effect it has on our living environments first-hand. Furthermore, the result shows how extensive the knowledge of a gardener is in terms of the physiology of the plant material - and their response to climate change, disease and extreme weather- as well as a broad understanding of the weather, soil health, biodiversity and often knowledgeable on the current research and demands in terms of green sustainability development.

However, how the garden is managed and what it can offer in terms of events and other educational purposes are tied to the economic means of the organisation. Going into the project I had the idea that gardens with an entrance fee were a more financially secure approach, this has proved to be an oversimplified view. The error on my part came from the misconception of beauty, at the time the colours and neatness of the British gardens spellbound me too much to see the organisation behind it. The gardens in this study vary in size, yearly visitor numbers and self-autonomy which gives the head gardeners unequal options to explore and try new methods. If you rely on the entrance fees of the visitors to sustain the garden, you must also keep the visitors happy and the garden visit worth the price tag. There is little wiggle room to try new approaches or make a complete turnaround. However, as the interviewees point out, today there is more appreciation and acceptance of

new approaches as long as they are accompanied by a good reason and a nice sign (Atkin, 2023; Greenslade, 2023; Gregers-Varg, 2023; Georgii, 2024).

Finally, gardens in the same economic situation as Gunnebo House and Gardens, who previously found stability in getting financial support from both the natural heritage and cultural heritage sectors, face double challenges in times of political instability, climate change denial and cut funding for cultural expression.

Another aspect made visible in this study is how the gardeners put different emphasis on culture and nature in their gardens. Here there are two different divides, both between Sweden and the U.K. but also between the botanical and non-botanical gardens.

The mindset seems to be partially guided by national regulations. In Sweden, the regulations governing listed gardens stem from established cultural heritage norms, which prioritise preservation over adaptation and evolution (Riksdagen, 1988). However, since gardens inherently evolve and change, these regulations often fall short of adequately accommodating their dynamic nature. Consequently, Swedish legislation primarily emphasises cultural heritage values in protected gardens. In contrast, UK legislation appears better equipped to address challenges like climate change and biodiversity loss. In the U.K. the gardeners are not afraid to tear out plantings that don't respond well to the climate, and speak of the atmosphere as the guiding principle (Atkin, 2023; Myr, 2024; Lannin, 2024).

In terms of botanic and non-botanic it is the question of history that causes a strain. To be branded worthy of conservation by governmental organs results both in financing of restoration– such as seen at Gunnebo and the Garden Society, but less freedom to re-adapt buildings such as the greenhouses at Botaniska (Lundgren, 2024; Löfstrand, 2024; Tornevall, 2024). How come some gardens are afraid of branding themselves as historic? Being a historic park should not hinder a garden from being part of the development of management of ecological and biodiversity-rich parks. Are there certain risks with profiling as a cultural heritage?

By looking at botanical gardens as natureculture we see that these gardens started in the culture realm. Their mission was to collect interesting new plants, promote and label the species for the public and the future. All from a scientific point of view where man brought order to nature. Since then the mission of botanic gardens has moved toward nature, safeguarding biodiversity and researching the climate crisis from a biological and horticultural standpoint.

Turning the statement around the cultural reserves shows the same indications, where the meadow and wide crowned oaks are signs of culture and man is part of nature and its continuous growth.

Norms

The interview material showcases a wide range of expert skills and knowledge. Apart from knowledge and skill the gardeners' decisions are guided by cultural norms and external regulations.

There is a divide in how we speak about the gardens, based on mindset, and the question of what is up to standard? The U.K. have a long tradition of horticultural excellence, the gardeners are interested in their craft and therefore spend considerable time reading about and visiting other gardens, most of which have a certain amount of neatness. I have experienced firsthand when working as a gardener in the U.K. how well-read the visitors are and how fast they are to point out the stray weeds, something I have not experienced in Sweden though I spent an equal amount of time gardening in each country. As stated by Floud (2019) the garden industry is a massive consumer of economic resources land, labour and money, and has been for centuries.

For example, we can see a large divide between the Swedish gardens and the British gardens in terms of pesticides. Ecological garden care has a long history in Sweden, with consumer regulations of glyphosates to help guide the change. Gardeners such as Myr who have experienced the difference as a gardener in both countries hope to see regulations implemented in the U.K. in the future (Myr, 2023). While this is not the case in all of Sweden, the gardens in the Gothenburg region have similar viewpoints on pesticides and fertilisers, likely fostered by collaboration and shared knowledge.

The British interviewees express that it is hard to stay on budget and be up to standard while using organic options and instead employ alternative practices such as spot spraying (Atkin, 2023; Greenslade, 2023). Though COVID-19 seems to have helped lessen the ideal standard and made the public more accepting of a few weeds and cutting back (Myr, 2023).

However, both in the U.K. and Sweden gardeners have a few tricks up their sleeve to make the gardens look well-kept. Nassauer's cues to care method (1995) is made visible in many of the gardeners' practices, for example at Aberglasney where Atkin trims a single mower's width along the paths to create a subtle transition and maintains clean edges or an orderly frame to a messy ecosystem as Nassaure phrase it (Atkin, 2023). We also see an

example of this at Iford where Lannin's team manually weeds the biggest and messiest weeds while still letting the garden stay wild (Lannin, 2023). Another example that is common today but not mentioned in Nassauers text is the veteranisation of trees, where the part of the tree that can be a hazard is removed but the rest left as a wildlife habitat for insects, birds or bats as seen at Botaniska, the Garden Society, Gunnebo and Kew gardens (Petersson, 2024; Lundberg, 2024; Löfstrand, 2024; Davies-Roberts, 2023). This is a reaction against the lack of naturally old trees, and could also be seen as a part of rewilding, many of which have been cut down either for timber or because they grew old and the gardeners of the time wanted to clean up. However, paintings from the 18th century show these old and dead trees depicted, during the romantic period these trees contributed with a sense of age and continuity to a garden (Tree, 2018).

Climate Change and Gardeners in Heritage Gardens

The study shows across all interviews that the gardeners experience climate change first-hand and have to work actively to handle extreme weather, displaced seasons, as well as disease, pests and invasive species that move north in search of milder climates. Further, the gardeners express growing pressure for organic and sustainable solutions from governmental bodies, such as the U.K. peat legislation or local watering ban during drought periods. Another positive experience amongst the gardeners is increasingly informed visitors who want to contribute to the change by educating themselves and finding inspiration for their gardens.

The gardeners work as suggested by Seiler (2020) developing methods to handle climate change as well as trying to be proactive and minimising the contribution to climate change in the areas where possible. As both U.K. and Swedish gardeners describe it is a balancing act between creating a pleasant visitor garden and developing a greenscape for more-than-human (Atkin, 2023; Myr, 2024; Lundberg, 2024). There is a notable difference between the countries, where Sweden started the process to eliminate pesticides almost 20 years earlier, though the U.K. is ahead in banning the mining of peat to lessen the release of CO_2 into the atmosphere. All gardens work by increasing the use of pollinator-friendly plantings and creating habitats for local species, either through habitat piles, leaving deadwood, planting hostplants or cutting back the dead plants later in the season to leave food and habitats for wildlife.

As proposed by Woudstra (In press) heritage gardens are important spaces for conserving historic planting material for resilience while investigating new trends like rewilding and planting native species. The gardens have developed a wide range of methods to do this. Gardens such as the Aberglasney Gardens, Iford Manor, and the Garden Society combine the two, keeping historic planting material in the core of the garden while creating room for new plantings such as the bulb meadows in both gardens and the Butterfly Hill at the Garden Society. Letting new plantings in today's spirit develop around the original garden. At Gunnebo, the gardeners have incorporated biodiversity-friendly and organic methods through traditional craft methods. Tending their lawns as meadows and restoring the woodland to grazing lands hold the same ecological value and ideals as the modern counterparts 'naturalistic gardens' and 'rewilding', although in less flashy packaging. The gardeners at Gunnebo show that traditional crafts can be part of the solution to the loss of biodiversity and climate change.

The result showed a strong consciousness and worry among the gardeners about the extreme weather. The gardens have different issues of drought and flooding depending on their surrounding environment as predicted in Gardening in the Global Greenhouse (Hadley and Bisgrove, 2002) and share how they work both proactive, e.g. by raising beds to protect sensitive roses from waterlogging (Georgii, 2024) and as a direct response such as not watering the plants they can afford to lose in favour of the larger and more rare specimen in all gardens.

The gardens located in cities are affected by the Urban heat island effect. In urban areas, the temperature rises to higher degrees which affects the plants in the garden. Two city gardens are Botaniska and the Garden Society, where smart watering during the night or when the gardener in charge can use their skill to see when a plant needs water to counteract the temperature most sustainably. However, urban gardens are important because they have a positive effect on cooling the city due to the trees supplying shade and vegetation that absorb heat and re-emit less than built structures.

7.2 Ecosystem Services

In this section the third research question 'How can cultural ecosystem services improve the multifunctionality of ecosystems in heritage gardens?' will be addressed. As seen in figure 1. *The ecosystem landwheel* the four categories Cultural (C), Supporting (S), Regulating (R), and Providing (P) and many subcategories, this model is followed in this section. While

gardens are man-made creations, where man decides what goes in and out of a garden, we established in the previous section that gardens are also a collaboration with the more-than-human.

The first topic presented in the result is that of pesticides and herbicides. The use of chemical and organic pest control has been discussed with all the gardeners. Out of the British gardeners, only two out of five gardens have stopped using pesticides and herbicides outdoors. In Sweden, all three gardens have stopped using pesticides and herbicides outside. Botaniska and Beth Chattos both make exceptions indoors for the most vigorous pests. The British interviewees agree that harmful chemicals ought to be left behind in favour of either finding eco-friendly alternative sprays or by changing the norms and methods to allow for a less neat expression (Atkin, 2023; Davies-Roberts, 2023; Greenslade, 2023; Gregers-Varg, 2023; Lannin, 2023; Myr, 2023). Only Myr (2023) calls for action from above, looking at his surrounding landscape and accountability from the politicians to take harder measures against glyphosates. To prohibit the use of glyphosates would put pressure on agricultural land and farming in a way that the recent trends and Gardens illustrated articles never will. However, if gardeners and garden visitors keep voicing these concerns, maybe one day gardeners will see the change we're looking for. Pesticides and herbicides have been commonly in use in all visitor gardens around the U.K during the last century. Historically the biggest and richest gardens afforded garden teams large enough to pull the weeds manually. (Atkin, 2023; Davies-Roberts, 2023; Greenslade, 2023; Gregers-Varg, 2023; Lannin, 2023; Myr, 2023, Georgii, 2024; Löfstrand, 2024) At Aberglasney Gardens, Joseph Atkins emphasises the importance of aligning gardening practices with clients' desires, the clients being both the visitors and the board of trustees. As Atkin (2023) states in the interview, it is largely a question of time and finances, his team cannot keep the same level of neatness as the use of Round-Up provides.

As we can see it is a question of norms, and here the Swedish and British gardeners seem to have two different mindsets and traditions. As someone who started her own garden training in the United Kingdom I have been shocked to learn how long the gardens in Gothenburg have been pesticide and herbicide free. (Georgii, 2024; Löfstrand, 2024; Lundberg, 2024; Irvine 2024) In the following graphs I will analyse the effect on how the approach we choose to implement cultural ecosystem services affect the supporting, regulating and providing services.

Table 1: *Chemical pest control impact on ecosystem services.*

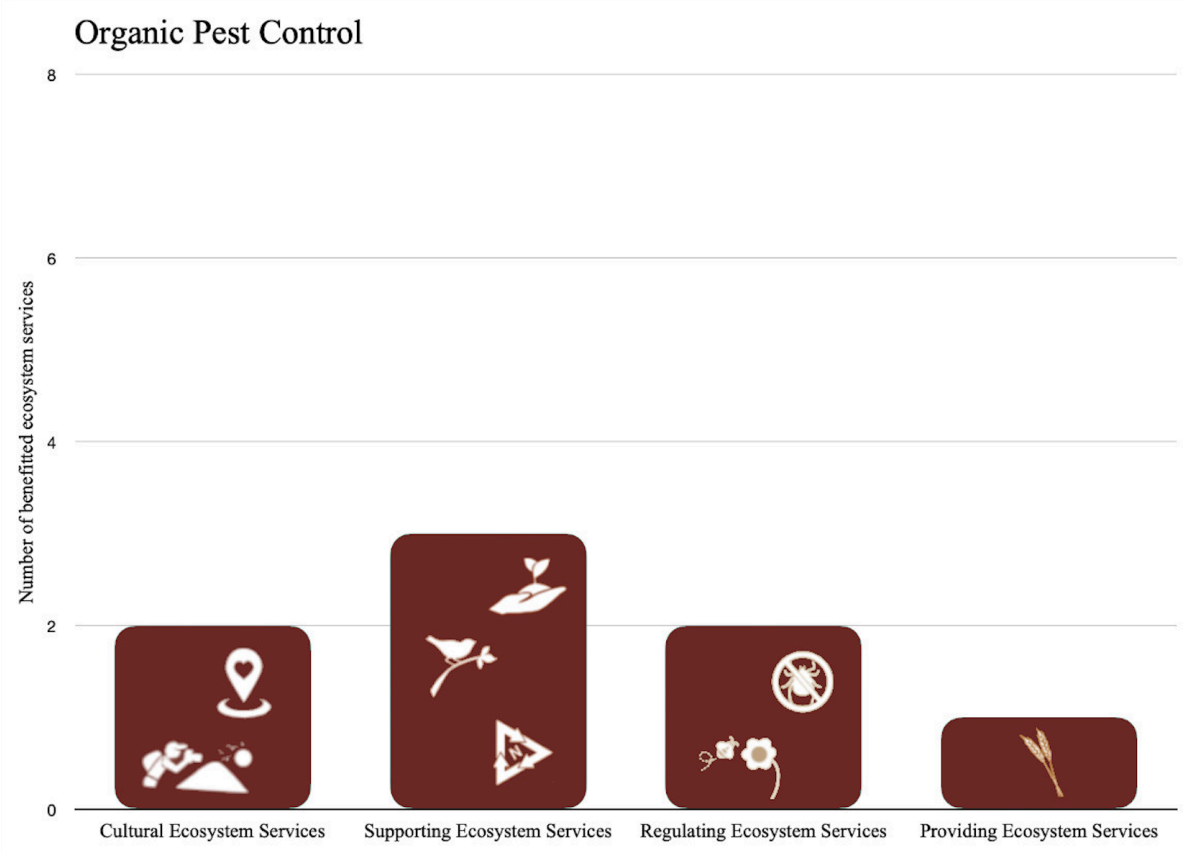

Table 2: *Organic pest control impact on ecosystem services.*

If we were to stop using pesticides and herbicides all together we could benefit every part of the ecosystem service model. To refrain from using chemical sprays would benefit services in each of the ecosystem service categories. The cultural values are harder to argue for and maybe where our national norms come into place. If you come from a country with a long and prestigious garden history such as Britain it may be a larger part of their cultural identity and therefore norms harder to break. As table 1 and 2 illustrate, both chemical and organic pest control benefit the cultural ecosystem service, closely tied to visual experience and tradition. However, the organic alternative benefits seven more ecosystem services.

There is also considerable difference in how Swedish and British gardeners approach the question of drought and extreme weather. The Swedish gardeners seem to take the topic more lightly. However, while Sweden has had fewer extremely warm summers, periods of drought, e.g. 2018, had extreme consequences, among others forest fires and no food resources for grazing animals. In this sense Sweden is at higher risk with our large conifer forest, as conifers are more likely to catch fire than deciduous trees (Tree, 2018). While it's impossible for gardeners to change the global heating of our world, this discussion translates into the broader picture, how serious should each individual take the climate crisis?

Other factors that play a role in drought is access to water and local environment, though it's important to have a plan for extreme weather. The gardeners employ tactics such as choosing to water the most important plants and storing water. At Gunnebo the strategy to use historic methods pay off. The gardeners are increasing the grass length to better adapt to the weather, as longer grass is more resilient during drought periods (Seiler, 2024).

Peat faces the same treatment; In the U.K. it's a limited resource while in Sweden it's bountiful. The peat legislation in the U.K shows how fast old methods and substrates can be phased out under pressure, though as Atkin points out the new substrates may not be more viable if the transport is long. In Sweden the opinions are divided, some gardeners decide that it's up to them to drive the change by requesting peat-free substrates from the large soil firms, other take the responsibility to find good alternatives, there's also academic investigations such as '*Kompostering i Historiska Trädgårdar och Parker*' by Flinck and Sjöberg, 2024. A subset of the gardeners don't want to take a stance and therefore keep themselves uninformed. Finally there are a few who think it is a question of moderation as there are other more pressing matters and because the horticulture industry stands for a small part of the total peat consumption and that the peat burning is much worse. A majority of the gardeners mention traditional methods and historic substrates as the solution they take their cues from.

Greenslade states that peat wasn't introduced as a substrate until the 30s. Here we see a clear example of how craft skill and traditional knowledge can lead the development of new sustainable, local and organic methods.

Biodiversity is a large and complex topic. The gardeners divide it into three main groups of efforts: "gene diversity", "pollinator-friendly" and "habitat creating". The two botanical gardens Kew and Botaniska both highlight the importance of gene diversity to maintain and preserve biodiversity for the future. The gardeners of Kew and Botaniska spend a large amount of time collecting seeds and cutting back seedheads to hinder cross-pollination. There are also gardens who conduct a lot of international interchange and still conduct collection trips to gather and safeguard material that is threatened by climate change. Moreover, the Botanical gardens work with repatriation to countries which have lost their original plant material, such as the Prunus 'Tai-Haku' at Kew and the Easter Island tree at Botaniska (Davies-Roberts, 2023; Tornevall, 2024).

In Sweden, there is the national scheme POM which highlights the importance of historic gene diversity. Both the Garden Society and the Botanical Gardens of Gothenburg are part of this scheme (Georgii, 2024; Tornevall, 2024). I believe one beautiful example of how simple but conscious changes can highlight the cultural heritage, is the move of the POM roses at the Garden Society from a more secluded spot to the main rosepark (Georgii, 2024), which shows their commitment to the cultural ecosystem service: ***Knowledge and learning*** (C).

At Beth Chatto's Plants and Gardens gene diversity is also important. This garden provides the opportunity to buy uncommon plants that you don't find at the garden centre while educating the visitors on how to find the right growing conditions for each plant, working with the natural conditions instead of against them (Gregers-Varg, 2023).

All gardeners in both countries talk about efforts to attract and feed pollinating insects and other wildlife. For some this is a question of modern methods while others see it as a reason to turn to historic methods. At Aberglasney they have planted an early flowering bulb meadow which gives food to the early waking queens while at Gunnebo they have recreated the historical meadows to provide a sanctuary for both native meadow plants and insects (Atkins, 2023; Lundberg, 2024). Both approaches are thoughtful and cater to different ecological niches that are both important. In terms of ecosystem services, these meadows benefit the supporting services ***space for wildlife*** (S) which in turn favour ***Healthy soil*** (S) and ***Pollination*** (R) by providing food and habitats for insects and wildlife.

The cultural ecosystem services are affected and benefit differently from these two meadow types. The first are ***Inspiration*** (C) and ***Knowledge and learning*** (C), both meadows help teach about biodiversity and meadow type plants, however, the meadow at Gunnebo also teaches the visitors about our Swedish cultural heritage as well as the craft skills behind meadow care which ties into the service ***Place of identity*** (C).

The following graphs present the ecosystem services benefitted by the creation of gardens spaces for the cultural ecosystem services by Naturalistic design– which is the most modern method, using science to create the most hardy and high value pollination flower beds to attract wildlife, Wilding– where man let go of nature and Traditional methods– where we cultivate the land with the purpose of production, e.g. creating meadows, grazeland or coppiced woods, with either traditional or modern tools.

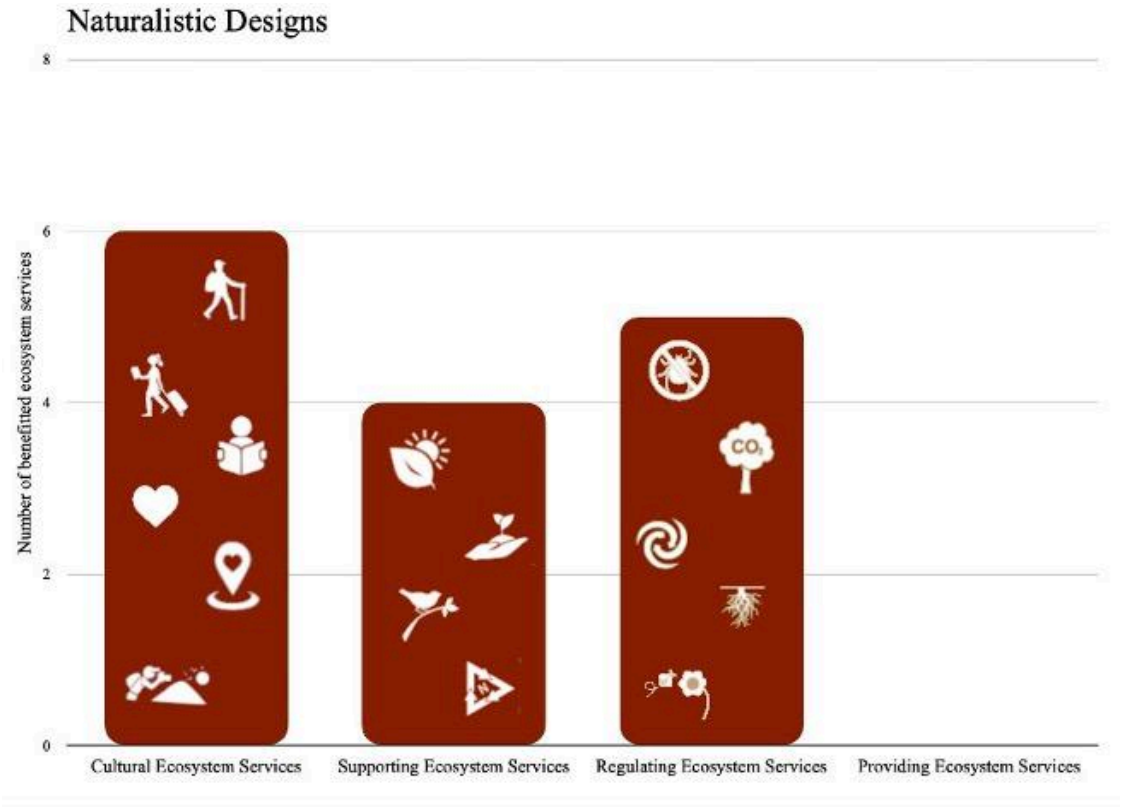

Table 3: *Perceived impact of naturalistic plantings on ecosystem services. The figure shows high scores for the impact of gardeners' choices in methods and practices on cultural ecosystem services, which in turn positively influences the two additional categories on ecosystem services.*

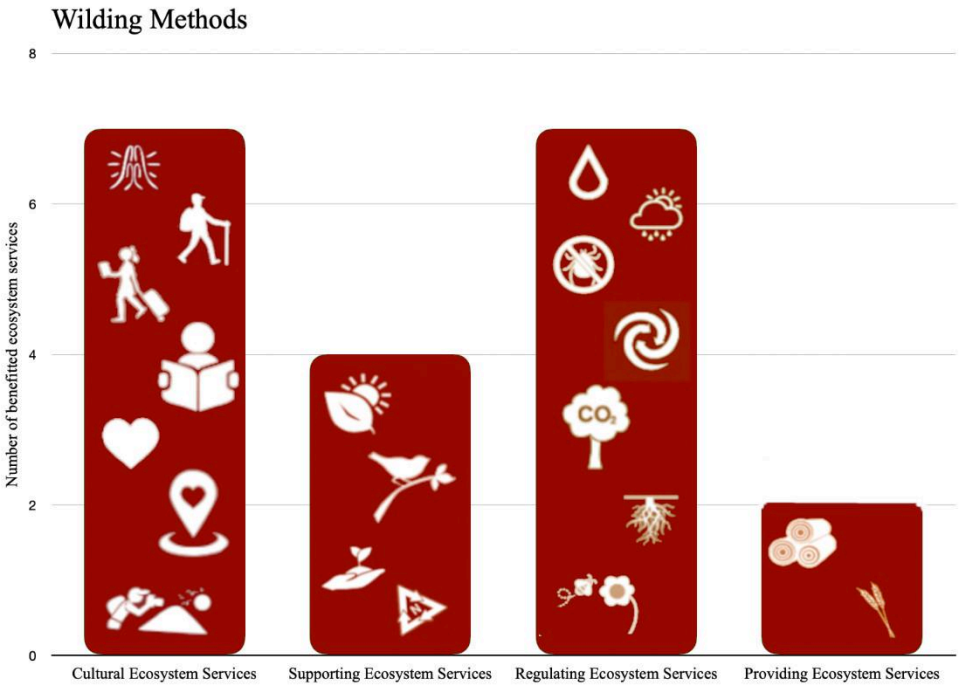

Table 4: *Perceived impact of traditional methods on ecosystem services. Compared to figure 3, the traditional method benefits additional services in the regulating and providing categories.*

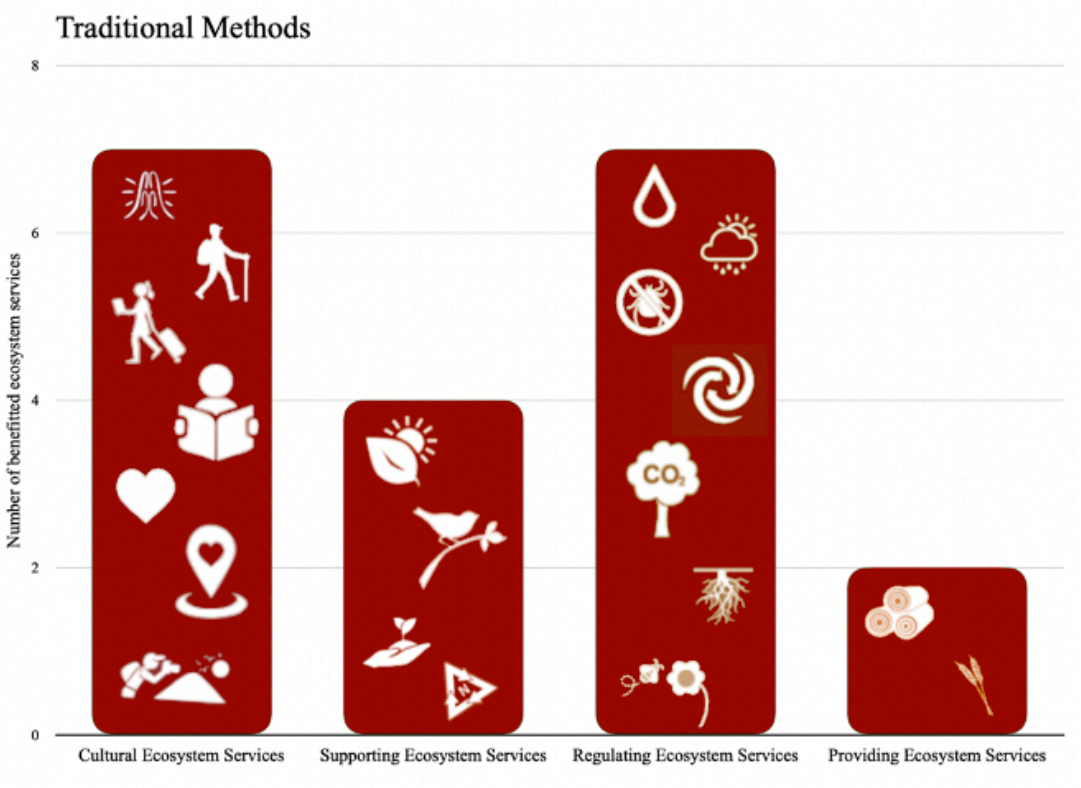

Table 5: *Perceived impact of traditional methods on ecosystem services. Compared to figure 3, the traditional method benefits additional services in the regulating and providing categories.*

The interviews have shown the importance of creating and safeguarding our green heritage, whether it is in the form of historic landscapes or formal gardens. Table 3-5 all show high scores in terms of how the cultural ecosystem services are affected by these methods and practices, which in turn benefits for the remaining categories of ecosystem services.

Looking at examples of cues to care (Nassauer, 1995) through ecosystem services show additional values. For example, veteranisation of trees is a method for safeguarding our cultural and natural heritage by creating ***space for wildlife*** (S). As Davies-Roberts points out, this is also a way to stabilise old trees so they won't have to cut them down which often saddens frequent visitors, therefore this method also benefits the ecosystem service ***sense of place*** (C).

During the results chapter I divided the heritage aspect into cultural and natural. It will be increasingly clear that they are really interconnected as we move into the topic of authenticity, education and influence.

All the gardeners see it as part of their work to answer questions and teach the visitors about different aspects of the garden such as the history, management, biodiversity and plant material. The gardens also identify with being a place for meetings and discussions. Something else all gardeners agree on is that the type of questions they receive is more climate and biodiversity focused, which shows that the garden interested public is more aware and interested in how we work and how they can contribute to a more sustainable world through their own gardens. Another common trend is that visitor numbers have risen since the COVID-19 years and seem to have resulted in a new-found garden interest. Though at the same time the gardeners speak of limited options, for example in buying annual plants as plant nurseries diminish and the average age of gardeners rise. The result also shows the commitment amongst the gardeners to create a space for learning through tours, exhibitions and courses, offered by all gardeners except the closed family owned gardens Iford- and Cothay Manor.By creating space for and working with the intent to benefit the cultural ecosystem services we invite the visitors to a space where other ecosystem services benefit from the gardeners care and maintenance. Here the visitor gains the inspiration and knowledge to start the work at home. When a person understands the value of nature in terms of recreation, education and beauty they are all the more likely to vouch for it.

The next topic I discussed with the gardeners were authenticity, restoration and re-adaptation. The topic of authenticity is closely tied to all other topics and hard to break free. The knowledge and interest each gardener has for cultural heritage shape the way they approach their garden craft. It dictates whether the gardener looks at the biodiversity crisis

and brings out the scythe or plant a compressed naturalistic meadow. Authenticity is also viewed differently in Sweden and the United Kingdom. The way the British gardeners speak of authenticity varies, though they seem to agree that overall atmosphere is more important. While all gardeners know that plant material ages and dies and that this is part of the gardens history the Swedish still have the option of watering extra rare or historically important plants while the british in some instances have to let go of important, large and old species, especially trees, in extreme drought periods (Atkin, 2023; Gregers-Varg, 2023).

Facing these challenges re-adaptation and restoration become important tools. Though it's not always clear which option is better. For built structures restoration is a safe bet, e.g. the Palmhouse at the garden Society is restored back to 1878 but new technology such as humidity, light and heat regulators are installed and hidden in the structures. It's harder to make the decision for living plant material. If the vegetation died due to climate related issues, is it right to start over? We saw at Iford the possibility of safeguarding the original plant material by propagation of Peto's plants (Lannin, 2023). At Aberglasney, Atkin shares his work with finding the balance between conservation and education which is more tied to atmosphere for him. Atkin wants there to be options and asks whether if you represent a garden of planthunters, do you keep the 16th century courtyard clear or do you fill it with an exhibition of exotic plants? (Atkin, 2023).

In the question of tools the gardeners are united. Electrical tools are eco friendly, less noisy and often weigh less than petrol driven. The only downside is the price tag, but as more and more people switch the electric tools get more affordable. Some of the gardeners speak of other values such as the historic soundscape (Seiler, 2024) and the visitor experience from less noisy machines (Georgii, 2024). Using traditional craft methods help safeguard the intangible heritage for future generations and thus benefit the cultural ecosystems such as ***knowledge and learning*** and ***sense of place***. Using traditional methods often comes with a broader understanding for the cultural and natural heritage. For example has meadowcare become popular as seen in the interviews (Atkin, 2024; Georgii, 2024; Lundberg, 2024; Myr, 2024) which leads to maintenance using methods that further benefit the ecosystem services ***pollination*** and ***space for wildlife.*** The following graphs show the impact of traditional and electric tools on ecosystem services.

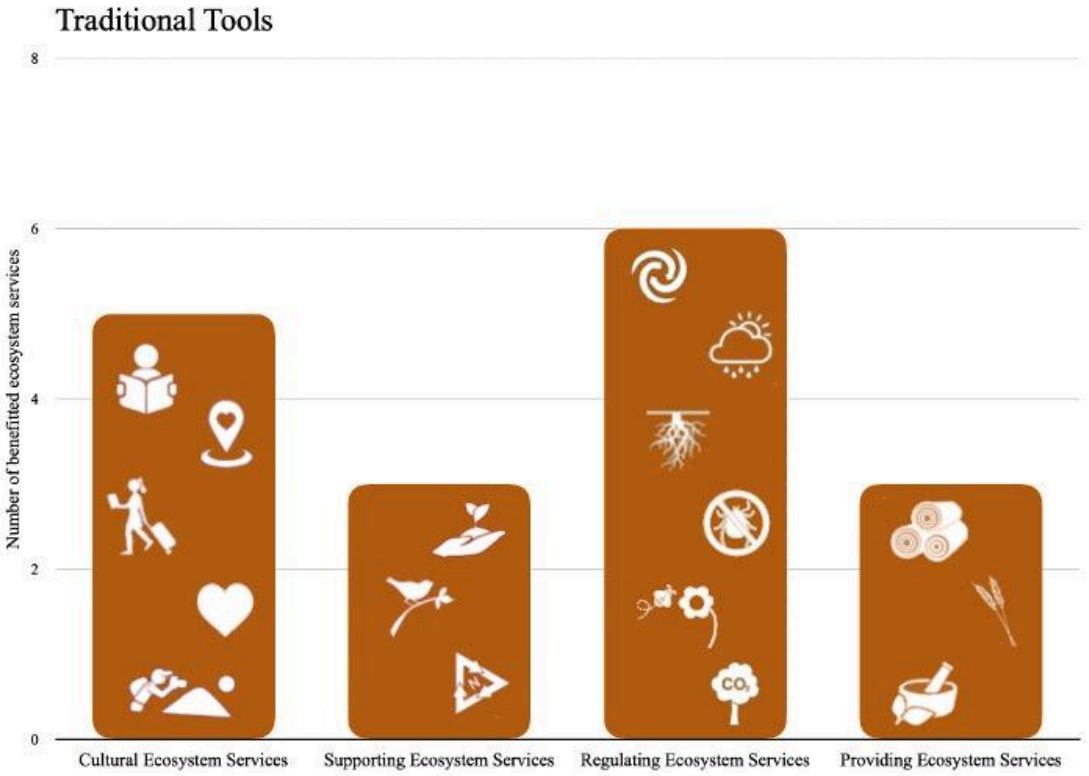

Table 6: *Perceived impact of traditional on ecosystem services. The figure shows how traditional methods can offer additional cultural and environmental benefits.*

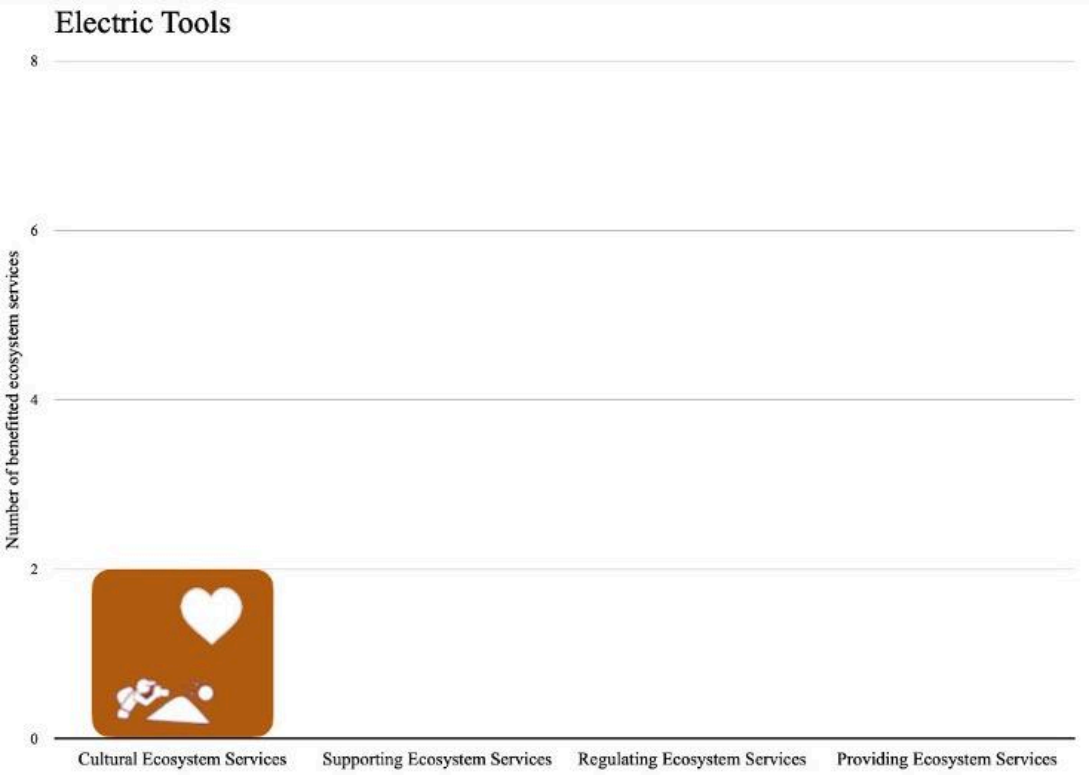

Table 7: *Percieved impact of electric tools on ecosystem services. The figure show low scores in all categories, even though it is perceived as a eco-friendly option.*

These graphs are interesting because electric tools score so low in terms of ecosystem services, even though they are the most widely used by gardeners and seen as the most ecosystem alternative. This shows that in terms of practice, the practicality, effectiveness and ergonomic sustainability is still the most important, and maybe it has to be in many gardens as no gardener should have back pains and injuries. However, it is interesting to see that by turning to traditional tools we inherently turn to traditional methods and norms. If the gardener use a scythe for the lawns instead of a mower, he will cut it less often, promoting a higher biodiversity in the lawn and among the insects that visit the lawn, the longer grass has a higher resilience and also have the opportunity to teach the visitors on biodiversity, climate change and historic lawn maintenance (Seiler, 2024).

The final topic discussed with the gardeners was the role of recent trends such as naturalistic plantings and rewilding in heritage gardens. These modern methods base their style in scientific approaches yielding high pollen and habitats for pollinators and other native species. While the gardens in this study are all heritage gardens and either a botanical garden or representing a certain historic garden era, none has implemented any large naturalistic plantings. However, many of the gardeners have drawn wisdom from the current trend. While some gardens such as Aberglasney, Iford Manor and the Garden Society simply find room for this around the heritage gardens. Making room for these trends benefits the cultural ecosystem services ***inspiration*** and ***knowledge and learning*** (C). By explaining the importance of creating a more-than-human space to the visitors, the ‘modern’ trends are also heavy punchers for supporting and regulating ecosystem services. Different ways these trends materialise in the gardens include: leaving plants over winter as interesting visual structures, which many U.K. gardens found new while the Swedes have long used this method. Another method is creating habitats and food for wildlife such as the butterfly hill at the Garden Society with sand beds for the bees and creating tight plantings with high pollination values inspired by the naturalistic gardens. Furthermore, native species are allowed to take more space as important host species for pollinators and other insects.

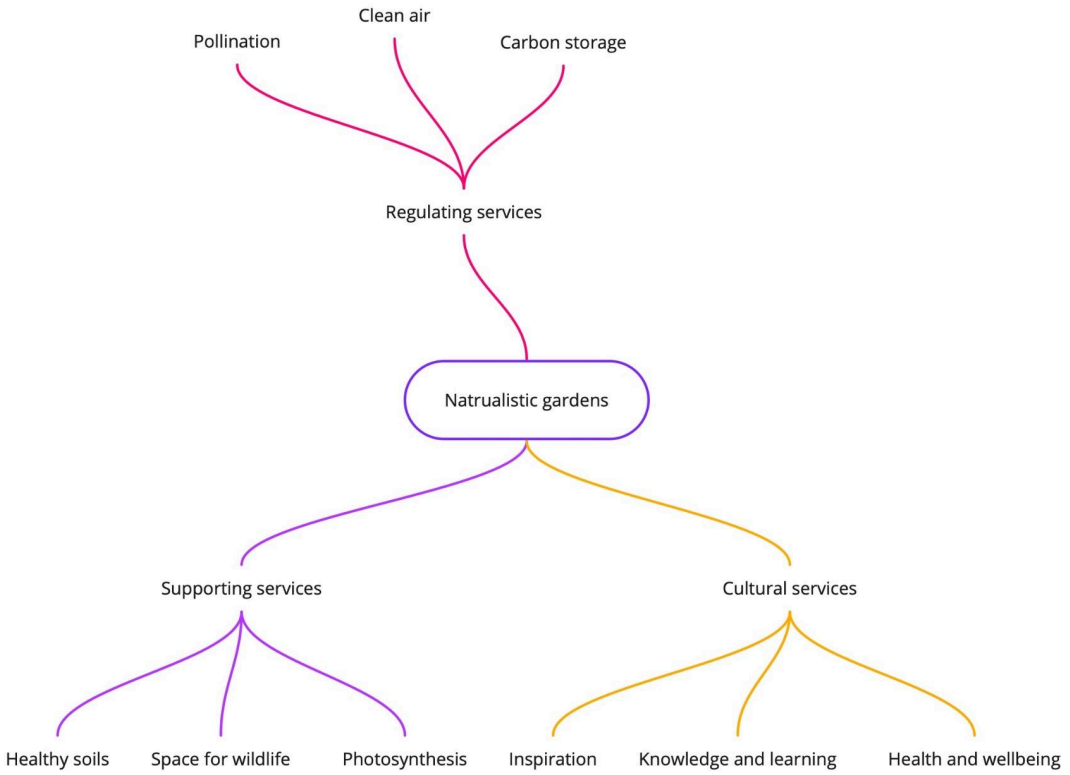

Figure 18: *Connection between ecosystem services.*

In this chapter we have seen that each gardeners' decisions and practices for heritage gardens affect the ecosystems growing inside them, and how important craft skills are to consciously work with learning and opposing dated norms. Furthermore, we see the possibility of highlighting and improving ecosystem services that can impact the multifunctionality of the ecosystem as a whole in a positive manner. Overcoming these challenges, the gardeners see additional benefits of changing their methods, such as lower maintenance and cost-effectiveness (Atkin, 2023; Greenslade, 2023).

7.3 Perspectives

We have seen it is hard to keep the Natural Heritage and Cultural Heritage apart as each of the ecosystem services benefits other parts of the ecosystem. By applying conscious effort to benefit the cultural ecosystem services the positive impact further overflows into supporting, regulating and providing ecosystem services. In embracing the concept of Natureculture, we view the process as a collaboration between humans, soil, water, plants, animals, air, microbes, trees, insects, and climate, as suggested by De Jong (2023). The interviews show the importance of culture as a driving force in protecting our heritage gardens and other

greenspaces, and how nature itself strengthens our cultural expression and human experience in our living environment.

Finally, I want to acknowledge the relationship between my two theories: cultural ecosystem services and natureculture. Ecosystem services as a framework have received much critique for being human-centred and focusing on what man gains from nature. It is in itself anthropogenic. On the other hand, natureculture positions humanity as part of nature, in which humanity doesn't stand above other species. Depending on which stance we take when we visit, manage and teach about our gardens we get different answers to how we are connected to and what our responsibilities are towards the more-than-human environment.

By choosing to see humanity as part of nature, I believe we get a more holistic understanding, where what we do in nature, and thus our gardens, doesn't only affect and potentially harm other organisms but also ourselves. There is not only culture or only nature. There is natureculture.

7.4 Further Research

It would be meaningful to work with heritage gardens with larger differences in economic means and investigate how this affects the mindset and prioritisation of sustainability and authenticity.

This essay ended up being broad, where many topics were brought up to show the interconnectedness between the gardeners' craft, current research and the climate crisis. There is more interview material that never made its way into the essay, each topic could thus be further extended and considered from different perspectives.

8. Conclusion

My goal in this study was to conduct a bottom-up study, exploring how gardeners' practical knowledge shapes sustainable development in the field and their firsthand knowledge of caring for natural and cultural heritage. I also wanted to look at how challenges around lacking resources in the form of economy and sustainable options affect the management of heritage gardens. Finally, I wanted to look at how the knowledge of gardeners transcends the gardens' borders and educates visitors and shapes norms.

The interview result was presented as a total of eight different titles where the first four, *Pesticides, Herbicides and Natural Alternatives*, *Water Use and Drought Management, Soil Health* and *Biodiversity* were grouped under the main title *The Natural Heritage* while the remaining four: *Education and Influence, Authenticity, Restoration and Re-adaptation, Tools: Traditionality, Green Energy and Craftsmanship* and *Naturalistic Gardens and Modern Methods* under *The Cultural Heritage.* Though this was a magic trick, as the discussion has shown, because the two are interconnected as one natureculture. By applying the natureculture mindset we allow for continuous collaboration with nature, where human history and expression create our living environment in collaboration with the more-than-human counterparts. This is also the answer I want to give to my first question; *How do the gardeners in heritage gardens cultivate natural heritage and cultural heritage?*

The second question I investigated was; How do current trends and changes in norms, such as sustainable and ecological practice, rewilding and naturalistic gardens impact the work and methods in heritage gardens?

Here I had the chance to explore how tradition, norms and mindset manifest in each garden, and while I can't speak for gardens not presented in the thesis, there are undeniably different underlying standards in each nation. In the British gardens leaving winter interest to better accommodate wildlife through winter is currently trendy. To promote biodiversity and rewilding, it took a big societal change such as the pandemic to make both gardeners and visitors slow down long enough to give it a real chance. Greenslade at Hestercombe speaks of their newfound national initiative "No mow May" which the gardeners like and decided to expand to "Check it off June" and "Just don't bother July". After trying it and seeing the effect it has on wildlife the British have given up old traditions of putting the garden to bed in fall for the winter by cutting back plants as early as October and November (Greenslade, 2023). As I lift these trends with the Swedish gardeners they have a few comments, they have never had the time to cut back everything, that is the work for early spring, they are also

careful to leave things they know benefit wildlife, such as rosehips or nesting material (Löfstrand, 2024; Georgii, 2024). The Swedish gardeners seem to have a larger freedom to try new ideas and have long ago started to lean into what contemporary research says about biodiversity and wildlife.

Another trend that's gaining more and more traction is rewilding. While the trend is new, the ideas and management methods it promotes are traditional methods and at times historic ones. The gardeners take lessons from rewilding, in particular, habitats for wildlife and promoting gene diversity, but only Gunnebo approaches rewilding seriously in restoring the historic grazing landscape around the park to safeguard the wide-crowned oaks standing here. Rewilding may have greater potential in large parks than urban gardens, but as Gunnebo shows, it doesn't have to be a complicated process, and it doesn't have to be a new trend, it can be learned from the past.

Hand in hand with rewilding are naturalistic gardens. This garden style has slowly grown to be the most popular due to big stars such as Piet Oudolf and Nigel Dunnett. While only the Garden Society and Aberglasney have adopted naturalistic plantings, which are situated outside the historic garden, all gardeners are conscious of the importance of choosing the right plants, which offer high pollination value and prolong the season as springs and autumns get milder. The discussion around the importance of native species also relates to the naturalistic plantings. As stated in the discussion, the gardeners approach this based on the type of heritage gardens and personal preference, some prefer the modern and scientific methods while others see it as a reason to turn to historic methods. Here we can look back to natureculture again. Is the meadow and naturalistic plantings equally supportive of nature or is one more "scientific" and controlling of nature? Or, could consciousness of choice be enough to treat our ecosystems with the care and respect they need?

While I feel myself leaning further into natureculture and romanticising traditional methods I am still aware of how much lighter electric tools are for my body, that the ecosystems and their inhabitants are continuously changing due to climate change and that there simply are fewer resources in today's political climate than a few years ago. Therefore, I can not acknowledge any of the methods as right or wrong, but rather the urgent need to discuss these methods between gardeners and demand financial and sustainable options for the many challenges discussed throughout the study. The study shows that mindset and norms are important guidance for the gardeners and that when new knowledge of biodiversity and climate change become available trends are one way to reach gardeners to challenge old traditions and norms.

The final question of the study is; How can cultural ecosystem services improve the multifunctionality of ecosystems in heritage gardens? In the theory chapter, I hypothesised that by highlighting areas of interest where a focus on cultural ecosystem service could impact the multifunctionality of the ecosystem in a positive manner in the context of heritage gardens. In the results we see how creating and benefiting cultural ecosystem services in gardens, through courses, creating space for relaxation, inspiration and spiritual connection and tourism, also benefit the other categories of ecosystem services. However, an important lesson is that it's not black or white. As we saw in the discussion both chemical and organic pest control benefit the cultural ecosystem service, but only the organic alternative benefits the other ecosystem services. Therefore while benefiting the cultural ecosystem services is one guidance in the care of our ecosystems, we have to be considerate and careful in which methods we use to benefit them, taking our responsibility to find well-rounded and sustainable options. Furthermore, ecosystem services can be a strong argument in promoting garden practices that help us build resilient greenspaces that slow climate change effect on heritage gardens. This model easily visualises the many uses of each greenspace and shows the multitude of benefits derived from protecting and promoting cultural ecosystem services.

As a final reflection I want to share my own learning journey. When I presented my findings from the interviews with the British gardeners together with Joakim Seiler at the BICCS Conference in September 2023 I presented figure 19, where the natural and cultural heritage stood as opposites with the economic sustainability as the arbiter.

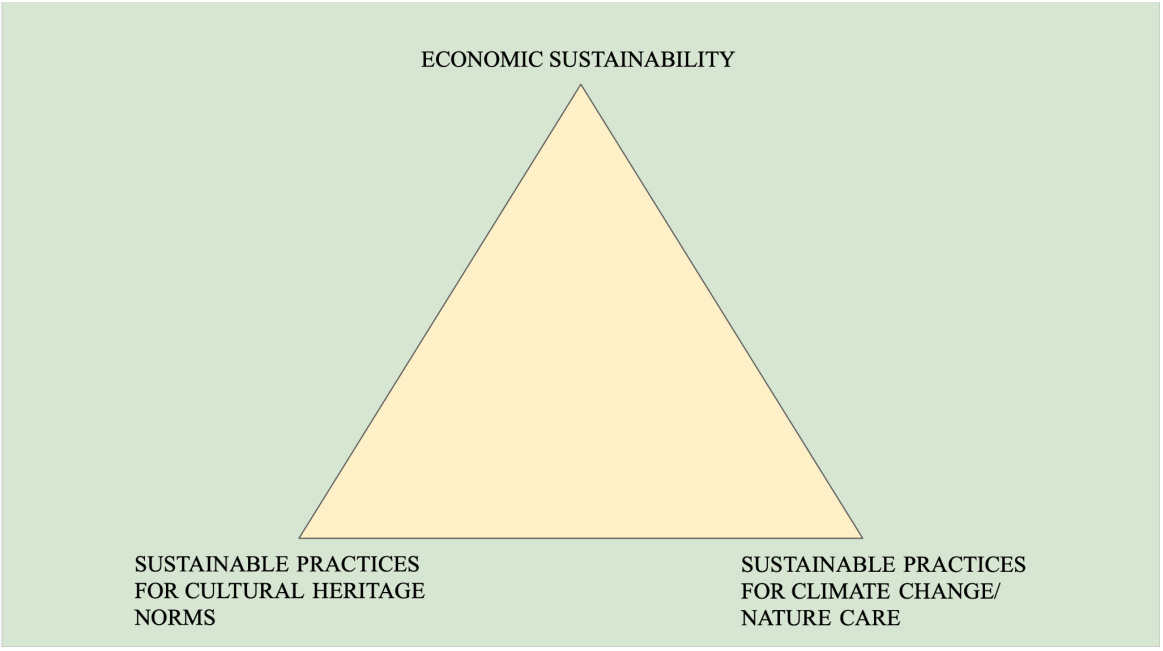

Figure 19: *Powerpoint presentation BICCS, depicting the sustainability triangles.*

During my study, I've come to find that there is no triangle but two circles overlapping in the middle. As the discussion showed, the idea that benefitting cultural ecosystem services – and thus the cultural heritage as a whole– overflows into positive outcomes for the natural ecosystem services, green heritage and climate change efforts.

Figure 20: *My original understanding of how Cultural Heritage Conservation and Nature Heritage conservation overlap.*

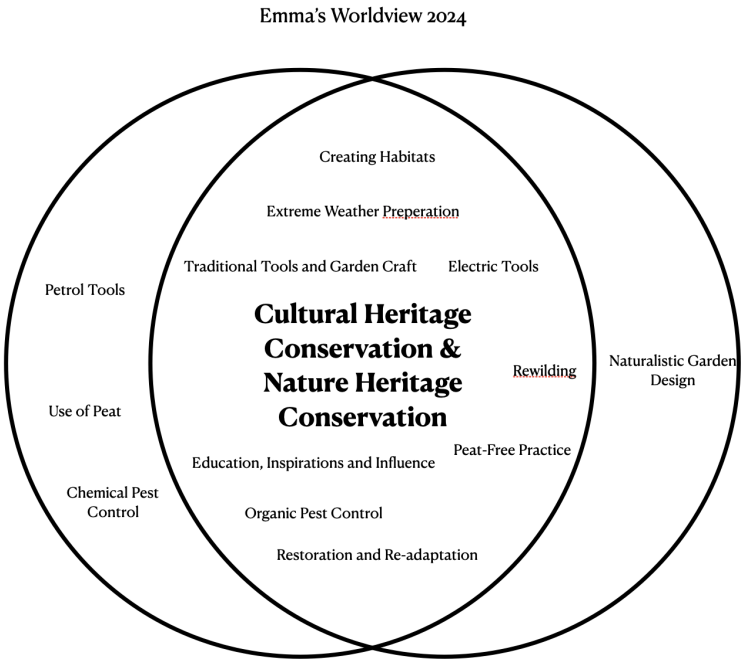

Figure 21: *My new understanding of how the circles co-exist and influence each other.*

What we see above does not represent only my journey but the development of a more sustainable and responsible gardening sector as a whole, where norms and practices are changing to better accommodate nature and create resilient but beautiful gardens in the face of the climate crisis. In Figure 20 I first associated the Cultural Heritage circle with exotic plants, completely weed free borders and petrol driven tools and machines. The Nature Heritage Circle wasn't a garden at all but rather protected nature like national parks and nature reserves.

During my study and master's years, I met and conferred with 19 gardeners, had the chance to work alongside them and continued my career as a gardener during the summer break. These experiences and in-depth discussions have broadened and shifted my view, as represented in Figure 21. Through discussion and analysis, it is clear that both the natural and heritage conservation aspects are needed in all heritage gardens. This showcases why it's problematic with the outdated dichotomy between nature and culture, where future visions, management, resources and funding aren't planned from an inclusive and collaborative standpoint.

Wordcount: 29,967

9. Summary

In this essay I have interviewed and worked together with a total of 19 heritage gardeners to collect and document their expert knowledge and experience. These gardeners represent the craftsmen facing the challenges of climate change in heritage gardens everyday. A total of nine different gardens have been represented. The first six are situated in the southern parts of the United Kingdom: Aberglasney gardens, Beth Chatto's Plants and Gardens, Cothay Manor's gardens, Iford Manor Estate, Hestercombe House and Gardens and the Japanese Gardens at Kew Gardens. In Sweden the three gardens are situated in the greater Gothenburg area: The Botanical Garden of Gothenburg, Gunnebo House and Gardens in Möndal and the Gardens Society of Gothenburg.

During the course of the study I have investigated the following questions: (1) How do the gardeners in heritage gardens cultivate natural heritage and cultural heritage? (2) How do current trends and changes in norms, such as sustainable and ecological practice, rewilding and naturalistic gardens impact the work and methods in heritage gardens? And (3) How can cultural ecosystem services improve the multifunctionality of ecosystems in heritage gardens?

I conducted semi-structured interviews with all of the gardeners but also had the opportunity to do participant observation at Aberglasney Gardens, Cothay Manor, Gunnebo House and Gardens, the Garden Society of Gothenburg and the Botanical Garden of Gothenburg.

I used the theoretical framework *Ecosystem services* from the UN-led Millennium Ecosystem Assessment 2005 and *Natureculture*. These frameworks are also compared to one another to see how following the ideas of each of them may influence the gardener's work and approach to nature. Eight main themes have been presented in the results divided into two groups, the Cultural Heritage and the Natural Heritage. The first theme presented was *Pesticides, Herbicides and Natural Alternatives*. The gardeners in the U.K. employ pesticides and herbicides both indoors and outside, though all are hoping to limit the use of chemical pest and weed control. The Sweden gardners' limit the use of chemical sprays, both Gunnebo and the Garden Society are completely organically managed and Botaniska only uses it as a last resort in the greenhouse. The study shows the importance of norms and mindset in these questions. The gardeners in the U.K. feel they must follow higher standards which they can only manage using pesticides and herbicides as there is not enough time or staff to complete

otherwise. In Sweden the regulations of glyphosates help guide the use of chemical sprays and the gardeners have found other sustainable solutions.

The next theme we discussed were *Water Use and Drought Management,* informed by my own work as a gardener. The summer of 2023 in Gothenburg started warm and dry, followed by extreme rainfall into autumn. Recent winters have also been mild and wet. In response, Swedish gardeners at Botaniska, the Garden Society, and Gunnebo are focusing on infrastructure improvements and smart water management. At Botaniska, Irvine highlights ongoing drainage improvements since 2013, including a delay reservoir for water storage. The garden benefits from clay soil, which helps during droughts, and employs strategic watering practices. Similarly, the Garden Society is constructing raised beds for delicate roses and using automatic irrigation systems.

In contrast, British gardeners at Beth Chatto's and Iford Manor are adapting to increasingly extreme weather with different strategies. Beth Chatto's garden, facing hotter and drier summers, relies on well-drained soil and drought-resistant plants. However, the garden has suffered significant tree losses due to drought. Gregers-Varg at Beth Chatto's emphasises the challenge of balancing water use, particularly since irrigation was discontinued in 2022. At Iford Manor, Lannin faces a dilemma: adapt the garden for sustainability with enhanced drought and flood resistance or maintain the original design for authenticity. The British gardens are grappling with more frequent heatwaves and mild winters, pushing them to rethink traditional garden designs and plant selections. The approaches reflect each region's specific climatic challenges and how we need both short-term and long-term solutions.

The UK has implemented a national ban on peat for horticultural use, effective by 2024. This legislative push has forced British gardeners to find peat alternatives more urgently. At Beth Chatto's Gardens, Gregers-Varg has been experimenting with peat-free soils for years, though challenges remain in finding the right mix for various plants. The garden uses council-collected green waste as mulch. At Cothay Manor, Myr has adopted SylvaGrow, a peat-free substrate endorsed by the RHS. Similarly, Hestercombe Gardens is transitioning away from peat, despite challenges with traditional planting schemes. Iford Manor focuses on using their own compost mix for propagation, minimising the need for peat.

In Sweden, the Garden Society seeks peat-free options but faces challenges due to low demand and limited availability. They are experimenting with biochar and pumice stone mixes to improve soil quality. Gunnebo is transitioning from peat, with experiments in leaf

composting and soil mixtures to reduce peat dependency. At the Botaniska peat is still used but together with their on-site made compost.

In Sweden the change is coming from the gardeners themselves by asking for peat-free options from the soil companies or by developing alternative substrates themselves.

The final theme in the Natural Heritage was *Biodiversity*. The gardeners divide it into three main groups of management methods: “gene diversity”, “pollinator-friendly” and “habitat creating”.

The botanical gardens of Kew and Botaniska emphasise the critical role of genetic diversity in maintaining and preserving future biodiversity. Gardeners at these institutions dedicate significant effort to collecting seeds and cutting back seedheads to prevent cross-pollination. Additionally, the botanical gardens engage in international exchanges and collection trips to protect material threatened by climate change.

In Sweden, the national program POM underscores the significance of historic genetic diversity, involving institutions like the Garden Society and the Botanical Gardens of Gothenburg. Similarly, Beth Chatto’s Plants and Gardens prioritises genetic diversity, offering visitors rare plants and education on appropriate growing conditions.

Gardeners in all countries are committed to attracting and supporting pollinating insects and other wildlife. While some adopt modern techniques, others revive historic methods. For example, Aberglasney has established an early-flowering bulb meadow to feed early-waking queens, and Gunnebo has recreated historical meadows to support native meadow plants and insects.

In the Cultural heritage chapter the first theme was *Education and Influence*. The gardeners share how it is part of their work to help the visitors and make it a better experience for them. The gardeners inform and educate on topics such as cultivation, biodiversity, climate change and the heritage aspects of their gardens through social media and guided tours.

Authenticity, Restoration and Re-adaptation touch both on what to do when a garden is lost and overgrown but today's challenges are closely tied to climate change. In the U.K. the gardeners main challenges are due to extreme drought that result in loss of large plantations and even trees. This seems to be an ongoing discussion, where gardners’ agree that it’s not sustainable to replace vegetation that can’t handle the current climate, but what do we do about the authenticity? In Sweden we prioritise watering what’s important while the U.K. are more open to redesign the area and instead aim to preserve the atmosphere of the garden.

On the topic of tools the gardens all agree that switching to electric is more sustainable both in terms of energy use, pollution and for the body of the practitioner as these tools are lighter and more quiet. They also add to a more pleasant experience for the visitors. At Gunnebo they use traditional tools to safeguard the traditional knowledge and provide an educational and pleasant visit to the visitors, providing a historic soundscape.

Finally I discussed the topic of trends, namely rewilding and naturalistic gardens. The interviews show that mindset and norms are important guidance for the gardeners and that when new knowledge of biodiversity and climate change become available trends are one way to reach gardeners to challenge old traditions and norms.

This study explores why it's problematic with the outdated dichotomy between nature and culture. The study showcase how a lack of understanding for the interaction between gardens and the more-than-human hinder future visions, management, resources and funding to be planned from an inclusive and collaborative standpoint. Further it shows how norms and mindset play an essential role in the management of heritage gardens and how trends may help us break out of old traditions in favour of biodiversity and climate adaptation.

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