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Introduction to Environmental Horticulture: Issues and Future

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Key Questions

- What is environmental horticulture?
- What is urban green infrastructure?
- How does environmental horticulture differ from conventional ecological thinking and concepts?
- What is meant by native and non-native flora – what are the potential problems associated with defining plant populations by national/political boundaries?
- What might you consider as 'ethical' and 'non-ethical' planting?
- What are some of the challenges that the environmental horticultural profession faces?

1.1 Defining Environmental Horticulture

This chapter attempts to put environmental horticulture into context. What are the core values of this discipline? Where does it come from? Where does its future lie? The expression 'environmental horticulture' first begins to appear in the literature and educational course terminology in the 1980s, particularly in North America. It is gradually adopted as a term for the subset of horticulture that is concerned with the use and management of plants in public and semi-public environments. In some parts of the world it replaces the term 'urban horticulture', although in many cases these descriptors co-exist for long periods of time, and in essence cover the same territory. In the UK, the words 'environmental' and 'urban' never really catch on as course descriptors, with the much older term 'amenity horticulture' tending to persist right up to the present day. These days in North America and elsewhere, 'landscape horticulture' is often the preferred term used to cover the planting and maintenance of landscape plants in public or private space.

At one level these terms are just about marketing and branding, trying to present a modern, culturally responsive face to compete in the educational marketplace for students. At another level these newer names signify changing ideas within this branch of horticulture. In the UK the term 'amenity

horticulture' first emerges in the 1970s to denote the horticulture that is concerned with public and semi-public landscape spaces, as opposed to various forms of crop production. This particular term develops at the same time as recreation and leisure management and reflects a view of the world where this strand of horticulture exists to provide leisure or amenity benefits to citizens through the cultivation of plants in public landscapes (largely urban) visited by the public. The 1970s and 1980s witnessed substantial changes in how horticulture interacted with plants in public spaces. The emergence of landscape architecture as the dominant design discipline in public spaces greatly reduced the role of horticulturalists in plant use decisions, particularly on new build, or other capital intensive projects. There were also significant changes within, for example, local authority parks departments, which led to a diminution of horticultural ambition and capacity.

The first of these changes in the UK were a result of the Bains report (1972) which identified just how inefficient the delivery of many local authority services were, including parks. This led to experimentation with new forms of service delivery that has continued because of changing political philosophies, up to the present day (Byrne, 1994). The first of these was the shift from the standard day

labour model, an approach modelled on the hierarchical organization of private estates of the landed gentry in the 19th century towards incentive bonus schemes. The former traditional organizational structures are based around chains of command, designed to highlight who is responsible for what, whilst developing horticultural skill. These systems did not necessarily maximize work rate, and hence the Bains report led to incentive bonus schemes. These were derived from 20th century industrial work study and placed much more emphasis on productivity; all tasks were allotted a time tariff for how long it should take to complete them. Staff received bonus payments where they demonstrated they had undertaken these tasks more quickly than the tariff. This attempt at modernization of service delivery also involved new forms of organization; horticultural service providers ceased to be fully in charge of their own future, in many cases becoming components of much larger departments, concerned with amenity and leisure in a much broader context. These changes can be seen in the marked shift in the content and tone of the articles published in the *Parks and Recreation Journal* in the UK during this time; from being dominated by detailed horticultural matters to much greater emphasis on the ‘management of the recreational experience’ in which horticulture becomes a relatively minor part.

With the benefit of hindsight, incentive bonus schemes proved to be unsuccessful in improving productivity in a way that was useful, with a tendency to be highly bureaucratic and to corrupt work priorities by favouring tasks that attracted the highest bonus payments.

In other parts of the world, such as North America, which have different horticultural traditions, based less on the gardenesque style of park of 19th century Britain, urban horticulture develops in the 1970s. From the personal perspective of the author, at this time, urban horticulture seemed more modern in its perspective. The name explicitly recognized that *urban* places were often more biologically challenging places in which to grow plants than were ‘gardens’ or ‘green sward parks’. This was due to, for example, higher levels of atmospheric pollution, soils destroyed by engineering and construction activities, sealed surfaces, changed urban climatic regimes, and sometimes hostile social contexts such as vandalism and other forms of antisocial behaviour. Urban horticulture also explicitly made connections with the human social,

cultural and psychological realm. Horticulture is engaged in and practised because it can make us feel better about our lives; it provides complex stimuli in both time and space that constructively moderates the fundamentally highly artificial experience of living in cities. In cities (and indeed in rural areas too), horticulture, whether practised by green-space professionals or home gardeners, is likely to provide the most immediate experience of ‘nature’, the patterns and processes associated with interactions between the physical world of our planet and the living organisms that have evolved in response to this.

Environmental horticulture is intrinsically linked too to the management of urban green space or green infrastructure, although these terms (see [Box 1.1](#)) may encompass woodland and other less intensively managed areas. As such they may not be the exclusive ‘domain of the horticulturalist’.

What about ‘environmental horticulture’? The exact origin of this term is uncertain, but it seems to represent an attempt to reposition horticulture to become more open to many of the ideas that developed from the 1990s onwards about biodiversity and ecological processes as well as the previously discussed human-centred ideas. In countries where the emergence of ecological consciousness had begun to lead to a wedge between ecological and horticultural thought, environmental horticulture provided a new paradigm whereby the practices involved in cultivation could be applied to systems that might, for example, consist of entirely native plants that would be seen as appropriate by ecologists. There is also an undercurrent that environmental horticulture should and does embrace more ‘environmentally benign’ actions and procedures that conform to an environmentally sustainable agenda. This includes reduced use of pesticides, use of biological control methods and seeking alternatives to peat and other ‘non-sustainable’ resources. Environmental horticulture has also been linked to ecosystem services, and the ability to deliver benefits to humans through the use of plants. This is particularly relevant to an urban environment, where ‘horticultural’ landscapes and plantings may be used to regulate water flow, improve water quality, alter microclimate or provide cultural services through opportunities for education, physical exercise, contemplation or creativity. Although environmental horticulture is not large-scale commercial field crop production, it does embrace food/human linkages through the likes of community gardens, allotments, edible walls and guerrilla gardening.

Box 1.1. What is meant by open space, green space and green infrastructure?

Open space is any open piece of land that is undeveloped (has no buildings or other built structures) and is generally accepted as being accessible to the public. Typical open spaces are school playgrounds, public squares and plazas, pathways, public seating areas, and vacant areas of even brownfield (ex-industrial) sites.

Green space is a form of open space. This is land that is partly or completely covered with grass, trees, shrubs, or other vegetation. Green space includes parks, community gardens and cemeteries. Green space, however, also comprises land that may not be always open to the public, such as private gardens and certain sports facilities, e.g. golf courses or soccer pitches.

Green infrastructure is the term used to combine different forms (typologies) of green space and is often used in conjunction with urban green spaces, i.e. as a juxtaposition to built (grey) infrastructure. It implies a matrix of green spaces and typologies, and increasingly one that is intentionally or strategically planned. It also alludes to the services such spaces should provide to local (human) populations. This includes its role in housing and economic growth, the regeneration of urban areas and the protection (or creation) of environmental assets and the underpinning of the sustainability of a town or city.

Natural England, the Government body in England, UK, tasked with nature conservation and the management

of National Nature Reserves defines green infrastructure as: 'a network of multi-functional green space, both new and existing, both rural and urban, which supports the natural and ecological processes and is integral to the health and quality of life of sustainable communities'.

Included within green infrastructure typology are:

- Natural and semi-natural urban green spaces
 - woodland and shrubs, grassland (e.g. downland and meadow), heath or moor, wetlands, open and running water, wastelands and disturbed ground, bare rock habitats (e.g. cliffs and quarries)
- Parks and gardens
 - Urban parks, country and regional parks, formal gardens
- Amenity green space
 - Informal recreation spaces, housing green spaces, domestic gardens, village greens, urban commons, pocket parks, other incidental space, green roofs, green walls
- Green (and blue) corridors
 - Rivers and canals, including their banks, road and rail corridors, cycling routes, pedestrian paths, bridleways and other rights of way
- Other areas
 - Allotments, community gardens, urban farms, cemeteries and churchyards

1.2 Horticulture Involves Human Agency

Whilst environmental horticulture covers a wide range of theoretical and practical territory, at its core lie the same practices and understandings of cultivating plants to achieve clearly defined goals. Implicit in the idea of cultivation is that human decision making, 'agency', is consciously applied, both as thought and action. This agency may vary from being very occasional through to frequent, but potentially significantly impacting the life of a given plant and/or synthetic plant community that it is part of. This agency process often commences through making decisions on which plants can be used in which environment, indeed in a rational world environmental conditions of the planting site should be one of the main factors in plant selection, and this is discussed further subsequently in this chapter. Agency is applied in varying degrees to different circumstances, often involving the

manipulation of water, nutrients, light and physical removal of plant tissues to control the rate and form of growth, the degree to which plants flower and fruit, and how plants are likely to be perceived by people. The use of these manipulation levers can be either intensive or extensive, sophisticated or crude, i.e. there are inherent gradients across which decision making can or must be made, depending on the needs of the location or context, and the resources that are available to decision makers.

At the low intensity end of the spectrum rather blunt forms of management, such as the non-selective cutting off of plant parts, may be used to nudge a plant or a plant community in a chosen direction. This issue of choice and decision making is critical to understanding the horticultural mindset. Within horticulture, choice, agency, or decision making, call it what you will, is seen as an intrinsic

part of the process; essentially as a ‘good’, whilst recognizing that no one input or outcome is appropriate in all situations.

Environmental horticulture and relationships with pure (purist) ecology

The involvement of human agency within environmental horticulture is the prime distinction from parallel disciplines that are concerned with plants, for example conservation ecology or restoration ecology. Depending on who is practising these activities, and in what context, there is also a gradient in terms of how much human agency can be applied, but in general it is much less in total, and often restricted to forms of management which work to kick-start or direct an ecological process, for example, increasing light at ground level in a plant community to benefit particular species by canopy removal. These processes inevitably disadvantage some species in order to benefit others. There are winners and losers, at least temporally.

Horticulturalists tend to find this a little disturbing; in the horticultural paradigm there is a desire to achieve some form of equivalence of benefit, i.e. managing in order to avoid the creation of obvious losers. This notion of ‘care’ is much more remote in conservation ecology or restoration ecology than in environmental horticulture, even when the latter are practising these same activities. Indeed, because these former disciplines are philosophically deeply rooted in the idea that human agency typically corrupts or damages the organisms and processes that we call nature, they are fundamentally uncomfortable or even hostile to the application of human agency to vegetated systems. This is most strongly developed in large, recently settled (by Europeans) countries with a strong ‘wilderness construct’. It is least developed (but still present) in countries with a long and obvious inter-relationship between the natural vegetation and people through various forms of low intensity agricultural exploitation and management.

Within ecological science dialogues, ‘gardening’, i.e. the intense and prolonged application of agency to plants, is often used as a pejorative, rather than a positive concept. These polar views explain why traditional ecological science is sometimes philosophically uncomfortable with the horticultural utilization of plants; it seems at best pointless and at worst almost decadent.

Horticulture, by contrast, is not at all embarrassed by human agency; it recognizes that human

beings can obtain great pleasure and sometimes much deeper psychological states such as meaning, through application of their own agency and that of others. By adding another trophic level of interaction (human agency) to the ecological food web, it is possible to achieve endpoints that are impossible through the rather narrow and blinkered processes that underpin conventional ecosystem development. Within the limits of what is possible, horticulture can choose, it does not have to be insular and dogmatic!

But choose what? Within ecology and botany, the development of increasingly comparative taxonomy linked to effective field survey and vegetation sampling from the early 18th century onwards, allows the construction of reliable lists of the native plants that make up the plant communities of a given region. These lists or ‘floras’ do, within a strictly ecological view of the world, circumscribe our choices for us. Deviation from these lists, in terms of species selection, is increasingly seen in the contemporary world of biodiversity as inappropriate, unethical or even plain ‘bad’. In the ‘wilderness’ countries recently settled by Europeans – such as the USA, Australia and New Zealand – this process has been in operation to some degree since at least the 1970s, but is increasingly prevalent even in long-settled countries as a result of biodiversity legislation effected through the planning process.

What genotypes should be planted?

For any given planting site the range of plants prescribed by the natural distribution of native species as a result of ‘natural’ ecological processes is often relatively small. In the UK for example, if the planting site was the whole of the British Isles, it would correspond to approximately 1100 native species. If a county was chosen, for example Northumberland, plant genotypes native to the area would decrease to about 1000, not much of a drop, because in small countries many species are found across the entire territory. If, however, a heavily shaded planting site in woodland in Northumberland was the chosen area, and hence required heavily shade-tolerant understory plants, the number of native species would fall to <300. If the criterion was then applied that the plants chosen had to be particularly attractive to human beings, this number would fall to <30. Continuing the interrogation that any species identified needed to be in flower or otherwise attractive in autumn, the numbers would drop to almost zero.

Hence in the Northumberland context, if one wanted to use species that flower in autumn, it would have to be accepted that this is simply not possible or one would have to look to the floras of other locations, where in response to local evolutionary pressures, plants exist that do what is desirable. In climates where summer rainfall is very high, a niche is created for some woodland plants to flower in autumn because the soil is moist enough to support this and there is less competition for pollinating insects, hence a genotype such as the eastern North American *Aster divaricatus* could be utilized. There will nearly always be a series of locations elsewhere in the world with a climate analogous to that of the site that needs to be planted, each with its own distinctive flora that is sufficiently fit to grow well on the designated site. For Northumberland, one looks to the montane species of western China and Japan, western and eastern North America. This larger pool of species throws up choices such as *Actaea racemosa*, *Aster divaricatus*, *Heuchera villosa*, *Rudbeckia fulgida* (all North America), *Begonia grandis*, *Impatiens omeiana*, *Saruma henryi*, *Nipponanthemum nipponicum*, *Saxifraga fortunei* (China and Japan) and so on. The quid pro quo in this process of meeting aesthetic aspirations is that these species may not be as well-fitted to their planting environment, and hence as robust, as the species native to Northumberland. Hence a balance must be struck between aesthetic and functional fitness, and where resources are too few to 'care' for the non-native species of lower fitness, then native or other more fitted species that do not meet the original aesthetic specification must be used.

Context therefore becomes very important in making these judgements; non-native species are more likely to be used in urban areas – with relatively high expectations of what plantings should look like and relatively abundant resources for management – than in rural locations. In large countries, for example the USA, an interesting situation has arisen that has fed the nativism concept in plant selection. Because the USA is both very large and biologically at the richer end of the plant diversity spectrum, it is easier to meet aesthetic planting specifications from the politically native flora of particular (very large) nation states. This leads to a certain assumption that working purely within the native flora is entirely possible and why do other countries not do the same? This argument plays less well at an intellectual and practical level

in small nation states such as the UK or the Netherlands and where there are relatively low levels of botanical diversity. The flip side to the USA position, which promotes the exclusive use of native plants, is that just because a plant is politically native does not mean it is necessarily well-fitted to use anywhere within this politically defined envelope. *Rudbeckia fulgida* is native to the USA, but is highly unfit for those parts of the country that have severe winter or low rainfall.

Whilst horticulture has a strong relationship with the use of plants from other parts of the world for the reasons given above, in large floras, for example South Africa, it is often possible to work purely within the native flora, although again subject to the inevitable issues of poor fitness for distant species, unless altitude and other factors reduce the expected loss of fitness. In this latter sense, the issues facing those who use native species drawn from beyond the local region and those using non-politically native species from further afield are the same. A fascination with the floras of other places, whether within the nation state or not, not simply as part of intellectual curiosity but as something that might be used and useful, is fundamental to the horticultural paradigm.

This extends to the manufacture of new genotypes through collection in the wild, breeding or selection; horticulture has an endless appetite for the new, whether the plants are originally native or non-native. This is in stark contrast to ecological thought, which is often horrified by the manufacture of the new and would like to believe that species represented in lists (floras etc.) are intrinsically right for that location and always have been. When one considers these issues in the context of geological time, it is clear that floras represent only ephemeral moments in time, not immortal certainties.

Can one apply moral or ethical notions to these contrasting paradigms? Debates in the media appear to assume that one can do this. Over the past 20 years there has been a tendency to see species drawn from regional lists as somehow right and appropriate, perhaps even good, and species from outside of these regions as inappropriate, perhaps even unethical. Such positions are entirely human constructs; one cannot find evidence for the righteousness of this within ecological science per se. One can measure the negative consequences of these choices in terms of species that are insufficiently or too well-fitted and have naturalized amongst extant native species – although even here

it is often difficult to measure harm per se (Thompson, 2014). The basis of measuring harm is that a native plant is better for the native animals that depend on that vegetation. Whilst in highly specialized ancient floras, such as that of South Africa, this may well be the case. It is looking increasingly difficult, however, to argue this as a generalization in Northern Europe. A recent paper (Hanley *et al.*, 2014) on the ‘goodness’ of native plants for generalist and highly specialized pollinators (bee species) found that the idea of localness at the scale of the nation state is often ecologically meaningless because many plants and pollinators have very wide overlap over their ecological history (Fig 1.1); a UK native bee or butterfly might be just as comfortable with the plants of distant portions of the Palearctic (the temperate band of vegetation running from Western Europe to Japan north of 33°).

1.3 Future Directions

So what of the future, the world in which environmental horticulture has to practise? Many of the core attitudes and values of horticulture were fashioned in a time when resources were much more abundant than they are now. This includes energy, water and the affordability of human labour. Diminishing resource availability has not made the end points traditionally valued by horticulture



Fig. 1.1. A native butterfly *Aglais urticae* (small tortoiseshell) feeding off the nectar of a non-native plant *Aubrieta deltoidea* in a UK garden. Although some schools of thought suggest that the planting of such non-native plants should not be encouraged, the species in question are unaware of the political boundaries. Indeed, these species may overlap in their distributions in other parts of Europe, and have some degree of ‘ecological fitness’ due to this.

irrelevant; however, they have made it much more difficult to deliver on these at the required level. In addition to the resources issue, there is also the question of horticulture having to deal with and respond to new policy drivers, for example biodiversity and sustainability legislation, and the ongoing reduction in various biocides used when staffing levels are very low to manage weed competition with horticultural plants. To this must be added changing attitudes towards education and human relationships with the environment, as reflected for example in a crisis within horticultural recruitment and training at all levels but particularly at graduate and postgraduate. The challenge in the 21st century is for horticulture to successfully deliver planted landscapes in this context.

Approaches to delivery vary, from various forms of rationing through to more radical approaches in which completely new types of vegetation are employed. Rationing is the simplest and most obvious means to reduce resource input, where the area of most intensive establishment and management of vegetation is reduced to meet the budget available. Traditional ‘staples’ such as annual bedding plants are shrunk down to small roundels in traffic islands sponsored by local businesses. This process tends ultimately to result in landscapes composed primarily of trees and mown grass, since everything else horticultural has relatively higher establishment and management costs. This not only reduces the potential for seasonal change, drama and engagement for people but also reduces the amount of pollen and nectar, and foraging space and volume available to pollination and herbivorous invertebrates that ultimately build urban food chains. Rationing, no matter how thoughtfully undertaken, ultimately leads to impoverishment over much of the urban estate.

The next step in a rationing process is to look critically at how to manage existing horticultural vegetation to achieve similar outputs with fewer inputs. The problem may be viewed through a social or cultural lens, determining the vegetation aesthetic threshold that is sufficiently appealing to people. For this, technical understanding may be employed, for example reduction in watering or fertilizing frequency.

The only other option is to look at substituting alternative forms of planting for more expensive energy-consumptive horticulture to maintain seasonal change and richness. In purely economic terms few if any of these substitutions other than simple forms of native woodland can be cheaper to manage

than gang-mown grass. The cheapest forms of managed herbaceous vegetation, such as rough grass flail-cut once a year, cost approximately the same as 30 cuts per year gang-mown grass. The argument to spend more than is necessary to maintain mown grass has generally therefore to be made on enhanced experiences for people or habitats for wildlife.

These substitution vegetation types are generally based upon or reflect natural or semi-natural plant communities, for example woodland, heathland-scrub, wetlands, and meadow-like vegetation. In all cases these substitution vegetation types can be created either with entirely native species: the restoration/conservation ecology approach; or with a horticultural approach using non-native species, such as in the Landscape Laboratories at the Swedish Agricultural University at Alnarp, near Malmo; or indeed through a combination of native and non-native species. The work of the author of this chapter is strongly grounded in the horticultural end of this gradient; taking non-native species, derived from prairies and other exotic plant communities and constructing essentially horticultural plant communities that look wild and are managed as if they were native plant communities.

The critical thing in most cases is that horticultural conceptualization of even an entirely native woodland system is likely to lead to different forms of management and a different physical end point than that a conservation ecologist would produce. For example, there is likely to be more interest in a hands-on than a hands-off approach and more emphasis on aesthetic impact at seasonal points in time rather than species diversity per se. The Heem Parks of Amstelveen in Amsterdam (Netherlands) are an excellent example of how native nature can be managed to fit more comfortably within horticultural value sets in which 'beauty' is a key element. Utilizing these substitution vegetation types requires a different skill set for horticulturalists. In particular, it requires a greater understanding of ecological processes, and how to manipulate these through reduced soil productivity, plant density, and other ecological 'levers' to achieve desired outcomes. This capacity to conceptualize and read plantings through an ecological lens is a challenging new skill.

Horticulture's role in improving the functionality of vegetation

One factor that will further encourage a drift to these more ecological types of horticultural vegetation is

the need to increase the functional performance of vegetation in urban places. Historically, horticulture has mainly seen vegetation in terms of cosmetic beauty. This is a critical factor to maintain and indeed obtain public support, but there is also a need to gain function, particularly when vegetation is to be used on a large scale (as is the idea with almost all of the substitution vegetation types mentioned above). Hence urban designed woodlands have to fix carbon, reduce local heat island effects, support as much animal biodiversity as possible and be harvestable for wood to meet local needs. Woodlands based on riparian species that tolerate cycles of flooding can be used to clothe and provide these functions at the same time as acting as infiltration swales for urban runoff. The same parallels can be drawn with herbaceous vegetation, such as the species used for sustainable drainage swales, which are temporally very wet then gradually dry out until they are replenished by a new stormwater event. These plants must, irrespective of where the species come from, look attractive for as long as possible, and in particular must not wilt and collapse when subject to reduced moisture availability in the height of summer. This mixture of ecological and functional characteristics force a different approach to plant selection and plant use.

Because of climate change and associated sustainability and biodiversity agendas, vegetation design, establishment and management skills are likely to become increasingly important in urban areas offering the potential for a horticultural urban renaissance. However, this will only be the case where horticultural skills are honed to match the current political and policy agenda. Environmental horticulture will maximize the employability of its graduates by looking to forge more relationships with other disciplines who are also key actors in the development and management of urban landscapes and have shared interests, such as in landscape architecture, architecture and engineering. Because of the changes from the 1970s onwards, discussed earlier in this chapter, horticultural input into urban planting design has much diminished, often to its detriment, for example, by a lack of critical thinking in selecting suitable species for a given project. This situation is not going to change; however, there would appear to be a huge opportunity for horticulture to work with landscape architecture as a partner in developing new landscapes that are as sustainable as possible rather than cosmetic.

Communication and interaction with less conventional partners will also become paramount.

Environmental horticulturalists need to be able to liaise with architects and engineers, for example to further break down the barriers between grey and green infrastructure, so in future it may be possible literally to entirely cover a building with a green mantle of vegetation (not just provide a rather tokenistic panel or two on the front façade). Similarly, better dialogue with sociologists and health experts is required for horticultural activities to be more effectively implemented to address issues around mental health, well-being, physical activity, crime avoidance and enhanced social integration.

To make these collaborations work, however, horticulture will need to be able to speak at least some of the language of these other disciplines, and in particular it will need to demonstrate that, in addition to having experience of plants in practice, it also has a research-based understanding of vegetation and establishment in the city. Due to the decline of the research-focused undergraduate and postgraduate horticulture sector in the UK over the past 20 years, these sorts of understandings are now thinly spread. This text attempts to assist with this process, with each chapter grounded in the latest research.

Finally, although much of the research pertains to the management of the public green realm, reference is made frequently to the private domestic garden, as there is obvious overlap in terms of agendas and practices, but also because private gardens contribute a significant component of urban green infrastructure. These private gardens may not come under the jurisdiction of the professional environmental horticulturalist, but much of the content of this book is also relevant to the keen amateur gardener who wishes to understand more about the scientific principles underpinning garden management.

Conclusions

- The term ‘environmental horticulture’ was coined in the 1980s and broadly correlates with the management of landscape plants in public and semi-public arenas. Over the subsequent years it has also become linked with a philosophy for more environmentally sustainable practices within urban horticulture.
- Environmental horticulture has a number of similarities with other forms of green space or environmental management, but differs in that it actively promotes the cultivation of plants, and

does not necessarily restrict itself to the use of native genotypes. It tends to bring humans and their perceptions and activities more actively into the framework of green space design and management.

- Environmental horticulture recognizes that human beings can obtain great pleasure and sometimes much deeper psychological states such as meaning, through application of their own interventions in the green space, and indeed from that of others.
- There is an acknowledgement within the discipline that the urban environment is unique in terms of its conditions and pressures, and that plant choice in this environment needs to reflect this, not only in terms of fitness, but also in the wider rationale of public appreciation or functionality.
- Although environmental horticulture will frequently use native plant species, it recognizes that certain non-native plants in particular contexts provide value too. This can include offering some services to native fauna species, such as pollen and nectar resources. Although alien invasive plants should be avoided in plantings, the concept that only plant genotypes located within political boundaries (countries) are appropriate for use should also be challenged.
- Those wishing to develop a career in environmental horticulture need to be adept at plant husbandry skills, but also are increasingly required to embrace other disciplines and widen their skills base. Horticulturalists of the 21st century need to work in partnership with landscape architects, ecologists, land or civil engineers, health and social work professionals and indeed many other disciplines.

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