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The Reconstruction of Historic Parks and Gardens in the Context of Climate Change

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THE RECONSTRUCTION OF HISTORIC PARKS AND GARDENS IN THE CONTEXT OF CLIMATE CHANGE

Abstract
Historic parks and gardens survive in many places with some sites still in use but others abandoned long ago and now given over to other purposes. Accurate repair and reliable reconstruction depend upon archaeological information which is particularly vulnerable to the effects of climate change. The impairment and loss of such detail threaten historical integrity. This means that we must monitor changes and develop suitable mitigation.

Historische Parks und Gärten überdauern an vielen Orten, wobei einige von ihnen noch immer benutzt werden, andere seit Langem aufgegeben wurden und inzwischen anderen Zwecken dienen. Authentische Instandsetzung und verlässliche Rekonstruktion bedürfen archäologischer Informationen, die besonders anfällig für die Auswirkungen des Klimawandels sind. Die Schädigung und der Verlust archäologischer Befunde bedrohen die historische Integrität. Dies bedeutet, dass wir Veränderungen genau beobachten und Maßnahmen zur Schadensminimierung entwickeln müssen.

The remains of historic gardens and associated parkland are widespread and have survived in many sites. In England alone, for example, it has been estimated that over 5000 formal gardens may have been created between the early sixteenth century and the beginning of the eighteenth century, possibly with as many as a thousand surviving in some identifiable physical form (Everson/Williamson 1998, 146). When we add to this the parks and gardens of other types and periods and include the remaining parts of the UK, we arrive at a staggeringly high total. Many are purely archaeological sites, preserved as earthworks where perhaps an associated mansion has long since disappeared. In other places the outlines of former embroidered parterres, abandoned for reasons of economy of maintenance, remain as a lawn within gardens that continue to be used. In each instance, their surfaces potentially conceal the remains of previous paths, flowerbeds and other arrangements – all important physical traces of the former appearance and historical use of those gardens. Such details

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provide essential information for understanding, accurate reconstruction and sound repair (cf. Dix 1999; 2014). They may be easily lost as a consequence of the effects of climate change.

Early garden reconstructions using such evidence, for instance in the House of the Vettii in Pompeii, which followed on from clearance and excavation in the mid-1890s, respected the historical layout and utilised the original architecture although the planting was purely conjectural. Later, in the 1930s at Colonial Williamsburg in Virginia, USA reconstruction of the gardens of the Governor's Palace was largely based upon a contemporary historical illustration. The use of archaeology was restricted to confirming salient points of layout such as the steps that connected the different levels of the garden (Dix et al. 2013, 292).

Today's increased emphasis on authenticity is based on thorough documentary and comparative research linked to better understanding of the field remains. We now realise that the most accurate reconstructions are the ones which combine the evidence from a range of sources – *historical*, both site-specific but also including analogy with other places and an understanding of contemporary historical practices, and *archaeological*, which includes the analysis of soil properties and associated plant and other biological remains in addition to a further range of recovery techniques (Dix 2016). At the same time, such cross-disciplinary studies have the potential to provide valuable insight into past weather patterns and previous methods of coping with extreme events (cf. Trow 2008; Watkins/Wright 2008, 87).

In addition to practical information, the survival of a designer's plan and original planting instructions can be compared to the outline of flowerbeds and other details revealed by archaeological excavation in order to identify the extent and manner in which the intended work was carried out (cf. Dix 2011a). However, some subtle traces like decoration picked out by powdered chalk or white lime are susceptible to damage from extremes of wetting and drying. They heighten the risk of ground heaving and cause pH changes that result in the dissolution of carbonates and other soil leaching.

Beginning in the mid-1980s accurate garden restoration following the lines of original planting started a vogue for such reconstruction at historic properties as a way of enhancing the appeal to visitors, with the potential to increase numbers and, importantly, raise income (Dix 2016, 99–100). The hotter and drier summers and extended seasons predicted for the future are likely to see even greater demand as people spend more time outdoors.[1]

Milder winters and long periods without ice or snow are changing the pattern and cycles of vegetation growth, with many plants flowering earlier than before. Some gardens are already starting to open all year round instead of only in the summer months. Whilst this, and special events such as open air musical concerts and other performances, may bring in considerable extra income to help maintain the property, the downside is greater wear and tear upon already vulnerable landscapes. Increased compaction may damage soil structure and drainage, affecting grass growth and leading to further surface deterioration.

1 Cf. Chapter »Gesellschaftliche Rahmenbedingungen und sozialwissenschaftliche Perspektiven« in this volume.

At the same time, visitors' increasing demands for more facilities such as catering, shops and toilets can alter a site's unique ambience and threaten its historic character (cf. Calnan 2014, 18f.).

A site's present meanings are defined by its past. Re-creating an historic garden, whilst often constituting an attempt to reinvigorate a site, should also remind us that it was once more than a ruin or empty space. It was a place often of style and splendour, politics and personality; and frequently at the forefront of taste.[2] Paradoxically, exotic planting schemes that were once the envy of visitors and a demonstration of horticultural skill can now be widely emulated as warmer summer temperatures and increased carbon dioxide levels intensify plant growth (White 2008, 14).

The way we plan our planting will inevitably change to incorporate plants that are more resilient, although species adapted to hotter, drier climates may not always be appropriate from the historical perspective. Changes in the colour and appearance of grass lawns and terraces, together with the nature of their management and other gardening activity, could be similarly problematic (White 2014, 210–214).

The shallowness of many buried remains of former garden and parkland layouts makes them particularly vulnerable to the effects of ground shrinkage and cracking. They are equally susceptible to storm damage, where for example the uprooting of trees can cause considerable local disturbance, destroying adjacent paths and carriage drives as well as damaging flowerbeds and other historic features – both above and below ground (cf. English Heritage 1997). Likewise, other soil erosion, ground subsidence, and the effects of frost waterlogging can result in the disintegration of path surfaces, leaving behind only their lowermost bedding or foundations with the loss of original finishing detail. The very same phenomena can be observed in the four examples studied by the interdisciplinary research group.[3]

The increased frequency and severity of extreme weather conditions, alternately wetting and drying, will accelerate the decay of brick and stonework, which might also include original drainage arrangements.[4] Underground drains formed by simple clay pipes or hollowed-out elm logs are easily ruptured by ground shrinkage and subsidence. The resulting damage can exacerbate the effects of increased surface water in wet weather. The need to adapt such systems to cope with increased rainfall intensity may seriously damage individual features as well as challenge the integrity of their original design. The installation of new and more effective disposal services with suitable arrangements to avoid silt accumulation can affect the preservation or survival of other historical elements and should be carefully considered. Likewise, soil replenishment and renewal, together with irrigation and other watering systems that provide intermittent wetting, can prove to be as harmful as they are beneficial.

2 Cf. Adrian von Buttlar in this volume.
3 Cf. Chapter »Kunstgeschichte und Gartendenkmalpflege« in this volume.
4 Cf. Chapter »Naturräumliche Ausstattung« in this volume.

Unlocking the archaeological evidence for a garden or park's history usually requires some degree of excavation. This involves the careful dissection of the multiple layers of soil and other material that constitute the record of its construction, maintenance and development over time.[5] Archaeological excavation is, by its very nature, a destructive and non-repeatable exercise and must therefore be carried out in the most controlled manner, with strict adherence to the highest standards of accuracy in the recovery, recording and reporting of discovered remains. The scope of work can range from investigation of an individual garden building or other feature to selective or targeted excavation at key path intersections and other salient points in order to aid interpretation and understanding of the wider layout – finally, with total excavation in preparation for complete reconstruction. The recovery of detailed information will depend mostly upon the careful observation, analysis and interpretation of differences in soil colour and texture (Dix et al. 2013, 290–295).

The individual character of often thin layers of soil and their relationship to each other are crucial to the identification of the form of previous flowerbeds for example, where individual planting holes can sometimes be discerned. Such delicate traces may be easily lost as the ground begins to dry out, crack and heave, and the soil leaches colour.

Soil is an important repository of information on past horticultural practice.[6] Layers of ash, charcoal and other material, together with chemical composition, may show how the earth was previously enriched. Information from phytoliths, pollen, seeds and other plant remains that survive within the infilling of former bedding trenches likewise demonstrate the nature of previous enhancement, as well as sometimes suggesting what may have grown there (Currie 2005, 76–84).

Insects and land snails can be sensitive indicators of the microenvironment afforded by different types of plant. Some species in particular are short-ranging and prefer specific habitats of varying dampness and either areas of open ground, beneath dense foliage or with intermediate shade. Their presence in historic deposits may also be a broad indicator of previous climate and original soil conditions (Wilkinson/Stevens 2008, 101–126).

These microfauna are very small, with dimensions that can be measured at the largest in millimetres. Like seeds, they may easily fall into cracks and with other bioturbation easily become divorced from their original context. One consequence of climate change may be the loss of stratigraphic integrity due to cracking and heaving from inevitable changes in sediment moisture.

Organic remains like seeds and other plant material that are such an informative part of the archaeological resource are largely preserved within waterlogged deposits, which may also conserve timber structures and other wooden relics. Such remains are vulnerable to severe degradation and eventual disintegration when the deposits that contain them begin to dry out. When a previously anaerobic burial environment becomes aerobic, rapid decay is likely to result from attack by soft-root fungi, algae, nematodes, mites, bacteria,

5 Cf. Michael Rohde in this volume.
6 Cf. Bernd Uwe Schneider et al. in this volume.

and insects (cf. English Heritage 2010, 27). Wooden elements will eventually disappear, potentially removing for ever the evidence of a structure that might not otherwise be documented in the historical record where surviving coverage is uneven at best (cf. Dix 1999, 372). Fluctuating water tables put such features at risk just as much as longer-term changes in hydrology, requiring us to monitor changes and develop strategies to maintain existing conditions of dampness.

Whilst low water levels in artificial basins or ponds, canals and similar waterways may expose and imperil original timber revetments, an increased volume of water can overflow the edges causing erosion of the banks and potentially damaging adjacent structures. At the same time sewage and other pollutants in floodwater risk contaminating archaeological deposits, whilst garden features such as mounts and terraces may have slopes that are vulnerable to collapse from waterlogging. They are also easily affected by surface water runoff, which at its most severe can cause gullies to appear and thus disfigure their appearance.

Uncertainty about the occurrence of large-scale climate change events, such as when major flooding might take place, means that measures for adapting to and mitigating the impacts should adopt a precautionary approach. The introduction of flood defences and the renewal of existing features to protect against periodic inundation, which sudden surges of water could cause, can often threaten historical integrity (English Heritage 2008, 7). The fulfilment of modern building requirements and engineering standards deemed necessary to cope with increased rainfall intensity affects old dam structures in particular. They may no longer be thought suitable to withstand a once-in-a-millennium catastrophe and therefore need reinforcement (cf. White 2014, 214f.).

The increase in the contribution to seasonal rainfall from heavy precipitation events, with the concomitant risk of flash floods, means that water courses and related lakes must remain clear and be well maintained by means of frequent dredging of silt. However, the deeper parts of some of these accumulations may preserve deposits that are rich in botanical information about the previous history of their surroundings and this should be taken into account (cf. Dix 2011b, 170–173).

Periods of drought can result in features drying out so that their bases are exposed and begin to crack, which may equally affect potentially vulnerable deposits. An increase in the number of wildfires as the result of prolonged hot weather, which often burn more aggressively than in the past, can threaten areas of historic woodland planting and encroach upon more formal garden areas and related buildings.

A further challenge to plant health is the increased spread of pests and diseases as the result of a warmer climate and milder, wetter winters.[7] This is already having an effect on tree species with infection increasingly leading to fatalities. Horse chestnuts, often a feature of historic designed landscapes, have been blighted by Bleeding Canker and are further threatened by a new leaf-miner moth. Invasive organisms also affect boxwood and others are causing alder blight and ash-sprout dieback (Lehmann 2014). In hot dry weather a rapid

7 Cf. Christian Hof in this volume.

influx of water can lead to sudden oak drop, where an already sick tree sheds a bough or main limb as a means of coping with the abrupt change. High moisture deficits may eventually result in beech forest plantations becoming unsustainable in south-eastern England, although it remains uncertain how this will affect parkland trees (Smith 2008, 16).

It is clear that climate change makes some historically authentic tree plantings difficult to conserve. Although the priority must be to protect and prolong the longevity of trees of heritage significance, in the longer term it may be necessary to provide for tree succession through a treescape of more diverse species. Thus, new planting programmes have been introduced which avoid a monoculture that may be susceptible to disease and pests, encouraging instead a mix of resilient species. Whilst acknowledging that changes to the climate and issues of biosecurity will influence species selection, the choice should always be made with proper regard for the earlier landscape design (cf. White 2014, 212–214).

Inasmuch as this may bring the natural and cultural heritages into closer alignment,[8] the decision eventually to abandon historically important species requires, in these instances, the full recording of all the evidence of past planting design and tree management methods before it is damaged or lost for ever (cf. Dix et al. 2013, 281).

The peculiarities of each individual site, past and present, should be at the heart of what we decide to do. Changes in vegetation patterns and palette threaten the visibility and integrity of historic parkland landscapes, many of which stemmed from a particular vision. Planting with different species may alter the silhouette and colour composition, especially in spring and autumn, as well as change historical effects of light and shade. Concomitant changes within the understorey may likewise affect the nature of flowering shrubs and other plants to create new but different and anachronistic sensations of sight and smell.

Adaptation to the variety of climate change and its extreme fluctuations therefore has serious implications for certain types of planting and the overall integrity of historic garden and parkland design. Whilst many such landscapes have already experienced and survived significant climatic changes in the past and may yet demonstrate considerable resilience in the face of future change, others – and in particular the buried remains they contain – are vulnerable to irreparable damage to the extent that the potential cultural, social and economic benefits they offer will also be lost. It is important to evaluate the potential impacts on a case-by-case or site-by-site basis, even if only, at the present time, to develop a strategy to monitor change and scope future needs.

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8 Cf. Tobias Plieninger in this volume.

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