

Preface

As ecologists, for over a hundred years, we have sought bold, overarching ideas and theories to provide insight into big issues and the ‘bigger picture’ of ecological systems and processes. From Tansley’s seminal volumes such as ‘The British Islands and their Vegetation’ (1949), to Rodwell (ed.) (1991a, b, 1992, 1995, 2000) with the National Vegetation Classification, ecologists have attempted to frame the national ecology systems into a logical, rational system. There is a tendency, however, for such approaches to try to capture some form of ‘correct’ stasis of condition, and this, perhaps, is an inherent weakness. Others, such as Grime et al. (2007), Grime and Pierce (2012), or Allen and Hoekstra (1992), aim to understand the ‘bigger picture’ of processes, dynamics, and the biological nature at the core of ecological systems.

This book addresses critical issues of the changing nature of ecology and ecosystems consequent on urbanisation, globalisation, climate change, and human cultural influences. From long-term human interactions through nature in agriculture and forestry, to increasingly major impacts of urbanisation and other environmental changes, people have forced and facilitated the hybridisation of nature. Indeed, in the face of human-induced and natural climate changes as globalisation accelerates, the pace of this hybridisation speeds up. Anthropogenic influences cause disturbance, nutrient enrichment, habitat replacement (through formation and destruction), and dispersal of species on a planetary scale. The ecological processes that drive the changes are the ‘natural’ mechanisms of ecological successions and changes, and of species and ecosystem hybridisation or adaptation. Today though, the mixing of species is occurring at a rate that is unprecedented in the history of biodiversity evolution. The so-called Anthropocene, the latest great evolutionary epoch is upon us and nature is adapting to a new canvas and a changed template. Issues relating to this recognition are discussed in a popular volume by Davies (2016) and seem to be directly relevant to recombinant and future ecologies.

The dramatic and largely unrecognised consequence of these human influences is a hybridisation of both species and of ecology itself. Whilst this process is most easily observed and recognised in the increasing urban environments of the planet, it occurs more widely, such as in forestry and in agricultural landscapes. As new

environmental conditions are forged, plants, animals, and fungi move and mix, beyond their natural distributions and limits, old and new, native and exotic, become enmeshed in recombinant communities and hybrid ecosystems. Here, and especially in the rapidly expanding urban heartlands of this new ecology, native and alien jostle for position with novel interactions and dependencies are formed.

This short volume brings together key research for the first time and considers the implications for future conservation. The issues of alien invasive species and natives are controversial and raise serious conservation and economic concerns (McNeeley 2001; Simberloff 2011; Smout 2011). Many human aspirations for nature conservation and our subjective perceptions of what is 'good' are based on the ideas of stability and continuity. However, it is increasingly clear that whether or not we like it, the world is not stable and indeed, is getting less so. Continuity is vitally important for nature conservation and land-associated management, but stability is problematic. As I discuss elsewhere (see Rotherham 2014, 'Eco-History'), a serious problem is not necessarily that of stability per se, but of the nature and scale of human ecological impacts and disturbance, as we move from micro-disturbance in pre-industrial societies to massive macro-disturbance and eutrophication with large-scale industry and urbanisation. The impacts of the changes are profound, and this important publication is the first step on the way to a fuller recognition of what they imply for a future ecology. Whether we like or not, our emerging ecology will be hybrid, and indeed, history suggests that it always has been. Some years ago, Thompson et al. (1995) stated that we can expect a continuation of the spread and invasion by species around the world, but that attempts to understand such phenomena should be placed within the existing frameworks of species range dynamics. Particularly, as they noted, invasions and the characteristics of invaders are '... of crucial importance to global change and declining biodiversity'. Furthermore, they noted how research at the time had attempted to identify the key ecological characteristics of invasive species and potentially invisible ecosystems, citing the example in the literature of Lodge (1993). Other attempts to address these issues include, for example, Noble (1989). However, they questioned the assumption that '... there is something unique about successful invaders, in the sense of species which establish themselves beyond their native range'. Thompson and colleagues suggested that '... there is nothing unnatural or even unusual about changes in species' ranges'. The assertion is supported by the observation that '... the entire biota of north temperate regions has migrated large distances within the last 10,000 years, and detailed recording reveals a constant ebb and flow of species' ranges'. They note how invasions are '... distributed along a continuum from natural expansions in distribution at one extreme to human-mediated transfer between continents at the other'. An important point too is that 'invasions' are generally perceived as movements across national borders, even though these are frequently of little biological significance. This issue of borders resonates with the thoughts of historian, Charles Warren (2005), when considering the impacts on attitudes to alien invaders of devolution in countries such as Scotland.

A context for these issues is a large and rapidly expanding literature on alien and invasive species around the world and focussing mostly on the undoubted issues and challenges that they raise (e.g. Simberloff 2003, 2005, 2011; McNeeley 2001, 2011). This is reflected in the publications focussed on the British flora (e.g. Stace and Crawley 2015). Invasive pests and diseases also have an extensive body of published research and popular reviews (e.g. Alford 2011); this is a frequently unappreciated aspect of invasions and new ecological processes and consequences. There is also a body of work on distinctively urban ecologies though much of this is on the natural history aspects (e.g. Goode 2014) and rather less on the underpinning ecological aspects such as the synurbic character of distinctly ‘urban’ species (e.g. Francis and Chadwick 2012). However, there seems to be a significant gulf between the works emerging from say Australia, New Zealand, and North America such as Hobbs et al. (2013), emphasising the development of ‘novel ecosystems’ on ‘hybridisation’, ‘recombinant ecologies’ (see Meurk 2011), and the British literature. Indeed, in terms of addressing the matters of recombinants, the latter has barely moved on from the work of Barker (Barker 2000; Barker et al. 1994). On the other hand, there is a significant output on more popular interest in the cultural histories of exotic species (e.g. Mabey 1996), and in popular scientific writing on new ecologies (e.g. Pearce 2015). Much of the work on novel ecologies relates strongly to concepts of supposedly pristine, native ecologies that have been degraded and to the extensive literatures on restoration ecology, for example. As such, the ideas and concepts help inform our view of the European and British situation, but the application and the language do not always transfer easily to landscapes dominated by long-term cultural ecologies and those highly modified by intensive land use or urban sprawl.

Here, I deliberately focus on the example of the British Isles, which benefits from a uniquely long timeline of ecological research and a good understanding of relevant aspects of environmental and social history. However, there is also the benefit of considering the intimate ecology of a group of islands, and indeed, a biogeographic area that has received species imports and colonisers from overseas for many centuries. I hope that this choice of case study will provide much of interest to other regions too.

In Chap. 5, I touch on ‘climate change and ecological hybridisation’, but do not dwell in detail on this theme. This is a short book, and that is a big topic for another occasion.

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