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Ian D. Rotherham

# Recombinant Ecology - A Hybrid Future?



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Photograph: Canada goose brought in to adorn great landscape parks of the 1700s and 1800s

# Foreword

When I first arrived in Australia in 1970, I was excited to explore vegetation, flora and fauna I had read about but had never seen ‘up close and personal’. In addition, I was determined to spend time researching the unique qualities of the diverse and complex Australian ecosystems. Yet after a couple of years, I realised the ecological challenges (and perhaps opportunities) lay in ecosystems which appeared as rough and ready weedy places, with invasive plants from all continents mixing it with native species. Sometimes, these invasive mixtures simply overpowered native species, at other times there was obviously a clear balance between native and invasive, alien, adventive—all negative terms ascribed to species that simply ‘do not belong’. In the bushland of the rapidly expanding City of Perth, I found not only some of the richest flora I had ever encountered, but also non-native species apparently thriving within an existing ecosystem.

One such plant is *Gladiolus caryophyllaceous*—an endangered species in its native South Africa, but regarded by many as a potential threat in Western Australia. Whilst it can clearly become quite invasive in some circumstances, at low levels of colonisation it is simply an addition to the native communities. There are other species rather more problematic for Western Australian bushland, for example *Erharta calycina*, the perennial veldt grass also from South Africa, can invade and destabilise native vegetation. To try and understand why these new ecologies were happening I visited South Africa—and there discovered the vigorous invaders in Australia were much less vigorous components of their native ecosystems—in contrast with many Australian species which were creating vegetation types previously unknown, or in some cases actual replicas of systems in similar climates in Australia.

From that point, I went on to observe this phenomenon in many places and coined the term ‘synthetic vegetation’ for such new ecologies. This term was designed to reflect the synthesis evident in, e.g., the new forests growing up in disused railway sidings in Britain. In these forests, a canopy of *Betula* and *Buddleia* develops over a rich grass and herb understorey of both native and non-native species. That term, however, did not resonate well. At about the same time, Michael Soulé in the USA had coined the term recombinant ecology, which has also had mixed uptake, but in this volume, it is successfully employed by Ian Rotherham. The publication by Hobbs et al. (2006) on ‘Novel ecosystems: theoretical and management aspects of the new ecological world order’, marked a step change in focus on the realities facing ecosystems globally—no less in Britain. Whilst there are still many who doubt the appropriateness of publishing and talking on the topics of novel ecosystems, recombinant ecosystems, synthetic vegetation, or other titles, given to this group of emerging ecosystems, that is a myopic view of where we are today. Moreover, where we are is in the Anthropocene, and that epoch is yielding many challenges for us as a species, but also huge opportunities.

In the pages that follow, Ian Rotherham sets out an agenda for understanding and managing recombinant ecologies. That there is much to think about in recombinant ecology is explained these writings, not least how we live with and manage these new systems. For, despite the noise and clamour around rewilding, they will be our new wild places, they will offer homes for species endangered in their original locales, and they will create conditions, which will allow many species to flourish in old and new combinations. And, of course, some species will be threatened by this new ecology—but they may well have been under threat from environmental change already.

Finally, whilst this volume has an especially British flavour, accelerating globalisation of biodiversity means its conclusions and observations will be helpful everywhere, in contributing to the debate on the new ecological world order.

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Photograph: Fallow deer—a long-term introduction by the Romans and then the Normans, now thoroughly established and often a keystone species

# 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