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Impact of human colonisation history on New Zealand Avian diversity

A thesis presented in partial fulfilment of the requirements for the degree of

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Frontispiece



New Zealand Fantail (Photo: Amiot C.)

“It is obvious that modern civilised man upsets the ‘natural’ ecosystems or ‘biotic communities’ on a very large scale. But it would be difficult, not to say impossible, to draw a natural line between the activities of the human tribes which presumably fitted into and formed parts of ‘biotic communities’ and the destructive human activities of the modern world. Is man part of ‘nature’ or not? Can his existence be harmonised with the conception of the ‘complex organism’? Regarded as an exceptionally powerful biotic factor which increasingly upsets the equilibrium of preexisting ecosystems and eventually destroys them, at the same time forming new ones of very different nature, human activity finds its proper place in ecology.”

Tansley, 1935

Abstract

Human activity has transformed earth's ecology and exerts new selection forces on entire species communities. This thesis examines the influence of evolutionary and human history on the composition of local biodiversity in New Zealand terrestrial habitats. The Auckland region of New Zealand provides an excellent model system because these areas have only recently been colonised by humans, and there is a gradient of habitats ranging from urban to protected native bush. The history of humans in New Zealand is used to inform the response of naïve biodiversity to anthropogenic transformation. First, a general concept of the effect of human societies on biodiversity responses to anthropogenic impacts is explained in chapter one. I focus on three major historical phases - hunter-gather, Agrarian and Industrial- to outline the contrasting influences of each society on native species extinction and extirpation legacies. I then examine the impact of two waves of colonization by humans in New Zealand on avifauna, to establish an understanding of the influence of different human societies on species communities. My results show that New Zealand's extinction rates are the highest recorded, and are associated with the post-colonisation period by European society and a more advanced human niche construction. This caused more advanced cultural, ecological transformations at various spatial scales. In addition, for exotic bird species in New Zealand, I examined whether the extent of previous coexistence with humans was a potential determinant of establishment success. My findings suggest that previously co-existing with humans is a potential key factor driving the establishment success of exotic species, particularly in habitats transformed by humans. To verify the idea that species functional diversity responds in different ways to human civilisation, I characterise differences in species biological traits among a gradient of habitats with variable degrees of anthropogenic disturbance. I show that no clear assemblages of traits are currently found along extant New Zealand native avifauna. I argue that this can be explained by the different experiences that NZ native avifauna has had with humans in comparison

to exotic species. To investigate the possibility of a time-lag response of birds to human habitat transformations, the response of an avifauna assemblage in a remnant forest in the urban habitat is investigated over a period of 26 years of human habitat changes. My results suggest that the community assemblage changed over that time, driven by the arrival of new exotic species. This resulted in a change of community composition to one dominated by exotic species. Finally, nest-site selection of exotic and native avifauna is examined across an anthropogenic gradient to understand the role of evolutionary history in shaping their behavioural response to habitat change. I found further support for the effect of species past-experience with humans. Indeed only native species more naive to anthropogenic habitats and its disturbance tend to alter their nest site strategy in relation to the degree of terrestrial predation. By using the history of a recently colonised location like New Zealand, this research has been able to show the potential importance of human society characteristics during colonisation and how previous levels of human coexistence of biodiversity has implications for current and future ecological consequences in an Anthropogenic world. This thesis highlights the importance of considering species' past-experiences with humans to inform ecological and evolutionary research and conservation strategies

Keywords : New Zealand, anthropogenic disturbance, anthrosequence, environmental change, time-lag, past-evolutionary history

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