Impact of human colonisation history on New Zealand Avian diversity

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

Doctor of Philosophy

in

Ecology

at Massey University, Auckland,

New Zealand.

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2016

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

Acknowledgments

First and foremost, the biggest thanks go to my supervisor team who without them this work would not have been possible, notably across their different teaching and contribution during these times.

I would like to thank my main-supervisor Weihong Ji who has believed in me and my project throughout the Ph.D. and who give me the opportunity to do my Ph.D. at Massey. You have always had such faith in me, despite the different contingencies that have punctuated the Ph.D. You have been able to leave me the opportunity to explore around my subject and get more in-depth in my ideas which I really appreciate. But you also brought me back to the right track and kept me concentrating on a small number of these ideas, which has not been an easy task. I am very grateful to your help to organise all the research funding for the Ph.D. and although some of them were fruitless, this time together always passed well and offered the chance to think about the best way to apply and for improvements on my English. Many thanks also for all the teaching opportunities that you have offered me, as well as for all the projects that you have involved me in during this time and in the future and the time spent in the field to help me with mist netting and nest finding around a cup of tea and biscuit.

Many thanks to my secondary supervisor Jim Dale, I am very grateful for your valuable knowledge, and your critical attribute that has been invaluable and for guiding me on some aspects of the thesis where I wasn't confident enough.

Many thanks to my third supervisor Dianne Brunton who has been supportive and a huge help throughout this research, and also through all the knowledge and information you shared with me. But even for being so welcoming, despite the time constraints that your status has given you during the Ph.D.

Last but definitely not least, Michael Anderson, big big thanks for your incredible support and involvement in this thesis. He has been a fantastic supervisor, always been present for any scientific

discussions and the instigator of great ideas. He always found time to respond to my mass of request for advice and comments and these were always very insightful and shrewd. He has spent so much time to help me to improve my scientific English writing. I learned lot from you and from your times spent in the field.

This research fieldwork would not have been possible without funding provided by the Institute of Natural and Mathematical Sciences and Auckland Council. I am also very grateful for the support of Gaven Martin and the Institute of Natural and Mathematical Sciences at Massey University for personal financial aid via tuition fees scholarship and an INMS doctoral scholarship.

As with most ecological studies, there have been many aspects of this research that would have been impossible to complete without valuable and appreciated help from others. The following people have helped in various ways with fieldworks tasks. So big thanks to Mattéo Belland, Sam Hill, Enéa Belland, Mike Anderson, Mark Delaney, Weihong Ji and Lucie Belland. Special thanks are needed for my field assistants Mariska Kraaij, Shelley Fischer and the teacher fellows Diana Hartley and Jill Marsh, who have spent many hours in the field looking for nests and were always present under all climatic condition. Big thanks to everyone again because without their support, I would not have been able to achieve half of what has been done.

Thanks to my fellows of the building 86!! From the early days, I thank Sarah Wells for sharing excellent times and discussion in the office around a cup of tea and coffee, and also for their advice on weather forecasts and spots for future surf sessions or trips. Thanks for my occasional office buddy Sam Hill for helping me with my English and to disconnect around music discussion, but also for all the long scientific talks. Thanks to Raj Kumar and Achyut Aryal for general chats about all kinds of things. Thanks for all the fellow of the C-MERG!! Sarah Dwyers, Gabriel Machovskey Capuska, Manue Martinez, Krista Hupman and Friederike Jordan for all the fun times we spent during lunch times, break times around table football and tea, as well as during nighttime work. Thanks to Luca Bütikofer for sharing a good time during fieldwork and for all this great discussion even if we still haven't been lucky enough to share a good surf

session. Also, huge thanks to Emelyne Cunnigton and Chaitany Gokhale for the tea break and late sharing dinner at uni.

A huge thanks for the ecology Massey team for the good times and laughs around the lunch or cake on the desk of building 5 that we share (sorry if I forget anyone): Manuela Barry, Marleen Baling, Anna Gsell, Dianne Bruton, Jurgen Kolb, Brigit Kreigenhofer, Jim Dale, Weihong Ji, Jany, Achyut Aryal, Karen Stockin, Sarah Dwyers, Gabriel Machovskey Capuska, Manue Martinez, Jennifer Laycock, Luis Ortiz Catedral, Kevin Parker, Luca Butikofer, Elizabeth Laman Trip-Jensen, Sonja Clemens, Aaron Hamer, Michelle Roper, Wesley Webb, Virgina Moreno, Jon Cope, Miriam Ludbrook, Kelsey Nichols.

Huge thanks to Gabriel Schmidt-Adam and Monika Merriman for all the teaching opportunities that you have offered to me during this time.

My family and my friends deserve a huge thank you for their incredible support and for galvanising me along this project. Big thanks Colorado, Chauvineau and Alami families that helped my family and me during the thesis and brought us great funny time and friendship with dinner, bbq, beach day that have been great support and housing, during hard times. Many thanks to Josie and Michel for their great help, and their housing offer when my family where in France. Big thanks to Zabeth and Claude for offering me the opportunity to establish an office in their home to help me to keep concentrate on the thesis far from New Zealand. Huge thanks to my family, my brother, my parents, and grandparents who have always been general support in life and, Mum and Dad for still backing my education and careers choices.

To Lucie and our kids, thank you so much for your continued support and patience while I have been writing this thesis. I am looking forward to now being able to spend more time with our family for walks in the forest and new adventures. Thanks my love, Lucie, for all the many things you have done to help me out and to have accompanied me on the other side of the earth, with our family, for this project important to me. Mattéo and Enéa, big thanks my kids to have always been present to help me in the field and for your vision of the thesis through eyes of children, and Ewenn to have been, so understanding to see dad always working in the office and not that much present for play.

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