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Pinto Nunes NogueiraDiogo, V.

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DEDICATION

*Dedicated to my parents,
who have always encouraged me
to pursue meaning and joy in what I do.*

PREFACE

Pursuing a PhD is largely believed to be a solitary endeavour. While the bulk of the work presented here has indeed resulted from research that I have carried out independently, I was fortunate enough for having been bestowed with the support and companionship of a vast number of people, to whom I am immensely grateful.

First of all, I would like to thank Eric Koomen, who has patiently guided me throughout my PhD with his unique supervision style, timely combining witty suggestions with constructive criticism. Eric has first introduced me to the topic of land-use change analysis and modelling at a time that I was still a part-time student assistant, stirring in me the passion to use maps as a tool to integrate knowledge, derive new information and unravel the complexity of the world. You had a major role in my career and personal development, being the main responsible for creating the stimulating environment and interesting opportunities that allowed me to thrive. I am greatly indebted to you and I look forward to keeping our fruitful collaboration ongoing in the years to come!

Secondly, I would like to thank my promoters Henk Scholten and Piet Rietveld, for their encouragement and enthusiasm, and for granting me the freedom to pursue my own research interests. Sadly, Piet passed away at an early stage of my PhD trajectory. He has been dearly missed ever since and one can only wonder how great it would had been to have his assistance throughout the completion of this dissertation.

Many of the chapters presented here have significantly benefited from the contribution of several co-authors, to whom I am deeply thankful: Tom Kuhlman, who had a crucial role in the development of my initial research ideas and was a major source of inspiration; my colleagues at SPINlab Jasper Dekkers, for his assistance in model building, and Bo André, for his research inputs and thought-provoking discussions; Pytrik Reidsma and Ben Schaap, for the nice and highly rewarding collaboration that resulted in Chapter 6; my MSc. thesis supervisors at Utrecht University, Floor van der Hilst, Janske van Eijck, Judith Versteegen and André Faaij, who had an influential role in my transition from a Master's student to a PhD candidate; and last but not least, all the colleagues with whom I have collaborated in Argentina and from whom I have learned so much about all the different activities and value chains in the agricultural and biofuel sectors, in particular Jorge Hilbert, Stella Carballo, Jose Volante and Alberto Garre.

I am grateful to the anonymous peer reviewers that have provided invaluable comments and helped improve the quality and value of the scientific publications included as chapters in this book. My gratitude also goes to the members of the Assessment Committee - Harmen Verbruggen, Tom Veldkamp, Leen Hordijk, Eric Lambin and Ken Giller - for their time and availability to review my dissertation.

Throughout my PhD, I had the opportunity to join and/or work closely together with different organizations. At the department of Spatial Economics of the Vrije Universiteit Amsterdam, and at the SPINlab in particular, I found a friendly group of colleagues and an exciting working environment for conducting scientific research. *Muito obrigado* to Eduardo Dias for alluring me to the academic world and for suggesting me to work together with Eric during my internship at Geodan – a seemingly small event that happened to change everything! Special thanks also for Maarten Hilferink and Martin van der Beek from ObjectVision, who developed the GeoDMS software upon which most of the spatial tools described in this dissertation were built. My PhD trajectory was punctuated from time to time with activities that, despite not directly contributing to this dissertation, gave me the opportunity to test some of the concepts and methods presented here and to apply them in new contexts. I am grateful to Bart Rijken from the Dutch Environmental Assessment Agency (PBL) for our “*awry*” discussions on the development of land-use modelling tools, and for the invitation to join a consortium investigating the implications of different water and land management alternatives on peaty meadow areas in the Netherlands. I would like to express my gratitude to Victor Sposito and Rob Faggian for warmly welcoming me twice at their research groups in Melbourne and allowing me to contribute to their ambitious work programme on climate change adaptation in Australia - I hope we can further strengthen our cooperation in the coming years! I have also greatly enjoyed the project carried out together with Eduardo, Wil Smits and André Freitas on the development of a spatial decision support tool for agro-forestry activities in Indonesia. Many thanks to Anna Duden for the invitation, on behalf of 33 Asset Management, to perform a case study on the economic feasibility to sustainably produce biofuel in Mozambique. I would also like to acknowledge the OECD Environment Directorate for commissioning a review of available land use datasets and indicators. For two years, I was part of the team developing the LUISA Territorial Modelling Platform at the Joint Research Centre of the European Commission, in which had the opportunity to put into practice some of the approaches developed during my PhD research. *Grazie mille* to all the LUISA team for the great time I have spent there, and particularly to Carlo Lavallo for inviting me join the team, and to Chris Jacobs-Crisioni, with whom I shared many research and personal interests and learned so much in terms of model building and programming.

In the last six years, I have been moving around quite a lot - Lisbon, Utrecht, Buenos Aires, Amsterdam, Melbourne, Ispra, Antwerp - and I was fortunate to meet some of the most amazing people in the different places where I have lived. Though the list would become terribly long to single out all their names, I am profoundly grateful to all my friends, old and new, for always providing me with all kinds of much-needed distractions from my work activities. Special thanks go to André Cerveira, not only for his amazing work on the book design and cover, but also for the challenging talks we had, which forced me to reflect upon the purpose of this book at a time that I really needed to do that – *grande abraço mano!*

I reserved my last acknowledgements for the ones that will always come first. *Aos meus pais e irmãs, um agradecimento muito especial por todo o amor e apoio incondicional, ainda que à distância!* To Gabi, I simply can't thank you enough for being the most amazing, inspiring and caring partner, always by my side to support me with the right balance of critical feedback, moral encouragement, leisure distractions and travel adventures (the right balance being, of course, more of the latter!). I am extremely happy that we can now celebrate this achievement together and I look forward to the next adventures that will certainly follow!

Vasco Diogo

Antwerpen, May 2018