

Preface

When starting to rearrange my lecture notes I had a 'short introduction to multivariate vegetation analysis' in mind. It ended up as a 'not so short introduction'. The book now summarizes some of the well-known methods used in vegetation ecology. The matter presented is but a small selection of what is available to date. By focusing on methodological issues I try to explain what plant ecologists do, and why they measure and analyse data. Rather than just generating numbers and pretty graphs, the models and methods I discuss are a contribution to the understanding of the state and functioning of the ecosystems analysed. But because researchers are usually driven by their curiosity about the functioning of the systems I successively began to integrate examples encountered in my work. These now occupy a considerable portion of this book. I am convinced that the fascination of research lies in the perception of the real world and its amalgamation in the form of high-quality data with hidden content processed by a variety of methods reflecting our model view of the world. Neither my results nor my conclusions are final. Hoping that the reader will like some of my ideas and perspectives, I encourage them to use and to improve on them. There remains considerable scope for innovation.

The examples presented in this book all come from Central Europe. While this was not intended originally, I became convinced the topics they cover are of general relevance, as similar investigations exist almost everywhere in the world. An example is the pollen data set: pollen profiles offer the unique chance to study vegetation change over millennia. This is the time scale of processes such as climate change and the expansion of the human population. Another, much shorter time series than that of pollen data is found in permanent plot data originating from the Swiss National Park that I had the opportunity to look at. The unique feature of this is that it dates back to the year 1917, when Josias Braun-Banquet personally installed the first wooden poles, which are still in place. Records of the full set of species

have been collected ever since in five-year steps. A totally different data set comes from the Swiss Forest Inventory, presented in the last chapter of this book. Whereas many vegetation surveys are merely preferential collections of plot data, this data set is an example of systematic sampling on a grid encompassing huge environmental gradients. It helps to assess which patterns really exist, and whether some of those described in papers or textbooks are real or merely reflect the imagination or preference of researchers scanning the landscape for nice locations. In this case the data set available for answering the question is still moderate in size, but handling of large data sets will eventually be needed in similar contexts. I used the Swiss wetland data set as an example for handling data of much larger size, in this case with $n = 17608$ relevés. Although this is outnumbered by others, it resides on a statistical sampling design.

Some basic knowledge of vegetation ecology might be needed to understand the examples presented in this book. Readers wishing to acquire this are advised to refer, for example, to the comprehensive volumes *Vegetation Ecology* by Eddy van der Maarel (2005) and *Aims and Methods of Vegetation Ecology* by Mueller-Dombois and Ellenberg (1974), presently available as a reprint. The structure of my book is influenced by Orlóci (1978) *Multivariate Analysis in Vegetation Research*, which I explored the first time when proofreading it in 1977. Various applications are found in the books of Gauch (1982), Pielou (1984) and Digby and Kempton (1987) and many multivariate methods used in vegetation ecology are introduced in Jongman *et al.* (1995). To study statistical methods used in this book in more detail, I strongly recommend the second edition of *Numerical Ecology* by Legendre and Legendre, probably the most comprehensive textbook existing today. Several books provide an introduction to the use of statistical packages, which are referred to in the appendix. For many reasons I decided to omit the software issue in the main text; upon the request of several reviewers I added a section to the appendix where I reveal how I calculated my examples and mention programs, program packages and databases.

I would like to express my thanks to all individuals that have contributed to the success of this book. First of all Rachel Wade from Wiley-Blackwell, who strongly supported the efforts to print the manuscript in time and organized all the technical work. I thank Tim West for careful copy-editing, and Robert Hambrook for managing the production process. My colleagues Anita C. Risch and Martin Schütz revised the entire text, providing corrections and suggestions. Meinrad Küchler helped in the computation of several examples. André F. Lotter provided the pollen data set. I cannot remember all the people who had an influence on the point of view presented here:

many ideas came from László Orlóci through our long lasting collaboration, others from Madhur Anand, Enrico Féoli, Valério de Patta Pillar, Janos Podani and Helene Wagner. I particularly thank my family for encouraging me to tackle this work and for their tolerance when I was working at night and on weekends to get it completed.

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Birmensdorf, 1 December 2009