

## Comparative Plant Succession among Terrestrial Biomes of the World

Despite more than a century of study by ecologists, recovery following disturbances (succession) is not fully understood. This book provides the first global synthesis that compares plant succession in all major terrestrial biomes and after all major terrestrial disturbances. It asks critical questions such as: Does succession follow general patterns across biomes and disturbance types? Do factors that control succession differ from biome to biome? If common drivers exist, what are they? Are they abiotic or biotic, or both? The authors provide insights on broad, generalizable patterns that go beyond site-specific studies, and present discussions on factors such as varying temporal dynamics, latitudinal differences, human-caused versus natural disturbances, and the role of invasive alien species. This book is a must-read for researchers and students in ecology, plant ecology, restoration ecology, and conservation biology. It also provides a valuable framework to aid land managers attempting to manipulate successional recovery following increasingly intense and widespread human-made disturbances.

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The world's biological diversity faces unprecedented threats. The urgent challenge facing the concerned biologist is to understand ecological processes well enough to maintain their functioning in the face of the pressures resulting from human population growth. Those concerned with the conservation of biodiversity and with restoration also need to be acquainted with the political, social, historical, economic and legal frameworks within which ecological and conservation practice must be developed. The new Ecology, Biodiversity, and Conservation series will present balanced, comprehensive, up-to-date, and critical reviews of selected topics within the sciences of ecology and conservation biology, both botanical and zoological, and both 'pure' and 'applied'. It is aimed at advanced final-year undergraduates, graduate students, researchers, and university teachers, as well as ecologists and conservationists in industry, government and the voluntary sectors. The series encompasses a wide range of approaches and scales (spatial, temporal, and taxonomic), including quantitative, theoretical, population, community, ecosystem, landscape, historical, experimental, behavioural and evolutionary studies. The emphasis is on science related to the real world of plants and animals rather than on purely theoretical abstractions and mathematical models. Books in this series consider issues from a broad perspective. Some books challenge existing paradigms and present new ecological concepts, empirical or theoretical models, and testable hypotheses. Other books explore new approaches and present syntheses on topics of ecological importance.

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## *Preface*

This book emerged from sharing a sticky, cinnamon-covered funnel cake while sitting on the grass in a park in Boulder City, Nevada. We, Karel and Lawrence, were scheming about new ways to work together and we agreed that a long-standing challenge in succession research was the lack of generalization at broader spatial scales. What if we could find a few basic ways to compare enough studies from many disturbances and biomes? Would that help unwind the numerous threads of successional research that, like the strings of our funnel cake, seemed hopelessly tangled? With the enthusiastic support of our wives, we decided to tackle the challenge to search for possible patterns among the thousands of studies of succession. We were encouraged by our recent paper (Prach & Walker, 2019) that showed clear latitudinal trends, following mining and abandoned fields, in what we call the success of succession, or the return to a study's local potential natural vegetation. Were such patterns the first glimpses to a more robust generalization? This book thus represents both the first comprehensive survey of plant succession in nearly two decades as well as the first attempt at global comparisons of terrestrial succession among all major disturbances and biomes. We encourage you to dip into it to see how we fared.

Plant succession is a central theme in ecology that focuses on temporal dynamics. Yet, despite the large number of site-specific studies, there is a lack of comparative studies on succession that consider broad geographical scales. In our research careers, we have attempted to address this imbalance.

Another aspect of succession that concerns us both is its applicability to practical issues of conservation and restoration. We see restoration as the deliberate manipulation of succession to a desired goal. We also have found that often well-intentioned manipulations are counterproductive to achieving a desirable endpoint, particularly if principles of ecological succession are not understood. Thus we hope that this book will be

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useful not only to academic ecologists but also to practically oriented people including conservationists and restorationists.

We have many people who helped this book come to fruition. First, of course, are our wives, who deserve much thanks for their patience, not only when we wrote in our own homes but when we were visiting each other. Karel thanks his home institutions, the Faculty of Science USB in České Budějovice (especially his Restoration Ecology Working Group) and the Institute of Botany, Czech Academy of Science for support, and funding for the project from Grant no. 17-09979S and partly from Grant no. 20-06065S from the Czech National Science Foundation. Lawrence thanks his institution, the University of Nevada, Las Vegas, for logistical and financial support. We both thank the staff of Cambridge University Press, particularly Dominic Lewis and Michael Usher, the series editor, for their encouragement and support of this project and the external reviews of the prospectus that they provided. Petra Pospíšilová diligently made many of our figures, Luboš Tichý and Petra Janečková helped with statistics, and Petra Janečková also was very helpful in searching the literature for suitable studies. We are indebted to our many colleagues whose detailed and insightful comments greatly improved the book. Reviewers included Richard Bardgett, Sandor Bartha, Peter Bellingham, Phil Burton, Ray Callaway, Bruce Clarkson, Roger del Moral, Ned Fetcher, Fred Landau, Scott Meiners, Ondřej Mudrák, Martin Prach, Marcel Rejmánek, Joanne Sharpe, and Aaron Shiels. We also thank our colleagues Ivana Jongepierová, Iveta Kadlecová, Jitka Klimešová, Jan Š. Lepš, Anička Müllerová, Klára Řehouňková, and Martina Vašutová for additional support. Photos were kindly shared by Grizelle Gonzalez, Lenka Oplatková, Elizabeth Powell, Lenka Šebelíková, and Zuzana Veverková (see figure legends for credits).