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Coastal Dunes

Ecology and Conservation

With 108 Figures, 3 in Color, and 33 Tables

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Cover illustration: Background: Coastal foredunes migrating inland, Fire Island, New York, USA. The house has since been picked up and moved inland, along with a few others that were in jeopardy of tumbling into the sea (Photo N. Psuty). Upper right hand insert: *Chamaecrista chamaecristoides* a shrubby legume endemic to the Gulf of Mexico with two disjunct populations on the Pacific. It is one of the first colonizers of mobile dunes and facilitates survival and growth of late colonizers (Photo M.L. Martínez). Lower left hand insert: Coastal dune system, La Mancha, in central Gulf of Mexico, Mexico. The photo shows different successional stages from early (mobile dunes) to late (tropical rain forest growing on dunes, in the back) (Photo M.L. Martínez). Lower right hand insert: Production of drinking water in the coastal dune area of Meijendel in the Netherlands. The photo shows an artificial lake where pre-treated water of the river Meuse is infiltrated into the subsoil (Photo K. Tomei)

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Preface

Coastal dunes are characterized by a high ecological diversity, which is the result of a wide set of geomorphological features, environmental heterogeneity, and species variability. These ecosystems have a worldwide distribution covering almost every latitude, from tropical to polar. However, in spite of this global abundance and their ecological and economic relevance, coastal dunes have been substantially altered by human activities, and many are already severely and irreversibly degraded.

Sand dunes have been studied for a long time (as early as 1835). However, there has been strong emphasis on the mid-latitude dune systems and little attention given to low-latitude situations. Unfortunately, it is in these lower latitudes, the tropics, where much of the modern exploitation and coastal development for tourism is occurring. In addition, the modest communication and collaboration among scientists studying coastal dunes in tropical and temperate latitudes have generated a degree of scientific isolation and have limited the occasions of comparing data, performing interdisciplinary studies, and coordinating joint research programs. In an effort to foster scientific dialogue and encourage collaboration, this book brings together coastal dune specialists from tropical and temperate latitudes covering a wide set of topics and experiences.

The concept for this book started at the joint meeting of the XVI International Botanical Congress and the Annual Meeting of the ATB (Association of Tropical Biology) held in St. Louis, Missouri, USA, 1–7 August 1999. During the Symposium titled “Coastal sand dunes: their ecology and restoration”, a group of dune specialists made presentations on dune morphology; the roles of species and groups of species in maintaining ecological processes; and specific proposals to promote dune conservation, protection, enhancement, and wise utilization. This meeting between multinational colleagues (mostly tropical and subtropical) led to the opportunity to exchange information and gain new perspectives, and spurred conceptual development of this collection. The theme for the book matured and evolved to include patterns and processes occurring in *both* tropical and temperate latitudes, but with a bias to the neglected tropical areas. The original set of participants was expanded to

increase the variety of topics and experiences. In the end, 48 authors from 9 different countries contributed to the book's contents.

A major product of this book is a set of recommendations for future research, identifying some of the most relevant topics of which detailed knowledge is still lacking. It also identifies potential management tools that will promote and maintain the rich diversity of the dune environments, independent of the latitude where they occur. Finally, the paradox of conservation versus increasing coastal development considers the maintenance of the natural dynamics of coastal dunes together with the changes wrought by human activities. That is, a dynamic approach is necessary in order to achieve an enlightened conservation of the coastal environment.

This book was peer-reviewed by many experts, whose comments greatly improved the quality of each chapter: J.M. van Alphen, S.M. Arens, Pieter G.E.F. Augustinus, Michael Barbour, Janusz Blaszkowski, Robert Boyd, Oscar Briones, Ragan Callaway, R.M. Crawford, A.J. Davy, Omar Defeo, Wilfried H.O. Ernst, Alberto González, Rudolf de Groot, A.P. Grootjans, Patrick Hesp, Peter Hietz, Gilles Houille, A.H.L. Huiskes, R. Karr, Suzanne Koptur, Robert Manson, M. Anwar Maun, Catherine Meur-Ferrec, Roland Paskoff, Edmund Penning-Rousell, Orrin H. Pilkey, Thomas Poulson, Gretel van Rooyen, John Sawyer, Ian Spellerberg, Martyn Sykes, David Sylvia, Guillermo Tell, Leonard B. Thien, and S.E. van Wieren. Specifically, we gratefully acknowledge Martyn Caldwell for his editorial advice and his thorough revision of the book.

Finally, the senior editor, M. Luisa Martínez, who bore much of the editorial workload of the book, would like to thank her colleagues who gave logistic support, namely: Octavio Pérez-Maqueo, Gabriela Vázquez, Rosario Landgrave, M. Luisa Vázquez, Antonio Martínez, Ana Martínez, Alejandra and Carolina Vela, Josefa Vázquez, Nickteh Sánchez, and Araceli Toga. Thanks also to Valeria Pérez-Martínez for the many meaningful moments while we were working on the book, and to Dieter Czeschlik and Andrea Schlitzberger for their constant interest and support throughout the different stages of the book, from the very beginning.

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