
Preface

Open ecosystems are an anomaly, an aberration from the way nature is supposed to work. They should be forests, the natural successional climax where the climate is warm enough and wet enough for tall plants to grow and shade out the smaller ones. For at least 200 years, open ecosystems have been explained away, by science, as degraded, deforested landscapes. Only in the last 20 years have we begun to recognize our error and accept that many of these ecosystems are ancient, far too old to be created by human actions. With that recognition, we have also had to accept that the enemies of forest, wildfires and large herbivores, are also ancient and powerful allies of the biota of open ecosystems. This book introduces readers to the major topics that are being explored in research on open ecosystems. From small, recent beginnings, an avalanche of research papers are being published covering diverse aspects of the ecology and evolution of open ecosystems. I have been involved in several of the topics and have tried to capture their brief history and where they are heading. This is no easy task given the rate at which new work is appearing.

There is an enormous literature, including a number of books, on each of grasslands, savannas, Mediterranean-type shrublands, and a rapidly exploding literature on fire as a major regional and global force. But this is the first book, I think, that takes a global view on all of these ecosystems and explores common attributes and explanations for their existence. My constant difficulty in writing it was trying to avoid getting side-tracked into the rich and familiar literature on fire ecology, or on the ecology of the major open biomes, grasslands, savannas, or shrublands. I have tried to stick to the fundamental questions of where, why, and for how long open, typically low biomass ecosystems occur

side by side with closed forest ecosystems. In trying to look at the world afresh, perhaps the most unnerving discovery for me was the profound way in which organisms can alter their own environments to better suit themselves and their progeny. I had been exposed so long to the view that the physical climate sets the rules to which plants and animals ultimately have to conform. It is challenging, to say the least, to accept that completely different ecosystems can develop from the same physical environment, and that life can manipulate the raw materials in such profound ways.

I apologize for glaring omissions of what those in the know consider key papers. Nevertheless, I hope there are enough signposts to get the uninitiated started if they want to pursue any research area further. As regards geographical coverage, I have tried to take a global perspective since I believe that recognition of open ecosystems around the world will force a major revision of our understanding of biogeography at a time when we most need it. I am most familiar with southern African grasslands, savannas, and shrublands on the light side and with closed evergreen forests and thickets on the dark side. I have been fortunate in visiting, and often working in, open ecosystems in the southern, and parts of the northern, hemisphere where I have tried out the ideas developed in this book. It has been an exciting and enjoyable endeavour shared with many excellent hosts.

A major motivation for writing this book was my concern over internationally supported policies and funding for eliminating open ecosystems by 'reforesting' them. There are areas of the world in dire need of protection of existing forest and restoration of felled forests. But it is alarming to see proposals taken seriously for planting up trees in an area half

the size of the Australian continent in the next decade, supposedly to reduce global warming. Fanatical afforestation on this scale could cause untold damage for generations to come. At the very least, people must learn to tell the difference between ancient old-growth open ecosystems and true deforestation so they know what they are destroying. It is my hope that this book will contribute to wiser counsel.

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Part of the excitement of the science of open ecosystems is that it is a global endeavour with new ideas and observations changing the way we look

at nature in many parts of the world. It can be very difficult picturing vegetation from the literature—e.g. there are many shades of meaning to the word 'forest'. Caroline Lehmann hosted a breakthrough field trip and workshop in Australia that brought together colleagues from South America, Africa, and Australia during which we developed a common vocabulary and set of concepts. On my travels, I am very grateful to the following for generous hospitality: Dick Williams, Garry Cook, Alan Andersen, Dave Bowman, and Grant Wardell-Johnson in Australia; Alan Mark, Kath Dickinson, and Bill Lee in New Zealand; Bill Hoffmann, Giselda Durigan, Alessandra Fidelis, Inara Leal, Geraldo Fernandes, and Elise Buisson in Brazil; Sandra Díaz, Lucas Enrico, and Pedro Jaureguiberry in Argentina; John Silander and Joel Ratsirarson in Madagascar; Yadvinder Malhi and Anabelle Cardoso in Gabon; the Tropical Biology Association, Duncan Kimuyu, and Colin Beale for East Africa; Norman Owen-Smith, Izak Smit, Winston Trollope, Harry Biggs, and Rina Grant for South Africa; David Beerling, Andrew Illius, and Colin Osborne in the UK, along with the remarkable group of fire palaeoecologists including Andrew Scott, doyen and entertaining guide to the deep past and Claire Belcher, brilliant experimentalist on ancient ecosystems. In Europe, many thanks to Joris Cromsigt, Mariska te Beest, Steve Higgins, Herbert Prins, Simon Chamaille, and Herve Fritz. The MEDECOS group has been a training ground and inspiration for many of my generation: thanks to Jon Keeley, Juli Pausas, Phil Rundel, and to Byron Lamont and Tianhua He for their surge of phylogenetic research on the ancient history of fire. In recent times in the USA thanks for great field trips to Joe Craine, and Quinton and Elizabeth Martins, and to Lars Hedin and Simon Levin for a friendly introduction to east coast academe. In India, we had exciting times, and great food, with Jay Ratnam and Mahesh Sankaran, and in China, also with great food, with Tristan, Kyle Tomlinson, and our hosts at Xishuangbanna Tropical Botanical Garden.

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