
Preface

We have used the term *Fynbos* in the title of this book. But what is fynbos? In a strict sense, fynbos refers to a narrowly defined vegetation type found in the extreme southwestern corner of Africa, the Cape Floristic Region (CFR). The term also has broader meaning, however, being used colloquially to refer to any fine-leaved vegetation found in this region, and even being used by non-biologists to refer more loosely to the sun-drenched, mediterranean-type environments of the Cape region.

Although the material presented in the present volume addresses a diversity of vegetation types (e.g. renosterveld, subtropical thicket, succulent karoo), besides fynbos, which occur in the Greater Cape Floristic Region (GCFR; encompassing the CFR and the adjacent succulent karoo region), we have entitled it *Fynbos* for two reasons. First, most informed biologists are familiar with the term and immediately associate it with the extremely species- and endemic-rich vegetation which forms the backbone of the renowned Cape flora. Second, while a title referring to the GCFR might have been technically more appropriate, we felt that such a title would be cumbersome and consequently lack punch. Besides, much of the material presented does focus on fynbos vegetation, making this an appropriate point of convergence and departure throughout the book. Overall, this book represents an interdisciplinary account of current knowledge relating to the ecology, evolution, and management of biological diversity in the GCFR, although some themes are addressed more broadly than others, both with regard to geographical scope (e.g. GCFR versus CFR) and the range of vegetation types addressed. Fynbos, however, occupies centre stage throughout.

The CFR has intrigued biologists for centuries, achieving iconic status as a locus of megadiversity and a place to study the ecological underpinnings of massive evolutionary radiations. Scholars, both local and from overseas, have made great advances, over the past two decades, in unravelling the ecological and evolutionary complexities of the CFR, especially that of the species-rich fynbos vegetation. While progress in

the evolutionary sphere has perhaps been most prominent, significant advances have also been made in the fields of conservation science, pollination biology, invasive plant biology, palaeoecology, and palaeoanthropology (modern human behaviour evolved along the Cape coast some 160 000 years ago). Moreover, a growing recognition of the physiographic and floristic affinities of the CFR with the neighbouring succulent karoo region has led many workers to broaden the geographical scope of their thinking to embrace the entire GCFR.

Lessons from the Cape region (CFR and GCFR) offer much of value for understanding the origin, maintenance, and conservation of biological diversity in general. Besides offering an independent view on megadiversity from that provided by tropical ecosystems, the region offers valuable alternative perspectives for understanding and testing ecological theory, much of which has been developed in the context of the Northern Hemisphere systems which first emerged in the wake of receding glacial ice sheets 12 000 years ago. The Cape region presents a contrary perspective, both on account of the greater importance of fire and nutrients as ecological drivers, and on account of its deep evolutionary history, undoubtedly a product of its greater environmental stability at least since the Early Pliocene. Such contrasts to accepted theory offer the grist to challenge and refine the models we use to understand the natural world and how it will respond to global change.

The purpose of the present volume is to document advances in our understanding of the biodiversity, evolution and ecology of the Cape region since the last major synthesis of the topic, *The ecology of fynbos: nutrients, fire and diversity*,¹ was published more than two decades ago. We can think of at least two compelling justifications for a new synthesis and interpretation: first, to capture the insights of a new generation

¹ Cowling, R.M. (1992). *The ecology of fynbos: nutrients, fire and diversity*. Oxford University Press, Cape Town.

of biologists, and, second, to incorporate the large body of knowledge that has accumulated in the two decades since the publication of the first volume. With regard to the latter, huge developments in computing power and analytical methodologies, as well as the rapid availability of DNA sequence data for many Cape plant lineages and spatially comprehensive digital plant and animal datasets, have made it possible to implement analyses that the authors of the first book could only dream about. In addition, it is hoped that the present synthesis will facilitate the urgent development of management policies and guidelines geared towards addressing the biodiversity challenges posed by accelerating global change. The present book is aimed at an international audience of scholars interested in the understanding of evolution and ecology of the GCFR biota. As such, our objective has been to produce a book that is comprehensible by the informed, but not necessarily specialist, reader.

The chapters included in this book fall into four broad themes. The first of these, represented by Chapters 1–4, relates to environmental context, comprising accounts of the vegetation of the GCFR (Chapter 1), the historical and contemporary physical environment (Chapter 2), and variation in fire regime and fire management (Chapter 3). Also included in this section is an evaluation of the general validity of the GCFR as a biogeographic unit (Chapter 4). The second theme, represented by Chapters 5–8, relates to the historical development of the Cape biota, with chapters exploring the Cenozoic assembly of the flora (Chapter 5), diversification process (Chapter 6), phylogeographic pattern and its determinants (Chapter 7), and the palaeoecological context of the emergence of modern humans in the region (Chapter 8). A third theme, presented in Chapters 9–11, is centred on ecological process, specifically that underpinning community structure and richness. Topics covered here include the assembly and functioning of plant communities (Chapter 9), biotic interactions (Chapter 10), and the influence of plant form and function (Chapter 11). The fourth major theme, represented by Chapters 12–15, relates to human impacts and their management, the major issues addressed here being biological invasions (Chapter 12), climate change (Chapter 13), conservation (Chapter 14), and people and sustainability (Chapter 15). Finally, Chapter 16 provides a global perspective, setting the climate and biodiversity of the GCFR in the context of the world's other Mediterranean-type ecosystems.

Invariably, a project of this scope relies on the support and contributions of many individuals, some of whom are not listed as authors or co-authors on

chapters. First and foremost, the editors wish to thank Richard Cowling for providing the inspiration behind this book. We also thank Richard for providing ongoing advice on editorial matters and for his willingness to serve as a 'third reviewer' on several chapter drafts. We are also extremely grateful to Michelle Bradshaw, who performed an outstanding job as copy editor, bringing a rigour to this task which we as editors would not have been able to do. We also owe an enormous vote of thanks to a large corps of individuals, some anonymous, who generously gave their time to review either the initial book proposal or the component chapters: Sally Archibald, Nigel Barker, Mark Botha, John Compton, Richard Cowling, Helen de Klerk, Barend Erasmus, Karen Esler, Pat Holmes, Peter Goldblatt, Gavin Gouws, Susan Harrison, Andrew Latimer, David Le Maitre, John Manning, Michael Meadows, Eugene Moll, Fernando Ojeda, Anibal Pauchard, Craig Peter, Tony Rebelo, David Richardson, Robert Ricklefs, Brad Ripley, Philip Rundel, Erik Veneklaas, Sandi Willows-Munro, Sarah Wurtz, Colin Yates. Finally, we thank the following organizations for financial support, C.A.P.E. and the South African National Biodiversity Institute, and our families, colleagues and institutions for their support during the writing and editing of this book.

Throughout this book we have sought to standardize terminology relating to the description of vegetation. Where left uncapitalized, the terms 'fynbos', 'renosterveld', 'succulent karoo', 'forest', and 'thicket' (including 'strandveld') are used to refer to the principal vegetation types as found within the GCFR (Fig 1.1). Similarly, 'desert', 'Nama karoo', 'grassland', and 'savanna' are used to refer to vegetation types of adjacent regions outside of the GCFR. Where capitalized, however, the terms 'Fynbos', 'Forest', 'Albany Thicket', 'Succulent Karoo', 'Nama-Karoo', 'Grassland', 'Desert', and 'Savanna' refer explicitly to the formal biomes, as defined by Mucina and Rutherford in *The vegetation of South Africa, Lesotho and Swaziland*. In some instances (e.g. grassland), traditional vegetation types and biomes are approximately equivalent, but in others they are not. Most relevant, in the context of this book, is the inclusion of renosterveld and thicket vegetation, in addition to fynbos, within the Fynbos Biome. This renders the terms fynbos and Fynbos non-equivalent. In contrast to all of these terms, which refer to vegetational entities, the terms CFR and GCFR are geographical.

To assist readers unfamiliar with the geography of the GCFR, a map indicating key localities and landscape features referred to in the book is provided in the beginning of the book (Figure A). This is accompanied, for reference, by a geological timescale for the Cenozoic (Figure B).

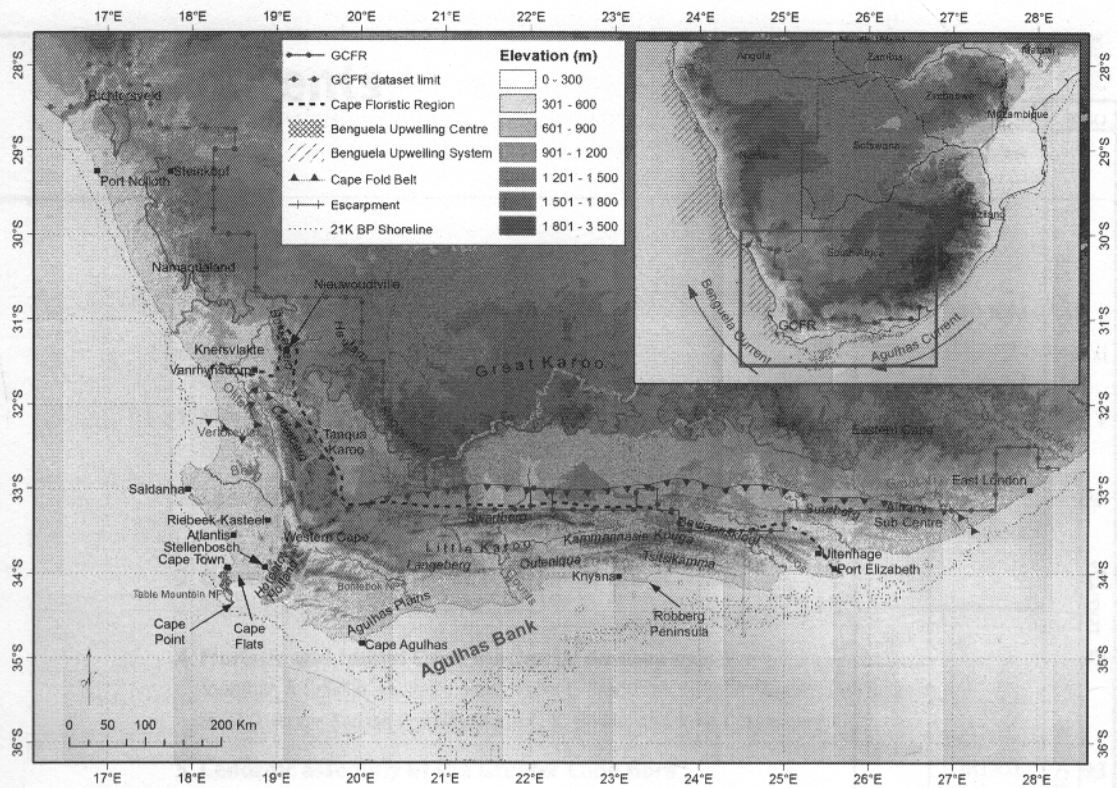


Figure A A map of the Greater Cape Floristic Region showing features and places referred to in the text

Sub-era	Period	Epoch	Sub-epoch	Ma
TERTIARY	QUAT.	PLEISTOCENE		0.01
			Late	1.8
		PLIOCENE		3.6
			Early	5.3
	NEOGENE	MIOCENE		
			Late	11.6
			Middle	16.0
			Early	23.0
		OLIGOCENE	Late	28.1
			Early	33.9
	PALAEOGENE	EOCENE		
			Late	37.8
			Middle	47.8
			Early	56.0
		PALAEOCENE	Late	61.6
			Early	66.0

Figure B A geological time scale for the Cenozoic Era. The Holocene is indicated by hatching. Ages are from Walker, J.D., Geissman, J.W., Bowring, S.A., and Babcock, L.E., compilers. (2012). *Geologic Time Scale, version 4.0*. Geological Society of America, doi: 10.1130/2012.CTS004R3C.