

## Preface

Flowering plants dominate the land, providing nutrition, shelter, and stability for a host of organisms, and the basis of all terrestrial ecosystems. Of the hundreds of thousands of species of flowering plants, a mere 100 or so survive in the sea, about equally divided between mangroves and seagrasses. Although not rich in species, both mangroves and seagrasses are, like their terrestrial counterparts, of major ecological importance.

To most people, mangroves call up a picture of a dank and fetid swamp, of strange-shaped trees growing in foul-smelling mud, inhabited mainly by mosquitoes and snakes. Mud, methane, and mosquitoes are certainly features of mangrove forests—as, sometimes, are snakes. They are not sufficient to deter mangrove biologists from investigating an ecosystem of great richness and fascination.

Mangroves are an assortment of tropical and subtropical trees and shrubs which have adapted to the inhospitable zone between sea and land: the typical mangrove habitat is a muddy river estuary. Salt water makes it impossible for other terrestrial plants to thrive here, while the fresh water and the soft substrate are unsuitable for macroalgae, the dominant plants of hard-bottomed marine habitats. The mangrove trees themselves trap sediment brought in by river and tide, and help to consolidate the mud in which they grow. They provide a substrate on which oysters and barnacles can settle, a habitat for insects, and nesting sites for birds. Most of all, through photosynthesis, they supply an energy source for an entire ecosystem comprising many species of organism. Mangroves are among the most productive and biologically diverse ecosystems in the world.

Seagrasses, although not true grasses, generally grow in a grass-like way, often locally dominating their environment in what are known as seagrass meadows. They grow intertidally, like mangroves, but also subtidally to depths of tens of metres. Like mangroves, too, seagrasses have adapted to conditions of high salinity and living in soft sediments. They create a habitat, and represent a food source on which many other organisms depend.

With both mangroves and seagrasses I discuss the adaptations to their challenging environment, and the communities of organisms that flourish in and around mangrove forests and seagrass meadows, before turning to more general questions of evolution, biogeography, and biodiversity.

Mangroves and seagrasses are of considerable economic significance. Apart from the direct collection of mangrove products, many commercially harvested species of fish, shrimp, and crab are sustained by mangroves and seagrasses, while both mangroves and seagrasses reduce coastal erosion and protect coastlines against wind and wave action. Unfortunately, the importance of mangroves and seagrasses is not always appreciated, and recent years have seen massive degradation and destruction of both habitats, sometimes deliberate, and in other cases inadvertent. Mangroves and seagrasses are vulnerable to climate change—but also, potentially, mitigate its adverse effects.

Conservation, restoration, and sustainable management of these important resources are therefore essential. The impact of the continuing loss of mangroves and seagrasses seems almost too obvious to need pointing out. Cassandra was fated to predict the future and to have her predictions ignored; biologists sometimes feel they have a similar role.

The productivity and diversity of these remarkable habitats therefore makes them of great interest to biologists and of considerable social and economic value, while degradation and destruction by human activities makes it more than ever essential to understand their significance. Research has advanced considerably in recent years, and the time seems right for an attempt to present our current understanding of the mangrove and seagrass ecology.

My aim in writing this book is two-fold: to share my own enthusiasm for these remarkable ecosystems, and to explain how our understanding is unfolding. Any author depends on the work of others, and I am grateful to numerous colleagues for their help in various ways. In particular, I should like to thank Larry Abele, Liz Ashton, Patricia Berjak, Mike Gee, Rony Huys, Ong Jin Eong, Daphne Osborne, Mohammed Tahir Qureshi, and Di Walker for their help with this and previous editions. Any errors that remain are, of course, entirely my own.

Writing books has its pleasures, particularly learning about areas of the subject with which one was previously not sufficiently familiar. It also has its disadvantages, and most authors would at some stage agree with the heartfelt—and, in this context, singularly apposite—words of the great American naturalist John James Audubon: ‘God . . . save you the trouble of ever publishing books on natural science . . . I would rather go without a shirt . . . through the whole of the Florida swamps in mosquito time than labor as I have . . . with the pen.’<sup>1</sup> For sustaining me throughout the labours with the pen (and for joining me in the Malaysian swamps in mosquito time) I should especially like to express my gratitude to Sylvia Hogarth, to whom this book is dedicated.

P.J.H.

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<sup>1</sup> Letter to J. Bachman, 1834, quoted by Alice Ford (1957): *The Bird Biographies of John James Audubon* (Macmillan, N.Y.), pp. vii–viii.