Insect Diversity Conservation

This groundbreaking book is an up-to-date global synthesis of the rapidly developing and important field of insect conservation biology. Insects are by far the most speciose organisms on earth, yet barely known. They play important roles in terrestrial ecological processes and in maintaining the world as we know it. They therefore present particular conservation challenges, especially as a quarter may well become extinct in the next few decades.

This book first addresses the ethical foundation of insect conservation, and asks why we should concern ourselves with conservation of a butterfly, beetle or bug. The success of insects and their diversity, which have survived the comings and goings of glaciers, is now facing a more formidable obstacle: the massive impact of humans. After addressing threats, from invasive alien plants to global climate change, the book then explores ways in which insects and their habitats are prioritized, mapped, monitored and conserved. Landscape and species approaches are considered. Restoration, and the role of conventions and social issues are also discussed. The book is for undergraduates, postgraduates, researchers and managers both in conservation biology or entomology and in the wider biological and environmental sciences.

MICHAEL J. SAMWAYS is Professor of Entomology at the University of Stellenbosch, South Africa. He is internationally known as a conservation biologist and policy advisor.

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MICHAEL J. SAMWAYS

University of Stellenbosch, South Africa

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Michael J. Samways
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Preface

Some say that 'the cockroach' will be the last species on Earth to survive. Then it has been calculated that one gravid aphid, left to reproduce with zero mortality, will, after one year, cover the globe with an aphid layer over 140 km thick. Not forgetting too, that flies and fleas vector disease. So, why should we even consider conserving insects? Quite simply, without insects, the likelihood is that the world as we know it would be radically changed in a matter of days. Besides, it is only a tiny minority of insects that harm our lives. These two faces of insects, friend and foe, are just one of the several paradoxes that characterize insect conservation from other facets of taxon-based conservation biology. Our impacting on landscapes can turn a benign insect species into a pest, while, on the other hand, it may cause an extinction of another species. Focusing on the land mosaic, its composition, structure and function, is thus central to insect conservation.

We have no idea of the outcomes from our modification of the biosphere. Blindfolded, we are turning the many faces of the Rubik Cube of biological diversity conservation in the hope that all the faces will match. It is not that we are incapable, it is just that the world is so complex. A thousand species, for example, in the same community (not an unreasonable figure) potentially produces 0.5 million interactions. In addition, strengths of those interactions, and hence outcomes, also vary.

Bleak as this may seem, we are beginning to lift the blindfold and make rational decisions for conserving biological diversity. Insects and their interactions are a major component of that diversity. Indeed, insects are virtual ambassadors for biological diversity. These little animals, by their great variety and abundance, play an unheralded yet pivotal role in our, and many other organisms', lives. We now have a major challenge before us: How do we go about conserving this largely unseen, unknown majority?

The ambassadorial status of insects for terrestrial and aquatic ecosystems is the reasoning behind the title 'Insect Diversity Conservation'. 'Biological' is simply replaced by 'Insect'. This is not in pursuit of entomological chauvinism but rather to emphasize that insects are central, yet with many special features, to biodiversity conservation.

The aim here is to overview and critically appraise the conservation of insect diversity. It focuses strongly on the variety and differences among insects, and links these to landscape and other large-scale conservation initiatives. After all, insects do not rule the world alone. This is not, though, to ignore special cases where a particular insect species requires particular conservation attention.

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Conservation cannot be done without clearly defining our feelings and motives for why we are doing it. This goes beyond simply the utilitarian value of insects for us. This field of environmental ethics in relation to insects is therefore addressed in the first chapter, and is a foundation for all that follows. In Chapter 2, the special case for insects, in comparison with and in contrast to other organisms, is argued. This is not to say that insect conservation is tangential to mainstream conservation. Rather, it is central, especially as insects play so many keystone roles in non-marine ecosystems. These roles and others are discussed in Chapter 3. These first three chapters together are the launching point for the rest of the book, and address why there is the need for insect diversity conservation. Part II (Chapters 4–7) addresses threats to insect variety, and emphasizes that many of these threats are multiplicative, with one threat compounding another. Part III (Chapters 8–12) then reviews the options that we have to ameliorate these threats.

As insects are now featuring much more strongly in biodiversity conservation, the field of insect conservation biology has grown enormously in recent years. It is clear too that there are many varying, even conflicting conclusions when various studies are compared. These differences seem to arise mainly from three different perspectives: differences in spatial scale of the study, differences in biogeographical regions, and differences in the focal taxa used. This is healthy and indicative of a rapidly growing field of study. Nevertheless, some general principles are beginning to emerge, and in terms of management, these are synthesized in Part III.

Insect conservation has been a rapid growth area in recent years, often with intense debate. In response, I really do appreciate the stimulating feedback from Jonathan Ball, Andy Beattie, Steve Compton, Eduardo Galante, Henk Geertsema, Justin Gerlach, Jeff Lockwood, Melodie McGeoch, Tim New, Paul Pearce-Kelly, Andrew Pullin, Nigel Stork and Stuart Taylor, as well as the lively minds of my research students over the years. Many authors kindly made available text figures, and these are acknowledged with each figure.

This work would not have been possible without the amazing support of Colleen Louw (processing text), Stuart Taylor (processing figures) and James Pryke (processing references). Anni Coetzer produced the beautiful cover and text illustrations, so rich in symbolism. Ward Cooper and Jo Bottrill saw production of the book to its completion. My warm thanks to these friends for making this such an enjoyable enterprise.

Cover picture

In an ever-changing, human-transformed world, we often overlook the importance of each little creature in our earthly ecosystem. Conscious and moral Man holds the future well-being of the world in his hand. Yet the race is against time, that these noble efforts are not in vain. Insects are an ancient, ecologically significant and beautiful component of the world, symbolized here by the dragonfly. The variety of insect life around us, be it in our garden or city park, are a constant reminder that these small but numerous animals are part of the fabric and health of our planet. By destroying these living creatures and their habitat, the delicate glass of our ecosystem will shatter, leaving us with a transformed, bare world, devoid of colour and life as we once knew it. Time is now short for ensuring the future of this amazing insect diversity.

Anni Coetzer