

Zoo Conservation Biology

In the face of ever-declining biodiversity, zoos have a major role to play in species conservation. Written by professionals involved in *in-situ* conservation and restoration projects internationally, this is a critical assessment of the contribution of zoos to species conservation through evidence amassed from a wide range of sources.

The first part outlines the biodiversity context within which zoos should operate, introducing the origins and global spread of zoos and exploring animal collection composition. The second part focuses on the basic elements of keeping viable captive animal populations. It considers the consequences of captivity on animals, the genetics of captive populations and the performance of zoos in captive breeding. The final part examines ways in which zoos can make a significant difference to conservation now and in the future.

Bridging the gap between pure science and applied conservation, this is an ideal resource for both conservation biologists and zoo professionals.

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John E. Fa, Stephan M. Funk and Donnamarie O'Connell

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The world's biological diversity faces unprecedented threats. The urgent challenge facing the concerned biologist is to understand ecological processes well enough to maintain their functioning in the face of the pressures resulting from human population growth. Those concerned with the conservation of biodiversity and with restoration also need to be acquainted with the political, social, historical, economic and legal frameworks within which ecological and conservation practice must be developed. The new Ecology, Biodiversity, and Conservation series will present balanced, comprehensive, up-to-date, and critical reviews of selected topics within the sciences of ecology and conservation biology, both botanical and zoological, and both 'pure' and 'applied'. It is aimed at advanced final-year undergraduates, graduate students, researchers, and university teachers, as well as ecologists and conservationists in industry, government and the voluntary sectors. The series encompasses a wide range of approaches and scales (spatial, temporal, and taxonomic), including quantitative, theoretical, population, community, ecosystem, landscape, historical, experimental, behavioural and evolutionary studies. The emphasis is on science related to the real world of plants and animals rather than on purely theoretical abstractions and mathematical models. Books in this series will, wherever possible, consider issues from a broad perspective. Some books will challenge existing paradigms and present new ecological concepts, empirical or theoretical models, and testable hypotheses. Other books will explore new approaches and present syntheses on topics of ecological importance.

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Foreword

There are many great books on conservation biology and many great books on zoos, as well as shelves full of academic journals and other literature that deal with these topics and their areas of overlap. It is a vast body of work, and for a new entrant to the field, one that is hard to navigate. Here is the answer to that problem. Fa, Funk and O'Connell have brought together all the various strands related to zoos and their roles in animal conservation. The book includes detailed treatments on the full range of relevant topics, ranging from the background to the current species extinction crisis through to the contributions that zoos can make to address it.

Of course, there are critics of zoos in general and critiques of the conservation roles that zoos play. The authors tackle these head on and highlight the areas of captive breeding, public education and being ambassadors for wildlife that zoos uniquely contribute. Over the past 30 years zoos have made major contributions to the science and practice of animal conservation in a number of ways, and contributed individually and collectively to the conservation success for a number of endangered species. Of particular significance is the role that zoos play in conservation that other organisations could not. Generally, this is where well managed living collections of wild animals contribute to conservation theory or practice. Their key roles come from educating and inspiring visitors through well-designed, self-sustaining animal exhibits, contributing to scientific knowledge through observations of animals in their care, developing and communicating expertise in the biology of small populations, and of course through captive breeding programmes. Over time, the zoo community has come to better understand what their conservation priorities should be, how to undertake their unique roles better, and then how to apply these skills through acting individually, collectively or collaboratively in order to maximise the benefits for animal conservation. This book is a testament to the body of knowledge and expertise that the work of zoos and people working in related areas have contributed. Here you will find authoritative and systematic information on all these key areas as well as pointers to more information.

It should come as no surprise that this book on zoo conservation biology largely emanates from Jersey Zoo – now the animal collection component of the Durrell Wildlife Conservation Trust (Durrell). Jersey Zoo was well established in the animal conservation world before most other zoos were even thinking about conservation. Through leadership that began with the vision of Gerry and Lee Durrell and has continued with a clear sense of purpose ever since, Durrell has contributed remarkable success stories showing how dedicated attention to detail, and effective links from the zoo to the wild really can save

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species from extinction. At the same time Durrell has been a flagship for conservation, attracting support and resources directly through beautifully designed and managed animal collections.

One key part of the Durrell programme has been to train conservation biologists, especially to support those from areas of the world with many endangered species. Running over more than 30 years this training programme has brought conservation management skills to a generation of wildlife managers, who represent a network with shared commitments to species conservation and the skills necessary to achieve it. Passing on knowledge and experience, and bringing the next generation of conservation practitioners to a point where they have the skills and resources necessary to act effectively is going to be more important as we enter a period of even greater environmental change with potentially serious consequences for the world's species. This book will be a key resource for the very important work that is to come.

Georgina Mace CBE FRS
London

Preface

Zoos are becoming increasingly important centres, not just for exhibition and recreation, but also for promoting and actively engaging in animal conservation. Emphasis is now placed on educating the visiting public, alongside entertaining them. However, zoos continue to play an important role in *ex-situ* breeding and reintroduction of endangered species.

The efficacy of zoos as institutions capable of maintaining healthy individuals and populations has undoubtedly grown in recent years, as a result of the development of scientifically based techniques. There is a wealth of information now available on zoo management, animal husbandry techniques, captive propagation of species as genetically and demographically viable populations, as well as on the importance of zoos in biodiversity conservation. Some of this knowledge is contained in specialised publications, such as the journal *Zoo Biology*, or the *International Zoo Yearbook* but the literature is dispersed and there are no dedicated texts currently available. No book, however, has directly focussed on what we describe as 'zoo conservation biology'. Zoo conservation biology, distinct from zoo biology which is much more to do with the 'how to' of breeding, behaviour and maintenance of animal species in captivity, is a discipline which studies how zoos can best contribute to biodiversity conservation. Alongside books and literature that support the technical aspects of captive animal management, zoo conservation biology pays more attention to achieving clarity on how best science can be applied within zoos to achieve species recovery and environmental awareness at a global scale. Thus, the object of this book is to provide an up-to-date review of the potential of zoos to actively support the conservation of biodiversity. It is an introduction to conservation biology from within zoos as it relates to the management of animals in captivity and how zoos can function as well-coordinated educational and commercial establishments.

In general, this book is written with the student in mind. However, it is meant to reach a wide audience, requiring no university science prerequisite. The book should guide any reader by providing him/her with the basics required to understand all topics involved, by providing the elementary learning blocks for the uninitiated and a bolster to those with some background.

Acknowledgements

This work has been inspired by our involvement with an organisation, originally the Jersey Wildlife Preservation Trust now Durrell, the worldview and charisma of its founder, Gerald Durrell, as well as the countless friends and colleagues within it (past and present). In particular, we are indebted to the many students from all over the world that have attended courses at the International Training Centre at Durrell, and whom we have taught, for always arousing our enthusiasm and giving us hope. We know they are **all** 'making a difference'. Many collaborators across numerous other organisations have also motivated us and bettered our thinking over the years, we thank them all.

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