Book review: Ecology and Conservation of the Sirenia: Dugongs and Manatees.

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Book Review

Ecology and Conservation of the Sirenia: Dugongs and Manatees. Helene Marsh, Thomas J. O'Shea and John E. Reynolds III. Cambridge University Press (2011). 521 pp., £46 (Hdbk). ISBN: 978-0-521-88828.

In the preface of *Ecology and Conservation of the Sirenia*, the authors state that "This book will fail if it does not instil passion, frustration, excitement and hope for the Sirenia". After having read this excellent volume on the biology and ecology of dugongs, manatees and their extinct relatives, I can personally say the authors have succeeded admirably. This book is both topical and timely, providing a detailed review of current research on the sirenians (dugongs and manatees), the only group of herbivorous marine mammals, at a time when their continued survival demands urgent conservation action. Although these animals remain relatively poorly known when compared to other marine mammals, the authors have a vast amount of experience to impart (having cumulatively spent over a century studying them), and this book is the eminently readable result.

This book does not include in-depth reviews of sirenian anatomy, physiology or genetics, which some readers may find disappointing. Instead, it focuses on major ecological themes that are increasingly important in practical sirenian conservation. Considerable attention is paid to the evolutionary history of the group, describing how much more diverse and species-rich sirenians were in the comparatively recent geological past. A separate chapter is devoted to Steller's sea cow (*Hydrodamalis gigas*), the fifth species of sirenian to persist until recent times, which was hunted to extinction by the 1760s. This chapter is greatly enhanced by the inclusion of numerous excerpts from Georg Wilhelm Steller's original scientific notes.

The next three chapters deal with the ecology of extant sirenians, particularly those aspects of significance to conservation. The authors review and discuss in detail the feeding biology of these aquatic herbivores, including a review of food plants and their nutritional quality, sirenians' foraging methods, and sirenian-plant interactions. An important theme of this chapter is that sirenians, as grazers of seagrass meadows, exert significant influence on food plant biomass, community structure and nutritional quality. The following chapter focuses on behaviour and habitat use in a broader sense, discussing sirenians' sensory systems, locomotion, time budgets, and long-distance movement patterns. Broad behavioural patterns, including social, reproductive and anti-predator behaviours, are also reviewed. The sirenians' obligate aquatic lifestyle and herbivory have led to unique yet surprisingly flexible behavioural patterns, which is good news for conservation. The next chapter is devoted to sirenian life history, reproductive biology and population dynamics, exploring such topics as age estimation, reproductive seasonality, and life history modelling. Throughout the book, considerable attention is given to current methods for studying sirenians including aerial surveys, mark-recapture techniques and molecular methods. Data gaps and avenues for future research are also highlighted, particularly pertaining to species and populations (such as West African and Amazonian manatees) that remain comparatively poorly studied. Each chapter ends with numerous suggestions for future research.

The final chapters focus directly on sirenian conservation, beginning with a review of the numerous threats faced by sirenians today. Many of these threats arise either directly (e.g. hunting, collision

with watercraft) or indirectly (e.g. fisheries bycatch, loss of access to warm-water refuges) through human activities, or may be exacerbated by them (e.g. disease outbreaks). The scale and significance of these threats, and conservation status of all dugong and manatee populations according to IUCN criteria, are reviewed in detail sometimes for the first time. These chapters provide uncomfortable reading for conservationists, as the challenges to sirenian conservation appear manifold and seemingly insurmountable. However, the authors finish the book on a positive note with their final chapter titled ‘Conservation opportunities’, in which they set out practical pathways to successful sirenian conservation and restoration efforts, based on examples from across the world. In the words of the authors, “We agree […] that the pervading culture of hopelessness among conservation biologists is likely to have a negative influence on our ability to mobilise conservation action among the general public”. This sense of cautious optimism that conservation solutions are possible provides a fitting conclusion to this book. Rather than focusing solely on expanding science, the authors instead propose a broader approach to conservation efforts also involving education, community partnerships, economic tools and adaptive management strategies. An extensive bibliography provides ample material for further study.

The authors are all experienced marine mammal researchers, and their desire to inform others about these animals is evident. The book is of a high scientific standard, is written in a clear, legible style and is well illustrated, although some figures could have benefited from a wider range of greyshading. This book is a valuable reference work for anyone who wishes to be informed about the current state of research on this unique group of marine mammals. It is suitable for a wider audience including researchers, resource managers and policymakers, and will also appeal to the serious graduate student with an interest in marine mammal biology, conservation and management.

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