

- 3 O'Brien, E.M. (1998) Water–energy dynamics, climate and prediction of woody plant species richness: an interim general model. *J. Biogeog.* 25, 379–398
- 4 Currie, D.J. (1991) Energy and large-scale patterns of animal- and plant-species richness. *Am. Nat.* 137, 27–49
- 5 Shepherd, U.L. (1998) A comparison of species diversity and morphological diversity across the North American latitudinal gradient. *J. Biogeog.* 25, 19–29
- 6 Andrews, P. and O'Brien, E.M. (2000) Climate, vegetation, and predictable gradients in mammal species richness in southern Africa. *J. Zool.* 251, 205–231

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## Conservation of turtles

**Predicting Extinction: Fundamental Flaws in IUCN's Red List System, Exemplified by the Case of Sea Turtles** by

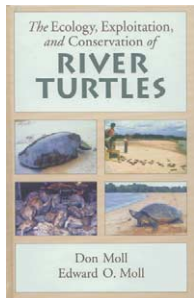
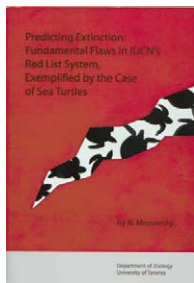
Nicholas Mrosovsky, Department of Zoology, University of Toronto; private publication, 2004 (70 pages).

**The Ecology, Exploitation and Conservation of River Turtles** by Don Moll and Edward O. Moll, Oxford University Press, 2004.

£40.00, hbk (404 pages) ISBN 0 19 510229 0

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For several decades, Nicholas Mrosovsky has provided insightful views on the conservation of sea turtles and has often been at the vanguard of efforts to draw attention to important issues. I remember his papers from the late 1980s about the importance of temperature-dependent sex determination as being one of the staples of my early scientific diet as a PhD student. Over the intervening 15 years or so, Mrosovsky has remained an internationally respected figure, although his views have sometimes been controversial. In *Predicting Extinction*, Mrosovsky examines some of the problems with the International Union for Conservation of Nature and Natural Resource's (IUCN) Red Lists, an issue that he has long championed [1]. The

IUCN Red Lists are an important first call for people trying to find out the conservation status of any species. In well argued detail, and with particular reference to sea turtles, Mrosovsky explains why the IUCN listings sometimes fail to convey realistically the conservation status of some species. For example the IUCN designation 'Critically Endangered' implies a high risk of imminent global extinction. Leatherback turtles *Derموchelys coriacea* are listed as Critically Endangered and yet, although nesting numbers have declined alarmingly in the Pacific, populations in the Atlantic are strong, with major rookeries (many thousands of nesting females) in both South America and West Africa. Likewise, Mrosovsky wryly explains that the Olive Ridley turtle *Lepidochelys olivacea* is listed as 'Endangered' but that this might appear strange to fishermen in Mexican

villages, who witness hundreds of thousands of turtles nesting in a single season. Of course, Mrosovsky is not arguing that turtles do not face conservation problems. He is acutely aware that the threats facing many populations are real and a cause for great concern. However, his message is that the IUCN must not 'cry wolf' over the plight of sea turtles.

Mrosovsky also argues that the IUCN listings should be based on the best available scientific data, but he also outlines some of the problems with assessing population size in sea turtles. Importantly, nesting seasons can be long and nesting areas, even those used by individual females, large. Therefore, maintaining beach patrols to count turtles or their tracks throughout a season and over relevant spatial scales is not simple. Furthermore, a confounding problem is that there can be significant interannual fluctuations in nesting numbers. These do not represent changes in the number of adult turtles, but rather that each female generally nests only once every few years, with the interval between successive nesting seasons depending on the conditions at the foraging grounds. Interannual variability in foraging conditions can lead to many turtles migrating to nest in some years, followed by few nesting in another year. For example, during the nesting season at Raine Island on the Great Barrier Reef, an average of 1347 turtles were seen per night during 1977, this plummeted to 59 per night during 1978, but bounced back to 2049 per night in 1979 [2]. This level of fluctuation is extreme, but, in all cases, interannual variability in nesting numbers means that reliable estimates of population size cannot be gained from one year of monitoring and, similarly, many years of data are required to identify trends in abundance.

Mrosovsky does a good job explaining some of the problems with the IUCN listing scheme. But no system will ever be perfect, so, most importantly, does he provide any advice for how the system could be improved? The answer is certainly yes, with a strong call being made for more transparency in how designations are determined and

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for available scientific data to be used critically. If the outcome of following these recommendations is that many populations start to fall into the 'Data Deficient' listing, this will identify where monitoring programmes and, just as importantly, the reporting of the results from these programmes, are required.

I found this book thought provoking and its small size means that it can easily be read in a single sitting, which should increase its audience. I would hope that this text will become a focus of 'journal club' type meetings in universities and conservation organizations and will get people thinking about these important issues.

*The Ecology, Exploitation and Conservation of River Turtles* is the work of two biologists who have a great love of river turtles and who have accumulated an encyclopaedic knowledge of this group. The central themes of the book are twofold: that many species are suffering as a result of human activities; and that river turtles might play important roles in ecosystems, but that these roles are little known because of the paucity of research focussed on this group. Throughout, the writing is exhaustive in its detail and *River Turtles* would be an ideal first stop for anyone wanting to find out which turtle lives where and what threats it faces. *River Turtles* is aimed specifically at those with an interest in river turtles, and perhaps herpetologists in general. I suspect general ecologists, however, would like to see more about how 'turtle studies' fit into wider issues. The figures are mostly photos of turtles or their habitats and I felt that the presentation of more graphs showing key results might have helped break up the text; for example when describing how clutch and egg size vary with adult body size and latitude and how species richness varies with latitude. That said, Moll and Moll do what they set out to do marvellously: to provide those interested in river turtles with a huge amount of information about this group.

Moll and Moll repeatedly emphasize the large gaps in

current knowledge of river turtles. For example, I was surprised to read that activity patterns (e.g. whether nocturnal or diurnal) of most species are unknown. In other areas of vertebrate ecology where animals are not amenable to direct observation (e.g. marine vertebrates including fish, mammals, birds and reptiles), data loggers have revolutionized our understanding of patterns of behaviour and it seems that this new technology has not yet been extensively exploited in the study of river turtles.

The oft-repeated message, that river turtles face a range of threats to their survival, from commercial exploitation to habitat degradation, can make quite depressing reading. We learn that exploitation is not new with, for example, concerns being expressed as far back as 1786 over the killing of huge numbers of giant South American River turtles. As with sea turtles, there is often a lack of good information about past and present numbers of river turtles. In fact, a most basic problem becomes apparent: there are no particularly reliable methods for accurately assessing the size of river turtle populations. So, as with Nicholas Mrosovsky's book, a clear message emerges: turtles are being killed in high numbers in many places around the world (and have been for centuries) but there is often an alarming lack of 'real' data to document the impacts of this exploitation. Hopefully, both books will help drive efforts to correct this problem of data deficiency.

#### References

- 1 Mrosovsky, N. (1997) IUCN's credibility critically endangered. *Nature* 389, 436
- 2 Limpus, C. and Nicholls, N. (2000) ENSO regulation of Indo-Pacific green turtle populations. In *Applications of Seasonal Climate Forecasting in Agricultural and Natural Ecosystems – the Australian Experience* (Hammer, G. *et al.*, eds), pp. 399–408, Kluwer

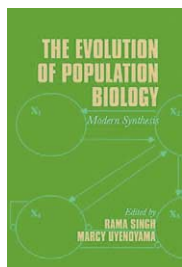
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## Unified population biology remains a work in progress

**The Evolution of Population Biology** edited by Rama S. Singh and Marcy K. Uyenoyama, Cambridge University Press, 2004. US\$120.00/£80.00 hbk (460 pages) ISBN 0 521 81437 5

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The editors of *The Evolution of Population Biology* have the dual aims of honouring Richard Lewontin and attempting a broad interdisciplinary treatment of the foundations and development of population biology. The former aim is roundly achieved: Lewontin's influence on the broad field

of biology and on the lives of individual researchers is acknowledged throughout and, as this is the third book in a series that is not the first to honour him, it seems safe to assume that Lewontin accepts the accolades in the spirit in which they were intended.

Although joining the crowds doffing their hats to Dick (as he is affectionately referred to), I am unconvinced that *The Evolution of Population Biology* coherently explores the development of population biology. The reader has to work consistently hard to make links, and, in spite of the claim that 'It should be

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