

COMMENTARIES AND REVIEWS

Editorial Comment. – This section has been established as a forum for the exchange of ideas, opinions, position statements, policy recommendations, and other reviews regarding turtle-related matters. Commentaries and points of view represent the personal opinions of the authors, and are peer-reviewed only to the extent necessary to help authors avoid clear errors or obvious misrepresentations or to improve the clarity of their submission, while allowing them the freedom to express opinions or conclusions that may be at significant variance with those of other authorities. We hope that controversial opinions expressed in this section will be counterbalanced by responsible replies from other specialists, and we encourage a productive dialogue in print between the interested parties. Shorter position statements, policy recommendations, book reviews, obituaries, and other reports are reviewed only by the editorial staff. The editors reserve the right to reject any submissions that do not meet clear standards of scientific professionalism.

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Turtle Management as Scientific Experimentation

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Pritchard (2000) and Mrosovsky (2000a, 2000b) highlighted a philosophical difference between the IUCN Crocodile Specialist Group and the IUCN Marine Turtle Specialist Group. As an ecologist who sometimes works on crocodylians and sometimes works on turtles, but usually works on other organisms, I would like to inject my own view into the debate on the benefits of strict protectionism versus exploitation.

The Crocodile Specialist Group grudgingly embraced economic use of crocodylians in the late 1970s, but they followed a strongly protectionist global philosophy. The only appropriate economic use they envisioned was through “ranching” (collection of eggs or juveniles for captive raising). I questioned that philosophy (Magnusson, 1984), suggesting that direct hunting of adults or large juveniles might be a better alternative in many countries, especially when the species involved has a low value hide. The problem with global solutions is that they regard all individual animals as being the same. This appeals to animal rights activists who regard individual animals as the objects of management, but is complicated for ecologists who manage populations. Crocodylian ranching seems to be working in Zimbabwe (Thorbjarnarson, 1999), but has been a total failure in Venezuela (Thorbjarnarson, 1991) and Brazil (Mourão, 2000). In many countries, it is difficult to determine the relative contributions of crocodylian ranching, farming, and hunting (Magnusson, 1997). Ranching seems to have promoted captive breeding, which may remove all economic incentive for protection of wild populations (Magnusson, 1997), and I have not noticed any of the “expert” biological consultants offering to reimburse the hundreds of well-meaning investors who lost all their

savings in ranching schemes. Legal exploitation does not appear to have removed threats to endangered species (Thorbjarnarson, 1999). Biological consultants seem to be slow to realize that expensive investments, such as captive raising operations, lead to major repayment requirements, and often lead to the economic necessity of laundering wild skins, or adulterating monitoring records in order to avoid restrictive quotas that would reduce cash available to meet repayments.

The root of the problem seems to be that few crocodylian or turtle biologists adopt the philosophy that management is an experiment (McNab, 1983), and an experiment without a control (null hypothesis) can only give very weak inference. This may not matter if investors make money and the wild populations are thought to be vigorous, but the debate in the literature indicates that this is not the situation for most crocodylians or turtles. Human influence is now so pervasive everywhere in the world that it is meaningless to infer that humans do not interfere with natural populations. The question for conservationists is how we should interfere. Doing nothing is an experiment, as is interfering to help the species, and without a control, it is an uninterpretable experiment (see Platt [1964] for a discussion of strength of inference). Any change observed may be due to the “experiment,” or may have occurred anyway. The “global remedy” approach implies that we know enough about population dynamics to predict the effect of our actions on the organisms. In fact, we know so little about the effects of interventions (or lack thereof) that only on-going empirical studies (monitoring) can reveal whether the results are acceptable (note that I did not say optimal) or not. This is why most commercial fisheries in the world have gone to economic extinction despite intensive population modeling, and the implementation of strategies that, at the time, were thought to be sufficient to protect stocks.

In the same issue of *Chelonian Conservation and Biology* as the debate between Pritchard (2000) and Mrosovsky (2000b), Mroziak et al. (2000) showed, by experimentation, that the “feel good” strategy of erecting cages to protect eggs may actually increase predation, and therefore be risky for the population. Studies in Florida clearly showed that street lights can disorient hatchling turtles, and the remedy, expensive modifica-

tion of municipal illumination, was imported to Brazil (Penteado, 1999). However, nesting beaches without illumination are much more extensive in Brazil and adult turtles appear to avoid nesting in areas with high light levels (Penteado, 1999). Reducing illumination in urban areas may induce more turtles to nest in heavily impacted areas, and result in more human-associated mortality, than would have occurred without interference. Modeling the net effects of beach illumination on population dynamics of turtles will require much more information than is currently available. The answers are never easy, and only careful testing of our preconceptions can indicate which is the best mix of strategies for each situation.

Instead of saying that we know the right strategy, we should be humble and look for opportunities to test our hypotheses. When there are very few individual animals, or they occur in few places and are critically endangered, we often have no choice but to follow our best guess. In this situation, I, as a middle-class researcher, who can put food on the table for his family and feed three dogs, almost always opt for total protection. However, not all animal species are as endangered, and we desperately need to look for new options for those less threatened. In the case of widespread species, occupying many countries, and exposed to a variety of legal, social, and economic environments, such as many crocodylians and chelonians, we not only have the opportunity, but also the obligation, to experiment. In the case of species that occur in many countries, this initiative should come from international organizations such as the IUCN specialist groups. If Cuba harvests hawksbills (as it does), this does not constitute an experiment for Cuban biologists because turtles are so mobile that all the Cuban population may be affected to some extent and there cannot be a control situation within Cuba. However, from a broader perspective, there are many control situations (as detailed by Mrosovsky and others). The opportunity is there for experimentation. Instead of assuming that they are right, biologists from developed countries should be humble and not commit the same errors that the World Bank committed by trying to export first-world remedies

to third-world countries. Science is not a fix-all, but it can help us see the world more clearly. Science without the possibility of refutation may not be science at all (Popper, 1976).

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