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## A Response to Nicholas Mrosovsky's *Sustainable Use of Hawksbill Turtles: Contemporary Issues in Conservation*

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Nicholas Mrosovsky of the University of Toronto has been a leading figure in the field of the philosophy, practice, and goals of marine turtle management for a generation. He is also a valued colleague and friend. This friendship has withstood — perhaps even been enhanced by — our sometimes energetic disagreements on the specifics of how turtles should be managed and saved. I believe that such valued and lively — even disputatious — relationships within the overall context of friendship constitute the essence of truly civilized behavior. In this essay, I propose to indulge in a further elaboration of this eminently sophisticated and respectful relationship by responding to the issues raised in his latest book (Mrosovsky, 2000).

There has long been a striking difference between the *modi operandi* of the IUCN/SSC Crocodilian Specialist Group and the Marine Turtle Specialist Group. The former, with close ties to the hide industry, is notorious for espousing "rational exploitation," whereas members of the latter generally advocate "protection." The reason for the opposite approaches may lie in differences in the biological specifics and population dynamics of crocodiles versus turtles; or perhaps in the different responses that they evoke from human beings; or perhaps even in the different kinds of people who direct or belong to the two groups. The turtle



people, when pressed (or sometimes even when not pressed), tend to dismiss the crocodile people as bloodthirsty sell-outs, intent on maximizing the sustainable take of their own research species in order to finance their field investigations and programs, and intolerant of anything that smacks of "protectionism," while the crocodile people have been known to dismiss the turtle people as sentimental, Bambi-obsessed, impractical elitists. Exaggerated stereotypes, it is true, but there is a nugget of truth within them. It has become Nicholas Mrosovsky's role and destiny to try to get the turtle people to think more as the crocodile people do.

Quite a challenge! While the Bambi Brigade can, at times, be persuaded to endorse programs for indigenous peoples to collect and sell some small proportion of the eggs laid on the beaches where the more abundant species (greens, or olive ridleys) nest, the present proposal is quite different. It means killing turtles — adult ones at that — of the endangered hawksbill species; and the purpose of that killing is for luxury products for international markets, not for subsistence. Mrosovsky will need to be mighty persuasive.

This is not Mrosovsky's first book on the subject of sea turtle management. His previous work, *Conserving Sea Turtles*, was published in 1983 to coincide with his resignation from the editorship of the prestigious *Marine Turtle Newsletter*. It called into question the endangered status of sea turtles and challenged many of the assumptions and practices of the traditional turtle conservation community. In the ensuing 17 years, Mrosovsky has refined and focused his theme. The new book is actually a position paper defending the rights of the Cubans to exploit controlled numbers of hawksbill turtles for the Japanese tortoiseshell (bekko) market.

This was a key issue before the delegates to the 11th Conference of the Parties to the CITES Convention in Nairobi in April 2000. The lobbying has indeed been heavy. The Cubans entertained governmental participants from 13 Caribbean countries at a Turtle Management Workshop in September 1999, seeking friendly CITES votes by introducing the participants to the traditional *careyeros* on the Isle of Pines, and showing them the stockpiles of tortoiseshell at Cojimar, whose exporters are awaiting the green light that they need from CITES. Meanwhile, the turtle protection interests held their own gathering in Santo Domingo, and their scorecard of delegates present (representing 35 Wider Caribbean nations and territories) would seem to have given them a substantial advantage over the Cubans. Moreover, the Cuban/Japanese CITES proposal required not just a majority vote in order to prevail, but a two-thirds majority — a sort of "stop me before I kill again" protocol (to be interpreted literally in this case) designed to make it difficult to undertake downlistings for which consensus is not available. But, lest it be thought the battle was won, the proposal gained a majority of votes at the previous CITES 10th Conference of the Parties in 1997 (55 to 49, with 7 abstentions), and there were further defections at the CITES 11th Conference of

the Parties in 2000 (67 to 41, with 9 abstentions) (see Richardson, 2000, for a good summary).

Both of Mrosovsky's books had somewhat surprising publishers, relatively little known in the Western Hemisphere. The first was published by the British Herpetological Society and the new one (Mrosovsky, 2000) by the Key Centre for Tropical Wildlife Management in Darwin, Northern Territory, Australia, for which it appears to be the first book-length publication. In both cases, it seems possible that the publisher was selected because of corporate sympathy to the "conservation by utilization" theme. Indeed, the new book has an unsigned Foreword that appears to constitute a philosophical statement by the publishers themselves supporting the consumptive use of wildlife.

### Words to Avoid

Mrosovsky has partially avoided use of some of the loaded terminology often employed by wildlife exploitation exponents — terms like "rational exploitation" (who would dare defend the alternative that must surely be "irrational?"), although he does utilize "responsive management," for which the alternative would presumably be the indefensible "unresponsive management." And he does not shy away from that ubiquitous contemporary term whose total disuse has been widely advocated, namely "sustainable."

This word is selected to overcome the objections of everyone except strict protectionists. Who else could object to something said to be "sustainable," even when the word is juxtaposed with something that is fundamentally unsustainable, like "development," or even with wildlife utilization, whose sustainability cannot be precisely (or even approximately) demonstrated in advance? One would love to see an end to this automatic, knee-jerk prefix, this concept of "sustainable use" as a synonym for "good," "defensible," or "problem-free." There are so many variables in wildlife conservation that sustainability of take is usually just a guess or a hope; and sometimes the "sustainable" take can only be determined by expending far more resources than the hunt itself will yield. Moreover, an authorized level of potentially sustainable use may carry unsustainable associations. Law enforcement may be made too complex to be practical, and other, unauthorized uses of the resource in question may be exacerbated. The alternative to "sustainable" is not "hands off" or "do nothing" as George Hughes claims in his Preface. Rather, "sustainable use" falls between the two extremes of "unsustainable use" and "complete protection."

And Mrosovsky does fall into the "harvest" trap. This word, limited by the meticulous to the reaping of an "earned" crop that had previously been sown and subsequently cared for, has felicitous, even delightful overtones — images of happy peasants in old-fashioned clothing, chatting together in sunny fields as they gather abundant crops of flowers, sheaves of wheat, or whatever, before they repair to church to partake in the thankful hymns of Harvest Festival. But it is an ugly twist to use this lovely word for the capture and killing of hawksbill turtles whose "seeds" (eggs?) had not



been sown by humankind, and whose "preparation" had better be kept off-limits to the public lest they be truly appalled.

### The Dual Nature of Risk

Theoretically, almost any species, however endangered, could tolerate some degree of human utilization or commercialization, even if the annual allowable take was only three or four individuals. But why take the risk? Admittedly, the majority of neonate individuals of any species are doomed to expire genetically intestate, but the unsolved trick is how to identify those individuals. And if exploitation is permitted under a quota system, how could one be sure that the take, species-wide, was actually kept to that figure? In a world where (thank Heaven!) central control of most things will never be complete, a growing scenario is one where proponents can offer sophisticated population models to demonstrate or calculate the "allowable take" of aquatic animal populations. But they fail to recognize that that "take" should have included all the unstoppable factors — of incidental and illegal capture, accidental mortality on highways or by ships' propellers, and so on. Yet these underrated or ignored anthropogenic losses may eventually displace or overwhelm that which was to be included in the "sustainable take" category. The species may have been able to tolerate either loss on its own, but not both together.

Moreover, the seemingly harmless "disposal of stock-piles" proposal has caused extreme alarm among turtle conservationists. The problem is that it is not simply a matter of making some profit from turtles already dead. Rather, Cuba has cynically been practicing "business as usual" during the six years of moratorium on shell export, the only change being that the completion of that business — the selling rather than the gathering of the shell — has been postponed. They are determined to do it eventually, and they have the money and persuasive power of the Japanese behind them. Cuba claims that its fishermen are "traditional," but I have never met genuine traditional fishermen so capitalized (and we are talking here about a communist country whose principles decry capitalism!) that they can postpone income from turtle fishing for so many years. Somewhere, there is some non-traditional, very non-communist industrial bankrolling of the whole operation. In reality, Cuba is rapidly going the way of China, and becoming communist in name only; visitors report that the only currency that matters today in Havana is the US greenback! This being the case, Cuba should cease and desist from "protecting jobs in the dodo slaughterhouse;" anyone clever enough to be able to catch hawksbills at sea could surely find a slot in the 21st century economy.

Mrosovsky argues that conservation action always involves some degree of risk. But an analogy will reveal that the term "risk" may cover two very different types of undertaking. Let us say that a patient with very severe bleeding was admitted to a hospital. Giving a transfusion would involve some degree of risk; the blood might be

tainted, and could result in hepatitis or AIDS. On the other hand, a deliberate effort to see how much *more* blood could be extracted from the patient — after all, there is a nationwide blood shortage — would also involve risk; the patient might die from loss of blood. But clearly the two types of risk are different. The former is an uncertainty resulting from attempts to help the patient, whereas the latter has no such benign motives. Rather, it represents a risky attempt to further stress the patient for purposes unrelated to his welfare.

### Why So Much Opposition?

It will not surprise Mrosovsky, a veteran in the field of turtle management, that the Cuban proposal has run into some resistance among turtle conservationists. With one stroke, it simply breaches too many of their standard operating principles. These include:

1. The hawksbill, while widespread, is not very abundant and is considered not only highly endangered on a global basis (with a few localized exceptions), but also difficult to protect because of its diffuse nesting habits.

2. Conservationists who accept or tolerate exploitation of marine turtle populations generally favor limited egg collection rather than a take of adult turtles themselves, on the grounds that the former have substantial "built-in" natural wastage whereas the adult turtles do not.

3. International trade is often considered to be a less pressing or legitimate use of sea turtles than direct utilization by subsistence-level people in tropical coastal areas.

The chronology of the main events in the Cuban proposal is incomplete, and leaves out some important stages. At the 1994 CITES 9th Conference of the Parties in Fort Lauderdale, Florida, a very different Cuban hawksbill question was put before the parties, and was debated until past midnight by technical experts from various NGOs. The question at that stage of project development referred to the *ranching* of hawksbill turtles in Cuba, with the production to be sold to Japan, and in exchange for this privilege Cuba agreed to eliminate its rather considerable take of wild hawksbills. The ranching would derive its stock from just a dozen or two nests per year. This proposal was considered so reasonable, with such a small risk (a handful of clutches per year) and potentially such great benefits (protection of hawksbills throughout Cuba) that even the more cynical or protectionist participants eventually supported it, although with strict provisos that the curtailment of the existing take would require international monitoring. But the proposal eventually metamorphosed into something so radically different (the annual take of hundreds of wild hawksbills) that many of its former supporters were alienated.

### A Stockpile in Every Backyard

What is curious about Mrosovsky's new book is that he omits mention of the companion proposal before the April 2000 CITES 11th Conference of the Parties, specifically Prop. 11.41, which would have given permission for the one-



time export of about 6900 kg of hawksbill scutes from existing stockpiles in Cuba to Japan. This would have been the equivalent of several years' take under the 500 turtle annual quota, and, if approved first and separately, might have given a chance to test Cuban market security promises without killing any more turtles. Somehow, this enormous stash of tortoiseshell accumulated without there being any legal means of exporting it. Whether it represents a series of governmental confiscations or whether its existence simply means that traditional fishermen continued to hunt hawksbills even though there was no outlet for the product, the conclusion is the same: this is not a tightly, or even adequately, controlled hunt, and it is naive to believe that it would quickly become tightly controlled if the two marketing proposals were approved. Most probably, the stockpiling was simply an attempt to force the hand of CITES, to ask the delegates permission to export that which was already dead, to make it too late to say No.

### Turtle Population Trends, Here and There

Some caveats and observations are germane to the "Complete Knowledge" chapter. One is that, when graphing the numbers of adult sea turtles nesting through a series of years, the high values (i.e., good nesting years, when high numbers of adult turtles must have existed) represent different kinds of data from the low years, when the reduced nesting is subject to ambiguous interpretations. Perhaps, in the low years, the turtles were in serious decline; but it could have been that most females simply did not nest in those years. Thus, the regression lines would be most appropriately drawn by joining the maxima rather than averaging the distance between the maxima and the minima and drawing an artificial straight line. Application of this alternative technique would considerably alter the interpretation of the nesting trends for Sabah green turtles (p. 15), with the trend through the 1990s becoming virtually horizontal rather than steeply rising. Furthermore, the graphs of hawksbill populations in Terengganu (p. 27) or on Buck Island (p. 28) would show a strong downward trend (rather than "no change") in the former example, and a downward rather than strongly upward trend in the latter.

This chapter is also noteworthy for giving examples that show that protected populations (e.g., of Kemp's ridleys, Mexican olive ridleys, or Sabah green turtles) can indeed increase, whereas exploited populations (e.g., Terengganu leatherbacks) have declined steeply under "controlled exploitation" (of eggs in this case). Sea turtles have withstood the rigors and the competitive and predatory stresses of the world's oceans for a hundred million years, and it is no surprise that, when a depleted population is completely protected, it may show a positive response.

Yet all of these examples only serve to make the case for *complete* protection, rather than Mrosovsky's preference for controlled exploitation. Further examples of *protected* populations recovering (e.g., Cousin Island, Seychelles) appear in the next chapter also. And one of the most disturb-

ing statements in this chapter is the assertion that the Kyoto Resolution states that "trade can sometimes be beneficial to endangered species" (p. 25). In fact, the Kyoto Resolution is spelled out in full (p. 3), and it makes no such claim. Instead, it acknowledges that sustainable utilization is appropriate for many species but that there are many other species for which trade would be detrimental to their survival. It nowhere recommends take or trade in *endangered* species.

### Status Categories: Objective or Subjective?

The key chapter in the book is entitled "Are Hawksbills Critically Endangered?" It opens with a discussion of whales, not turtles, and chides the American public for not knowing much about minke whales. This is no surprise; there are many things the American public knows little about. But, Mrosovsky reports, when representative Americans were given a paragraph about minke whales that stressed their current abundance, and the meritorious uses to which the meat would be put, the cultural antiquity of whale harvest, regulation of worldwide take by the IWC, etc., 71% expressed some degree of support for the harvest.

What the public was not exposed to (apart from the IWC loopholes such as the Commission's inability to control alleged "take for scientific purposes"), was details on how whales are killed, with explosive harpoons and other painful gadgets, nor the characteristics of remarkable intelligence, and possibly emotional sensitivity, that they may show. A comparable survey might be commissioned to ask people just emerging from the Shamu Stadium at Sea World, where a smiling orca had just waved its tail to them in a farewell gesture, and ask *them* what they thought of whale exploitation. Both techniques smack of the methodologies of loaded political surveys ("tell 'em what you want 'em to think, then ask 'em what they think"), and should be avoided.

The remainder of the chapter presented a somewhat perfervid argument that hawksbills were not critically endangered according to the new, numerical CITES and IUCN criteria. At this point, Mrosovsky and I have some points of agreement, although his arguments center upon the fact that the hawksbill does not meet the strict legal requirements for Critically Endangered status, while mine would center more upon disagreement with the concept and practicality of the new IUCN status criteria, which have been several years in the making and are still being refined.

Mrosovsky, of course, is correct when he observes that a species with the worldwide distribution (with a light dusting of robust populations in a matrix of general depletion), and significant global population numbers of the hawksbill is not critically endangered compared to, say, the host of vertebrate species confined to single remote islands, single cave systems, and so on. Total extinction is not just around the corner for the hawksbill. Nevertheless, it *does* meet the IUCN objective criteria for "critically endangered," and there seems to be little opposition to the assumption that hawksbill populations have decreased 80% during



the last century — one of the several alternative criteria for “critically endangered” status.

The current vogue for “objective” status designations stems from some of the national delegates to the CITES Convention showing frustration with the lobbying success of some of the protectionist environmental groups. Consistently, plans for international trade in species listed as Appendix I have been thwarted by lobbyists who have successfully made the argument that the species in question are still endangered. To circumvent this, IUCN was enjoined to develop objective criteria for status categories, that have been under development ever since. The gist of the contemporary criteria for “critically endangered” centers upon a demonstration that the population has declined by 80% or more during the last three generations or ten years (whichever is more), or is confidently expected to do so in the next ten years or three generations if trends continue. Additional criteria allow the listing of species whose range is less than 100 square kilometers or with a total population of fewer than 250 mature individuals.

IUCN has adopted these criteria even though the interests of CITES (centered upon commercially valuable species in international trade) and IUCN (interested in all species) are fundamentally different. But the objectivity breaks down in at least two places.

1. A species may be endangered for subtle reasons, including political ones, or the possibility of civic unrest, that are unrelated to current numbers or demonstrable trends. A new government which is known to be unsympathetic to endangered species concepts may just have taken power, or perhaps entered into entangling alliances with foreign or international bodies, and so on. But these data can never be objective, nor their outcomes quantitatively predictive.

2. As a society, we are gradually realizing that the inventory of endangered species is not just a brief inventory of interesting, popular, or huntable vertebrates of medium to large size. It includes a myriad of species, most of them small and poorly known, and many of which disappear unnoticed each year. Very few have been the target of any detailed field studies. To subject species such as these to the objective criteria of IUCN will drive all of them into the “data deficient” category, and lead to an impasse. It is simply unreasonable to expect that species that are rarely even seen (because they are rare, localized, cryptic, microscopic, or whatever) will ever be known in the detail that might be expected for, say, the African elephant.

The larger issue that derives from the whale protection movement, and the absolute constraints of the US Marine Mammal Protection Act, is that of whether or not humankind should seek to occupy the trophic position of being the ultimate predator, not just the top of all food chains on earth, terrestrial and aquatic, but a consumer at all lesser levels of these food chains also. This is the philosophy espoused or expressed by two very different subgroups of *Homo sapiens*. It is true that the most sophisticated and educated people are found in cities, but the cities are also home to a homely, simple-minded class, far removed from nature, whose only

question when shown a particularly unusual creature (or even just one they haven’t seen before) is a slack-jawed “what good is it?” At the other extreme are participants in genuine subsistence cultures, closer to nature than anyone else on earth, who are obliged by hunger and need to seek uses for all organisms they encounter.

These subsistence people are the same ones who will disappear in Mrosovsky’s *Brave New World*, where a global economy and cultural uniformity prevail and where everyone plays by the rules.

But, in between these extreme groups, humankind is progressively making decisions that certain species should not be consumed. This may be because they are endangered or threatened or fundamentally vulnerable; or because they show elaborate higher brain functions, extended parental care, altruism, or human appeal; or because they are, even if not brainy (or having brains at all) in some way “magnificent” or awe-inspiring. Redwoods and raptors, whales and birds of paradise, great apes and song birds; and for many people, turtles too fall into this latter category.

Many thoughtful people agree that, rather than making heavy-handed raids into every ecosystem (however delicate, complex, or poorly understood that ecosystem may be), or into every population of every species, mankind should establish some set-asides. These should not only be lands and landscapes, but species too, with a tacit or expressed agreement that these will not be exploited. Instead, such natural entities will exist as examples of fundamental “good,” inspiring the human spirit, and — even if rarely seen or visited — with their own right to exist undisturbed. For those who argue that we can respect or love these “special” species even as we kill them, I would allude to the pages of Alfred Russel Wallace’s 1869 book *The Malay Archipelago*, in which the account of his truly loving and tender efforts to raise an orphaned orang-utang are sandwiched between detailed reports of his enthusiastically shooting its parents and other relatives. The account is so graphic and disturbing that few would be unmoved by the bizarre contrast, which strikes a modern reader as bordering on the schizophrenic.

### **A Vision for the Future: Myopia or Brave New World?**

Mrosovsky’s closing subchapter is entitled “A Vision for the Future.” It is presented as an idealized vision, but, as such, it is a strange one. It sees a world dominated by a global economy, with no moral distinctions between taking turtles for subsistence, sale, luxury, etc., where turtles are not considered “unique,” and where there will be considerable worldwide harvest of wild, adult sea turtles. Most human ecologists, by contrast, see virtue in preserving boundaries and maintaining the social integrity of indigenous tribal peoples, even though such peoples cannot reasonably be controlled or made subject to external laws and regulations. This is because the alternative scenario would constitute a loss of cultural and linguistic diversity, and loss of the special respect and knowledge of nature at a local



level that comes with constant, daily contact with natural systems.

Pursuit of a global economy would ultimately lead to a cultural homogeneity that would not only be devastatingly boring (everyone speaking American television English and eating MacDonald's hamburgers), but that would have all of the vulnerabilities of a monoculture when it came to coping with change or dealing with such crises as the exhaustion of petroleum. Mankind will always experience crises, here or there, but they don't become global catastrophes unless all cultures are cobbled together by shared bad habits, interlocking stock markets, vulnerable single-source suppliers, and so on.

As amplification of the last of these examples, consider, if you will, the following vision for the future: 1) the nation of Japan, with a newly expanded and heavily capitalized hawksbill industry making massive profits; 2) the "Cuban connection" failing to provide the amount of product needed by this industry as its hawksbills become harder to find; 3) the industry in Japan putting pressure on its own government to "do something;" 4) the Japanese government using its political and economic pressure to overcome global resistance and securing hawksbill supply contracts from many small and impressionable nations; and 5) a return to the unrestricted global vogue for hawksbill shell that brought the species to its endangered status in the first place. Optimists may feel that this cascading sequence of events could be cut off at any point; pessimists (and here include "realists") may insist that it be nipped in the bud.

In his "Vision" chapter, Mrosovsky draws a parallel between the biology of sea turtles and of crocodilians, with their common features of substantial natural wastage of eggs and low survival to adulthood. He concludes, almost plaintively, even desperately, that *some* form of consumptive utilization of sea turtles is surely possible, as if this were some kind of absolute, unchallengeable necessity, however well protection may be working, and whether or not there is existing real demand for the products.

Actually, the parallel with crocodilians is very flawed. The differences include:

1. Crocodilians are the top predators in their ecosystems, and are generally safe from predation themselves within just a year or two of hatching. Sea turtles have predators at all life stages.
2. Large adult crocodilians are often cannibalistic, and their presence may be a significant constraint upon new recruitment into the population. On the other hand, adult sea turtles are, according to most models, the most crucial members of the population, worthy of and needing special protection.
3. Crocodilian nests are not necessarily easy to find, and when they are found they are often guarded by the adult female. Sea turtle nests are extremely easy to find, and they are not guarded by the female.
4. Crocodilians, being dangerous and occasionally anthropophagous, have a public relations problem. In many areas of the tropics, large numbers of adult crocodilians are

perceived to be (and may actually be) a danger to humans, and they need to demonstrate some kind of economic value for them to be tolerated. On the other hand, "too many turtles" is rarely if ever a problem.

And a fifth point could be made: already, dependency upon the profits from crocodilian products is causing great difficulties for crocodilian field researchers and conservationists. The market has been glutted, and (being an auction-based system), prices have tumbled. Crocodilian conservation dollars have started to become scarce.

We all speak from a point of view, and, for sure, we are all entitled to. My own reflects that of a "realist with protectionist instincts," or perhaps vice-versa. Certainly, as a long-time patroller of beaches where turtles nest in small numbers, my instincts are to regard an adult hawksbill as a pearl of great price that should be protected under all circumstances, whereas, being also closely familiar with the colossal (and seemingly wasteful) arribadas of olive ridleys at Ostional, Costa Rica, I support closely controlled schemes to utilize eggs from abundant turtle populations for human benefit. In short, I am neutral enough to see merit in arguments presented by both sides — the protectionists on the one hand and the farmers, ranchers, and sustainable yield enthusiasts on the other.

But what is surely clear is that both approaches — the closing of markets that protection demands, and the opening of markets that trade demands — cannot proceed simultaneously without hopelessly confusing the public. It has to be one or the other. But there is a proviso, under the protectionist scenario, that one may continue to tolerate some subsistence take of turtles, preferably of eggs from abundant breeding populations. This is partly because we could not stop it anyway, partly because it probably is biologically tolerable, partly because it doesn't breach international conventions such as CITES, and partly because it does provide for real human needs.

Since the global conservation approach has to be either market closure or market saturation (but not both), let's try one first and if it doesn't work, switch to the other. Of course, the experiments are already well under way, but the protectionists got started first (although only just!) with passage of the US Endangered Species Act and various other pieces of national legislation, closely followed by commercial turtle farming (Mariculture, CORAIL Réunion, etc), and it seems fair to ask whether we can consider the protective approach to have been a failure. I don't believe it has. Mrosovsky's statistics on increasing populations of Kemp's and olive ridleys, green turtles at Tortuguero, etc., are well presented with plenty of appropriate caveats about the quality of the data, and my only quibble is the one I gave above about the maxima representing a more fundamentally useful kind of data than the minima. But these were protected populations!

Con conversationally, I have sometimes offered Mrosovsky the opinion that he is increasingly in danger of being perceived as a man with only one "trick" (i.e., conservation by utilization) in his bag of tricks. His response has been that,



while editor of the *Marine Turtle Newsletter*, he urged and supported a letter-writing campaign to lobby for better protection of olive ridleys in Orissa by the government of India. But that was two or three decades ago, and it is instructive to observe that someone demanding protection of the extremely numerous Orissa ridleys is potentially guilty of inconsistency in now endorsing exploitation of the much less abundant Cuban hawksbills. One guesses that Mrosovsky would not spearhead a protection campaign today.

We all change with time, and perhaps we even get wiser with time. Archie Carr, in his earlier writings, waxed so eloquent about the glorious taste of green turtle meat that many have considered him, as the world's "master turtler," to have been the crucial inspiration for the Cayman Turtle Farm, an institution that he later came to deplore as he developed an extremely conservative philosophy about wildlife exploitation. The metamorphosis from "happy hunter to stern protectionist" is not an unusual one — Sir Peter Scott was a conspicuous additional example — and may mirror both external changes in the world (as wildlife populations and wild places become scarcer) and internal, psychological changes, as older people become aware of their own mortality. But Mrosovsky's philosophical transition has been the reverse. Perhaps he represents a variant on the Churchillian theme "he who is not a liberal when he is young has no heart; he who is a liberal when he is old has no head."

To conclude: most of the "exploitation experiments," ranging from the potentially disastrous exploitation of adult Kemp's ridleys at Rancho Nuevo in 1970, to the protracted olive ridley slaughter operation in Oaxaca, to Mariculture Ltd. in Grand Cayman, to the green turtle ranching in Surinam, the ranching of hawksbill turtles in the Torres Strait Islands, the legal take of adult green turtles in Caribbean Costa Rica, or the annual auctioning of "egg collecting rights" for the leatherback eggs in Terengganu, have all been curtailed or ceased to exist for one reason or another, in almost all cases to the rejoicing of turtle enthusiasts. Should we try and revive these operations, these entrepreneurial casualties, these dinosaurs, in the changing world of turtle conservation? Most would say no. Not because conservation by exploitation is fundamentally flawed; but simply because the opposite approach seems to be working.

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## Conservation and Cultural Diversity: Reply to Pritchard

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First I will address some miscellaneous misconceptions in Pritchard's commentary (Pritchard, 2000) and then move to broader issues about sustainable use and protection.

Pritchard may be strong on civilized discourse but he is weak on statistics. He misunderstands regression lines. These are not based on taking distances between maxima and minima and drawing an artificial (his word) straight line. It is quite possible to obtain meaningful assessments of trends with data, such as those on nests per season, that show much variability. It simply takes more years to obtain significance. The suggestion that conventional regression lines be replaced by fitting lines to maxima immediately runs into the problem of defining objectively what is a maximum. Many data on turtle numbers do not approximate nice sine waves. However, Pritchard's offhand suggestions have sometimes been prescient, for instance, his speculations on leatherback thermoregulation (Pritchard, 1969). It may well be that improved methods of analyzing trends will evolve. But for the present, it is safest to use all the data, which regression lines do. If maxima are arbitrarily picked out, objectivity is lost.

Pritchard also misunderstands the Kyoto Resolution of CITES (conf 8.3). This resolution does not specify or exclude particular categories of species (endangered, not endangered, etc.), and this is hardly surprising because CITES is, after all, the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Consider the case of the Chinese alligator. This truly is critically endangered. Only a few hundred remain in the wild and many of these are too scattered to form effective breeding groups. There are about 5000 in captivity, reproducing well, but there is virtually no suitable habitat remaining for releases. It is all occupied by rice paddies and people who do not appreciate alligators eating their ducks. The cost of maintaining the captive stock is considerable. Without value to local farmers, the Chinese alligator, even with 2000 being the year of the dragon, is in real trouble. CITES has permitted regulated trade in the captive stock. Whether in the long run this will help or not remains to be seen; there may not be sufficient demand for Chinese alligator products. The point here though is that CITES (and conf 8.3) does not automatically exclude trade in endangered species, or even critically endangered species. Another example: limited trade of African elephant products has been allowed under CITES even though this species is listed by IUCN as endangered.