

## Continuing controversy over ridleys in Orissa: cui bono?

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Sea turtles in India have featured in the Marine Turtle Newsletter (MTN) on a number of occasions (e.g., MTN # 23, 25, 31, 61, 63 suppl, 64) – and rightly so because India hosts major aggregations of turtles, especially olive ridleys. The present debate over the construction of a port at Dhamra and other ports along the Orissa coast is part of long-standing controversy about turtles in this region.

More than 25 years ago, in 1982, the MTN (# 23) launched a letter-writing campaign about the extensive but uncontrolled and unmonitored killing of ridleys. Numerous letters were sent, signatures added to petitions, and the matter mentioned in some influential newspapers. Are such campaigns effective?

Certainly, awareness of the importance of India for olive ridleys was heightened. The head of Wildlife Preservation, Department of Environment, India, told me that the letters had strengthened their hand (Mrosovsky, 1983). And Mohanty-Hejmadi (2000) considered that the letter writing to the then Prime Minister, Indira Gandhi, was among the factors resulting in better protection at the main nesting beach at Gahirmatha. But matters were not thoroughly resolved and a new problem arose, namely the proposal to build a large jetty and facility for fishing boats, only about 10 km from Gahirmatha.

In 1993, stimulated by Harry Andrews (1993), a second alert and round of letters was initiated by the MTN, then under the editorship of Karen and Scott Eckert (1993). For various bureaucratic and financial reasons the issue appeared to die down, only to resurface at the present, with construction of a port already underway and calls by Greenpeace to sign a petition and dissension within the IUCN Marine Turtle Specialist Group (MTSG).

It would seem that opponents of the port are losing because construction has already started.

How did this come about? Part of the reason, perhaps, is that no convincing alternatives have been advanced. And this in turn may result from disagreement or inadequate formulation as to the why of conservation. Why is it desirable and important to look after this population of ridleys? Who benefits? As so often the case, there are underlying clashes between preservationist and sustainable use approaches to conservation.

The calls for action in the earlier MTN-promoted appeals were not in fact based on either of these philosophies. They were aimed primarily at alerting the conservation community and the public in general that events were unfolding which might have major impacts on what was thought then to be the largest aggregation of olive ridleys in the world. Other than expressing concern to the Indian authorities, what might be the best course of action was not advocated. However, neither of these early appeals argued against consumptive use as a component of a conservation strategy (Mrosovsky *et al.*, 1982; Mrosovsky, 1993). How does this possibility look today?

Consider the following points:

1. After a petition against the Endangered status of olive ridleys on the IUCN Red Lists, this species has been downlisted from Endangered to Vulnerable.
2. At large arribadas, it is common for nesters to dig up and destroy eggs laid earlier by other females. On occasion, 70% of the eggs are destroyed in this way (Mohanty-Hejmadi & Sahoo, 1994). The figure varies considerably and depends on how soon one arribada follows another. When Cornelius *et al.* (1991; see also Cornelius, 1986) made their studies in Costa Rica, it was estimated that typically at Nancite about 17% of the eggs in an arribada were dug up by turtles nesting subsequently. This is a huge loss and suggests that carrying capacity is being approached.

3. Cornelius *et al.* (1991) pointed out that removal of some of the nests might result in higher hatch rates and greater recruitment. Douglas Robinson was interested in testing this possibility, and preliminary experiments were initiated. In 1983, at Ostional, he showed me two corrals intended to control nest density. One appeared unfinished, and the other seemed in disrepair, having proved insufficiently strong to prevent unwanted turtles from joining the experiment. I do not know if this experiment was continued and am unaware of any published results.

4. Despite lack of proof, the idea of density-dependent limits on recruitment was appealing, and persisted (e.g., Pritchard, 1984; Mehta *et al.*, 2000). Recently, Honarvar *et al.* (2008) have obtained experimental evidence that crowded nests do worse: % hatch at Nancite was compared among plots of 9, 5 and 2 nests/m<sup>2</sup>. The key points were that at densities of 5/m<sup>2</sup>, 5 nests produced about the same number, or slightly more hatchlings than did 9 nests at densities of 9/m<sup>2</sup> (Table 1). And 2 clutches at densities of 2/m<sup>2</sup> produced more than half the number of hatchlings as 5 or 9 nests at densities of 5 and 9/m<sup>2</sup> respectively.

**Table 1.** Hatch as a function of density of clutches, all of 70 eggs (data from Honarvar *et al.* 2008).

Nests /m <sup>2</sup>	Hatch %	Hatchlings per clutch	Hatchlings per plot
2	71.6	50.1	100.2
5	55.9	39.1	195.5
9	29.5	20.7	185.9

So, for example, if 5 clutches were moved from 9/m<sup>2</sup> to 5/m<sup>2</sup> density areas, 195.5 hatchlings should be available plus 4 X 70 = 280 eggs from the remaining 4 clutches. The latter could be used for subsistence, commerce with some of the proceeds going toward conservation, or to augment recruitment. For example, if these 280 eggs were incubated at densities of 9 clutches/m<sup>2</sup>, they could be expected to produce 82.8 hatchlings. If they were incubated at densities of only 2/m<sup>2</sup>, they could be expected to produce 200.4 hatchlings.

Such calculations should not be taken too literally or applied mindlessly to other beaches.

Not all arribada beaches have nest densities as great as those formerly at Nancite. The study there focused on nest density *per se*. Of course, predators and destruction of nests by other turtles come into the equation. In Costa Rica, the % of nests dug up by other turtles is related to arribada size (Alvarado, 1990; Cornelius *et al.* (1991). And in India it has been noted that at Rushikulya, a beach with relatively sparse nesting, the hatch rates are much higher than those at the more densely packed Gahirmatha beach (Pandav, 2001). Also, if eggs are not taken for consumption or to other beaches, the availability of suitable low density areas to which to transplant thinned out clutches is important. But the present quantitative considerations do illustrate the potentially large benefits that might be obtainable by reducing nest density.

5. The existence of solitary nesters with fertile eggs suggests that aggregation in large groups is not a necessary stimulant for reproduction. An Allee effect, if it occurs, would not appear to be threateningly strong (see also Hays, 2004).

6. At Ostional, despite imperfections of the program there, limited harvest of eggs has not apparently devastated the nesting population (Ballesterro *et al.*, 2000; Chaves, 2004; Cornelius *et al.*, 2007).

The biological points above should be considered in the context of the degree of poverty and malnutrition in parts of India and a legitimate desire there to modernize, industrialize, and increase the standard of living. It is not as if the olive ridley is now thought to be a species on the very brink of extinction. Moreover, there is a good chance that recruitment might actually be increased by a careful thinning out of nests. Why not try it? Treat it as an experiment. If there are problems, the trial can be discontinued. There are an increasing number of examples of sea turtles recovering from low numbers (Balazs & Chaloupka, 2004; Broderick *et al.*, 2006; Marcovaldi *et al.*, 2007; Márquez *et al.*, 2005).

Essentially, these suggestions are a version of the more general conservation strategy of identifying causes of natural mortality (one of which in this case is density-dependent destruction of eggs) and taking some of these otherwise doomed eggs for consumption but leaving others to augment recruitment (Mrosovsky, 2001). As Cornelius *et*

al. (1991) put it, “The basic objective should be to use nests that have a low expectation of success”. Both cash and subsistence use were proposed, but conservation would nevertheless be likely to be enhanced because of increased recruitment from nests left in situ.

It is not argued that the harvesting arrangements at Ostional should be copied in detail elsewhere. Sociological as well as biological conditions vary at different areas (Campbell, 2007). Regionally appropriate systems are needed. But it is argued that the biology of large arribadas allows for, even begs for, some take and that had the interests of fishermen and villagers in Orissa been more actively promoted, there might have been, and now be, a constituency of local people benefiting from a legal turtle harvest, and by that token with greater power as stakeholders to influence the course of events. It is not implied that this would be enough to overpower mighty steel companies, or stop major trends promoting

industrialization as a way forward for India. But it might have given the turtles a stronger representation at the negotiating table.

There is a need for the turtle conservation community – especially the MTSG - not to cling to positions adopted in different circumstances, but to evolve. If human population increase and environmental degradation do, as many fear, lead to major food shortages, flooding and other catastrophic events, preservation of biodiversity may be lower in the list of priorities than it is today. Species whose eggs provide protein, in a sustainable way, nearly every year, may be more highly valued – not just by tourists and turtle biologists but by people most in contact with the animals and their habitat. This will be more likely if they have tangible and dignified incentives to assist in enforcement and other aspects of conservation. As Webb and Vardon (1996) emphasized, the essentials are simple. People conserve what they value.

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