

## NATIONAL USE OF ESTUARINE AND MARINE REPTILES

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### ABSTRACT

This paper briefly discusses the marine and estuarine reptiles of India, their status, exploitation and some of the prospects and limitations of reptile conservation in India.

### INTRODUCTION

In the Indian region, four groups of reptiles (including four species of sea turtles, two 'freshwater' turtles, twenty sea snakes, one crocodile and one lizard) live mostly or entirely in the sea or estuarine areas (see Table 1).

With the exception of live bearing sea all of these reptiles must lay their eggs a most vulnerable period of their ad Except in the case of the crocodile, n care is limited to choosing and excavat nest site, depositing, covering and the eggs to their fate.

TABLE 1. Marine and estuarine reptile resources in India

Scientific name	English name	Status	Distribution	Use
<i>Crocodylus porosus</i>	Saltwater crocodile	Endangered	Orissa, West Bengal, Andaman & Nicobar Islands	Skin, meat
<i>Leptochelys olivacea</i>	Ridley sea turtle	Common	Main populations in Bay of Bengal	Meat, skin, calipee
<i>Chelonia mydas</i>	Green sea turtle	Uncommon	Kutch, Gulf of Mannar, Andaman & Nicobar Islands, Lakshadweep	Meat, skin, calipee, s
<i>Eretmochelys imbricata</i>	Hawksbill sea turtle	Uncommon	Gulf of Mannar, Andaman Nicobar, Lakshadweep	Meat, shell
<i>Dermochelys coriacea</i>	Leatherback sea turtle	Endangered	Andaman & Nicobar	Meat, oil
<i>Batagur baska</i>	Batagur turtle	Endangered	West Bengal	Meat
<i>Pelochelys bibroni</i>	Bibron's softshell turtle	Rare	West Bengal, Orissa	Meat
<i>Laticauda, Enhydryna, Hydrophis etc.</i>	Sea snakes (20 species)	Common	Seas	Skin, meat
<i>Varanus salvator</i>	Water monitor lizard	Uncommon	West Bengal, Orissa, Andaman & Nicobar	Skin, meat

le complete studies on the biology of reptiles have yet to be done, enough own to make a beginning toward their le, sustained yield use for food and leather human consumption. All these groups ptiles (except the sea snakes) have been ited to some degree, notably the crocodile ea turtles. Historically the use of reptiles ood by indigenous people in India pro- had little detrimental impact on their ations. However, increasing human pres- on habitats and the commercialization of in these reptiles in the last thirty years rought some, like the crocodile to the of extinction.

ere are several conservation success s in which highly endangered species have rehabilitated for their own sake and are ng a comeback. However, these are exceptions and we are witnessing the evable loss of several taxa every year lwide. For India, which indeed spends money and effort on conservation than other developing country, the effective rvation of endangered species should be d with their careful management and use. promise of eventual economic returns from vestment of public or private money in ing and managing reptiles will, in the run, be the strongest motivation for protection. For example, there is little athy for the crocodile from fishermen; cological arguments of food chains and of a master predator are rarely appre- d. However, if these same fishermen can volved with the conservation and use of crocodile as a lucrative resource, their peration is assured.

dict laws help of course. But in India ee that, inspite of the sea turtles being cted under the highest category of the life Act, thousands are killed annually alcutta markets, alone; and their eggs are ally collected throughout the coastline

and on the islands. Similarly the saltwater crocodile is still being heavily exploited in the Andamans.

There are several farming and ranching schemes used for reptile exploitation in other parts of the world. India has made excellent headway in the technology of crocodile husbandry and sea turtle research, and head starting has been proceeding for nearly a decade India has the resources, personnel and agencies to convert unmanaged and endangered reptile populations into important, rationally used resources. This paper briefly discusses some of the prospects and limitations of this approach to reptile conservation.

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#### I. Saltwater Crocodile

The saltwater crocodile has the most valuable skin of any reptile and if properly managed, can be a very valuable resource. While it is a hardy survivor of the age of the dinosaurs, the saltwater crocodile is vulnerable to habitat loss and over hunting. As a result, the largest reptile one earth is being steadily wiped out throughout its range from India to Australia. It typically inhabits estuarine areas with mangrove and grass swamps. The three areas where it still survives in India are: the Sundarbans (Gangetic delta) in West Bengal, Bhitari Kanika (Mahanadi delta) in Orissa and parts of the Andaman and Nicobar islands. The total number of adult saltwater crocodiles in these areas probably does not exceed 1000, a sadly depleted resource but still viable enough to reverse the downward trend.

The government programmes started in 1975 to rehabilitate the saltwater crocodile have concentrated mainly on egg collection, several years of captive rearing and subsequent

release back to the wild. The West Bengal Forest Department and the Madras Crocodile Bank have successfully bred this species in captivity. The major constraints to the survival of expansion of the wild population are increasing human pressure on the little available habitat and the unpopularity of this large predator.

TABLE 2. Optimum Growth rate of Marsh Crocodile (*Crocodylus palustris*) in captivity at Madras Crocodile Bank Trust

Age (Years)	Average Length (cm)	Weight (gms)
0	28	64.39
1	90	—
2	125	—
3	180	—

While it is essential to protect and expand saltwater crocodile populations to the maximum within the habitat available, it seems likely that commercial usage could best be achieved in a combined scheme of ranching (captive rearing of young from wild collected eggs) and farming (closed cycle captive breeding).

A brief breakdown of the productive value of one adult female saltwater crocodile, conservatively calculated, will serve to indicate the value of this reptile as a resource and the tremendous waste resulting in killing one of these females (average figures):

1. Age of female at maturity—10 years
2. Number of years of productivity—30 years
3. Number of eggs per year—50 eggs
4. Number of hatchlings (60%)—30 hatchlings
5. Mortality in four years (20%)—24 survivors
6. Value of 24 four year olds (skin and byproducts)—Rs. 57,600

7. Rearing costs for four years—Rs. 14,400
8. Net value of 24 four year olds—Rs. 43,200
9. Life productivity value of one female—Rs. 1,296,000

It is thus apparent that the protection of wild crocodiles for ranching and their captive farming can be lucrative. The technology is still young but success has been achieved both in wild population management as well as commercial captive rearing in several countries including Thailand, Australia and Papua New Guinea.

The value of the saltwater crocodile in controlling fish predators and in its role as the ultimate predator/scavenger of estuarine areas cannot be underestimated. Studies on this species have unfortunately lagged far behind its over exploitation, and we stand to lose the economically and ecologically valuable reptile before we even partly appreciate its value. The single most important conservation measure required in India is the protection of its habitat of the saltwater crocodile—the remaining mangrove habitat (that we now know must be retained as a cyclone buffer and breeding zone for many of the other commercially exploited species, especially fish, crabs and prawns).

## II. Sea Turtles

Perhaps, the most heavily exploited reptiles are the sea turtles. The Ridley is the only common sea turtle in Indian waters, and its main nesting concentrations are limited to parts of the Orissa coast. The other three species regularly reported in the Indian region are much less common. Of these, the leatherback sea turtle is considered to be endangered, with significant numbers nesting only on some beaches in the Andamans and Nicobars.

Sea turtles are valuable for meat, calipee (the cartilage in the plastron which is used in soap making), shell (in the case of the hawksbill and green) and leather (which, though little is obtained from a turtle, came into fashion following the scarcity and high price of crocodile leather). Hawksbill shell (scutes) is now worth about Rs. 500 per kg.

But how can sea turtle be sensibly used as a sustained yield resource? Cayman Turtle Farm in the Caribbean is so far the only place that has succeeded in breeding them in captivity, after a great input of research and development of adequate pens complete with nesting beaches. Considering the high productivity of eggs (250-500 eggs per year per female) and high hatchling mortality (probably over 90%) the logical answer is collection of egg and rearing (ranching). This is in fact the present government programme in the States of Tamil Nadu (originally begun by the Madras Snake Park Trust) and West Bengal where thousands of transferred eggs are hatched and the hatchlings released each year.

The fairly rapid growth rates of sea turtles makes them seem to be logical candidates for commercial ranching of surplus hatchlings that would otherwise not survive in the wild. In 1984, for example, it was observed at Gahirmatha in Orissa (where the mass nesting of several lakhs of female ridleys takes place annually in January, February and April) that literally millions of eggs are destroyed by predators, erosion by the sea and digging up by successive waves of nesting females. It can be argued that a portion of the eggs could be collected and the hatchlings reared for commercial sale in West Bengal (few people will eat turtles in Orissa). But what will they be reared on? The fish, crab and prawn harvest in the nearby mangroves are the food of the local human inhabitants. Their protein resources obviously cannot be used to rear another protein resource which is to be then exported.

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TABLE 3. Growth rate of the Hawksbill Sea Turtle (*Eretmochelys imbricata*) at Madras Crocodile Bank Trust

Age	Carapace Length	Carapace width	Head width	Weight
6 months	10	10	—	125 gms
1 year	23	22.5	4.5	1500 gms

The sea turtle resource deserves an urgent injection of research and study, already started in a small way by Orissa, Tamil Nadu and the CMFRI. Status surveys on the Indian beaches (mostly by one person, Satish Bhaskar) have identified important nesting beaches of the valuable hawksbill and green sea turtles, mainly in the Andamans and Nicobars and Lakshadweep. Without knowing more about the mysteries of their biology, we are still far away from using sea turtles as the valuable resources they are.

Similarly the two chelonians which live in association with the mangroves of Orissa and West Bengal, (the batagur and Bibron's soft-shell) deserve immediate attention because of their scarcity and consideration of their potential resource value for the future. In the old herpetological literature, batagur at least was reported to be a valuable protein source when millions of eggs were collected yearly in the 1800's from the banks of the Hoogly River where it is today extinct.

### III. Sea Snakes

Several of the 20 species of sea snakes in Indian waters are very common, notably the hook-nosed sea snake (*Enhydrina sphisostoma*) which has been in aggregations of lakhs off the West Coast. Several islands in the Andamans such as whitecliff in North Andaman are nesting sites of the amphibious sea snakes (*Laticauda*) which come ashore in large numbers to lay their eggs.

There is a significant demand for sea snake meat and skin in Hongkong and Korea where several island populations have been heavily exploited for decades. Recently commercial fishing firms in Queensland, Australia have been permitted to exploit incidental catches of sea snakes in trawl nets for their skins but no details of price or numbers are known.

Sea snake venoms, for research and the production of antivenom serum, are among the world's most valuable venoms with recently quoted prices as high as Rs. 20,000 per gram. However, the market is limited; and extraction is very difficult because of the small size of fangs and small venom output per snake.

Almost nothing is known about the status or biology of sea snakes in Indian waters, some of which grow to nearly 3 m in length. Basic studies could be easily taken up by collection of specimens brought in by commercial shrimp trawlers and, in some seasons, inshore seines.

#### IV. Water Monitor Lizard

The water monitor is one of the three largest lizards in the world, growing to 2.5 m in length. Its optimum habitat are the estuarine mangrove and grass swamps, and it survives in India in the same areas the salt-water crocodile still hangs on. It is an important predator of crocodile and sea turtle eggs and, in habitats where it is not harassed by humans, occurs in high densities. In India, it is endangered because of killing for skin, meat and fat and due to habitat loss. The water monitor is still locally common in some parts of the Andamans and Nicobars but, being very easy to catch with the help of dogs, is extremely vulnerable.

Little is known about the biology of this large lizard. As with most monitors, the incubation period of its eggs is quite long, nine to ten months. This means a longer period

during which the eggs could be destroyed, seemingly a disadvantage for survival. Monitors very often use termite nests as incubation chambers for their eggs, apparently common sites.

The water monitor has bred in captivity at Ahmedabad zoo and the Madras Snake Park but not consistently and with little survival success. It would appear at first sight that commercial farming of monitors is not feasible because the rearing costs for the three or four year period needed to bring them to croppable size would not be offset by the value of the skin (now about Rs. 20 for a raw, salted skin on the world market).

A study on the breeding biology and captive rearing of the monitor would be an important contribution to its conservation and management and its utility as an economic resource.

#### CONCLUSION

The past decade has seen the development of what appears to be a viable industry based on the captive breeding and rearing of various crocodylians including the American alligator, Siamese crocodile, Nile crocodile and West Guinea crocodile. However, in spite of the obvious commitment of several Governments to the careful usage of crocodiles as a sustainable yield resource, it remains to be seen whether farmed products will replace those taken from the wild.

The fears of a certain lobby of conservationists that farming wildlife merely increases the market and demand, exerting even further pressure on endangered species (particularly in countries where enforcement of protective laws, if any, is inadequate) may be justified to some extent. These fears, however, can damage the chances for a wildlife farming operation to succeed. The best example is Cayman Turtles.

Farms which, because of a strong preservationist lobby in the U.S.A., was stopped from selling its farmed products in that country, resulting in considerable losses that could jeopardize its existence. While one can appreciate the ideal of no commercial trade in wildlife products, farmed or otherwise, the economic situation of hundreds of millions of people in developing countries prevent them from sharing that ideal. They will use their countries' wildlife to extinction unless they are provided with and convinced of practical alternatives. It would be far more sensible if the same people who spend time and money lobbying for total protection of wildlife would invest in the research and technology of captive breeding, sustained yield ranching and scientific management of those taxa which have potential for rational use as economic resources.