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# STATUS AND DISTRIBUTION OF TURTLE FAUNA (TESTUDINES : REPTILIA) IN THE MALABAR PART OF KERALA, INDIA

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## INTRODUCTION

Turtles, tortoises and terrapins (now usually termed, 'turtles') belong to the reptilian order Testudines. They are mainly amphibious creatures, most of them living in various freshwater and marine habitats. Their body is well protected in a box-like, bony or leathery, shell. The upper portion of the shell is the carapace and the lower, the plastron. In India, about 33 species of turtles are known to inhabit the land and coastal waters. These include 5 species of sea turtles representing two families of Cheloniidae and Dermochelyidae, 5 species of the family Testudinidae and at least 23 species, chiefly freshwater ones, of the families Trionychidae and Bataguridae. In the present report, an attempt has been made to provide a consolidated account on the turtle fauna of the Malabar part of Kerala, with special reference to their status, distribution and some aspects on their conservation.

## STUDY AREA

The present study has been conducted in the Malabar part of Kerala. The area comprises of the hilly tracts, from Manjeswaram in Kasaragod district to the southern limits of the Malappuram district, along the western face of the Western Ghats, as well as the midlands and the coastal strip of land washed by the Arabian Sea. The area falls under the 4 districts of Kasaragod, Kannur, Kozhikode and Malappuram in Kerala. Based on physical features, the region can be divided into 3 natural divisions. They are the highlands, the midlands and the lowlands. The Western Ghats which bound the Kerala state on its eastern side dominate the topography of Kerala and constitute the high lands. This division supports different kinds of forest vegetations and plantations. The midlands, an undulating terrain, is dominated by laterite hills cut across by rivers. The lowlands comprise of the long and narrow coastal belt on the west, with stretrches of sand and backwaters. Extensive paddy fields and numerous coconut plantations dominate the landscape in the lowlands. Out of the 41 west flowing rivers of Kerala, 23 originate in the Malabar part of the state. The important rivers are Chandragiri, Kariangode, Kavvayi, Kuppam, Valapattanam, Kuttiadi, Korapuzha, Chaliyar and Bharathapuzha. Besides these rivers, the Malabar region has a long chain

of lagoons and backwaters including Kumbala, Kalanad, Bekkal and Kavvayi. The area receives maximum rainfall of more than 3000 mm., mainly from the south-west monsoon during June–September. Northeast monsoon brings light showers during October–November. Malabar region has a warm, humid tropical climate with a relative humidity ranging between 75 and 92 percent and a comfortable temperature ranging between 16°C in winter to 38°C in summer. Primarily, the vegetation is mostly tropical rain forests in the highlands, and a good growth of mangroves in the coastal areas. The lowlands are also blessed with many patches of sacred groves.

## METHODOLOGY

Field surveys were carried out from January 1994 to June 1996 in the northern districts of Kannur and Kasaragod. Later from February 2001 to August, 2002, we concentrated mainly in the Kozhikode and Malappuram districts. Recent records of marine turtle breeding were incorporated in planning the survey. Many less important beaches were also included in the survey to locate further breeding grounds of sea turtles. Numerous interviews were conducted with the local inhabitants closely associated with the sea and the forests. Over a length of 200 km of the coastline was surveyed during the study period to assess the conditions prevailing in the various breeding habitats. A number of terrestrial and fresh water habitats were also surveyed to assess their current status. Besides, literature was reviewed to compare the past and present status and distribution of turtles in Malabar.

## RESULTS

A total of 8 species of turtles belonging to 5 families are found to occur in the Malabar part of Kerala, the details of which are presented below. Besides, a key to the identification of the turtle fauna known so far from the area is also provided.

## SYSTEMATIC LIST OF TURTLES OCCURRING IN THE MALABAR PART OF KERALA

Class REPTILIA

Order TESTUDINES

Family CHELONIIDAE (Sea Turtles)

1. ***Lepidochelys olivacea*** (Eschscholtz)
   Olive Ridley Sea Turtle

Family DERMOCHELYIDAE (Sea Turtle)

2. ***Dermochelys coriacea*** (Linnaeus)
   Leatherback Sea Turtle

Family BATAGURIDAE (Asian Pond Turtles)

3. ***Melanochelys trijuga trijuga*** (Schweigger)
   Indian Pond Terrapin
4. ***Geoemyda silvatica*** Henderson
   Cochin Forest Cane Turtle

Family TESTUDINIDAE (Land Tortoises)

5. ***Indotestudo forstenii*** (Schlegel and Miller)
   Travancore Tortoise

Family TRIONYCHIDAE (Soft shell Turtles)

6. ***Lissemys punctata granosa*** (Schoepft)
   Indian Flapshell Turtle
7. ***Pelochelys cantorii*** (Gray)
   Asian Giant Softshell Turtle
8. ***Aspideretes leithii*** Gray
   Leith's Soft Shell Turtle.

**Key to turtles of Malabar**

1. Forelimbs modified into paddle-shaped flippers ..... 2
— Forelimbs not paddle-shaped, at the most semi-paddle shaped only; digits distinct ..... 3
2. Surface of carapace covered with scutes, carapace and plastron without ridges ..... *Lepidochelys olivacea* (Eschscholtz)
— Surface of carapace covered with skin; carapace with seven and plastron with five longitudinal ridges ..... *Dermochelys coriacea* (Linnaeus)
3. Shell covered with soft skin; horny mandibles concealed under fleshy lips; three claws on each limb ..... 4
— Shell covered with scutes; horny mandibles exposed, with no fleshy lips; four or five claws on each limb ..... 6
4. Marginal bones present; cutaneous femoral flaps on plastron ..... *Lissemys punctata granosa* (Schoepft)
— Marginal bones absent; cutaneous femoral flaps on plastron absent ..... 5

5. Anterior of shell poorly-defined, grading smoothly into the skin of the neck; carapace very flat; proboscis very short ..... *Pelochelys cantorii* (Gray)

— Anterior of shell thickened and nodose with patches of wart-like prominences demarcating the division between shell and neck; proboscis well developed ..... *Aspideretes leithii* (Gray)

6. Large, well-defined scales usually evident on snout and between the eyes; hind limbs elephantine with relatively short toes, lacking webbing ..... *Indotestudo forstenii* (Schlegel and Muller)

— Skin on snout and between eyes smooth, lacking large well-defined scales; hind limbs not elephantine; toes prominent with at least slight webbing ..... 7

7. Upper jaw feebly notched at the middle; vertebrals II and III longer than wide ..... *Melanochelys trijuga trijuga* (Schweigger)

— Upper jaws hooked; vertebrals II and III wider than, or as wide as long ..... *Geoemyda silvatica* Henderson

## Sea Turtles

Sea turtles which appeared in the late Triassic differed little from those alive today. Having evolved from land based ancestors these large reptiles need to complete their breeding cycle on land. There are seven species of sea turtles living in the world and five of them come ashore to nest in India. They are, the Leatherback (*Dermochelys coriacea*), the Green Sea Turtle (*Chelonia mydas*), the Hawksbill (*Eretmochelys imbricata*), the Loggerhead (*Caretta caretta*) and the Olive Ridley Turtle (*Lepidochelys olivacea*). Of these, Leatherback and Olive Ridley Turtles represent the marine turtle fauna of Kerala. As in the southern part of the Kerala coast, there could be stray visitations of other species of sea turtles in the Malabar coast too that might not have been reported. On some of these beaches, turtle nesting is seasonal, while on others, nesting can be observed throughout the year with a peak season during December.

### Family DERMOCHELYIDAE

The family Dermochelyidae is represented by a single species *Dermochelys coriacea*(Linnaeus), commonly called the Leatherback sea turtle. It is the largest known marine turtle species in the world. It is widely distributed in the world's oceans, nesting on tropical beaches and islands. Its carapace is formed of small polygonal bony plates covered with skin. The neck is short and slightly retractile. The limbs are paddle shaped, clawless and feet are scaleless. Nothing is known about the ancestry of this unique family.

### Leatherback Sea Turtle

***Dermochelys coriacea*** (Linnaeus)

The Leatherback Sea Turtle or Luth is the largest and the heaviest of all living turtles in the world. Its average weight is about 400 kg with a maximum record of 725 kg. In local Malayalam language, the species is called 'Kolama', due to its elongated body shape. The carapace is smooth-skinned and rubber like, and bears 7 strong nodular longitudinal ridges which provide considerable rigidity. The limbs are paddle-shaped and without claws. It is a circum-global species and nests on the beaches of tropical seas of the Atlantic, Pacific and the Indian oceans. Nesting records for India are scarce, but according to Pritchard (1971), egg bearing females have been observed at Travancore, southern Kerala. Das (1995) reported the species as quite common on the Quilon coast of Kerala, at the end of the nineteenth century, when some 40 turtles were caught annually, either while nesting or in special nets set in the sea. In the early part of the last century only two or three were caught annually, and the species was reported to frequent the outskirts of the Tangasseri Reef, off the Quilon coast (Smith, 1931). Jones' (1959) record of a breeding turtle at Kozhikode (Calicut) beach observed during daytime in July, suggests the prevalence of its breeding once in Malabar. The global decline of Leatherbacks has received much attention in recent times, including prediction of extinction in the near future (Spotila, 2000). The Leatherback is protected under Schedule I of Indian Wildlife (Protection) Act, 1972 and it is included in appendix I of Convention of International Trade in Endangered Species of Wild Fauna and Flora (CITES), which prohibits trade in turtle products by the signatory countries.

## Family CHELONIIDAE

The family comprises of marine turtles whose carapace and plastron are covered with horny epidermal shells. The neck in these turtles is incompletely retractile and bends in a sigmoid curve almost in a vertical plane. Flippers are covered with small scales; claws are reduced to one or two on each limb, and shell is covered with scutes. All living species, except the Green Turtle (*Chelonia mydas*), are carnivorous as their adults feed on marine organisms. The green turtles are herbivorous and mainly feed on marine algae, sea grasses and seaweeds. They lead a perfect aquatic life and visit the sandy coastal areas of the land only for breeding. Five genera and seven species represent the family in the world, of which four species occur in the waters of the Indian subcontinent. So far only one species of cheloniid sea turtle, the Olive Ridley Turtle (*Lepidochelys olivacea*), is represented in the waters of Kerala.

### Olive Ridley Turtle

***Lepidochelys olivacea*** (Eschscholtz)

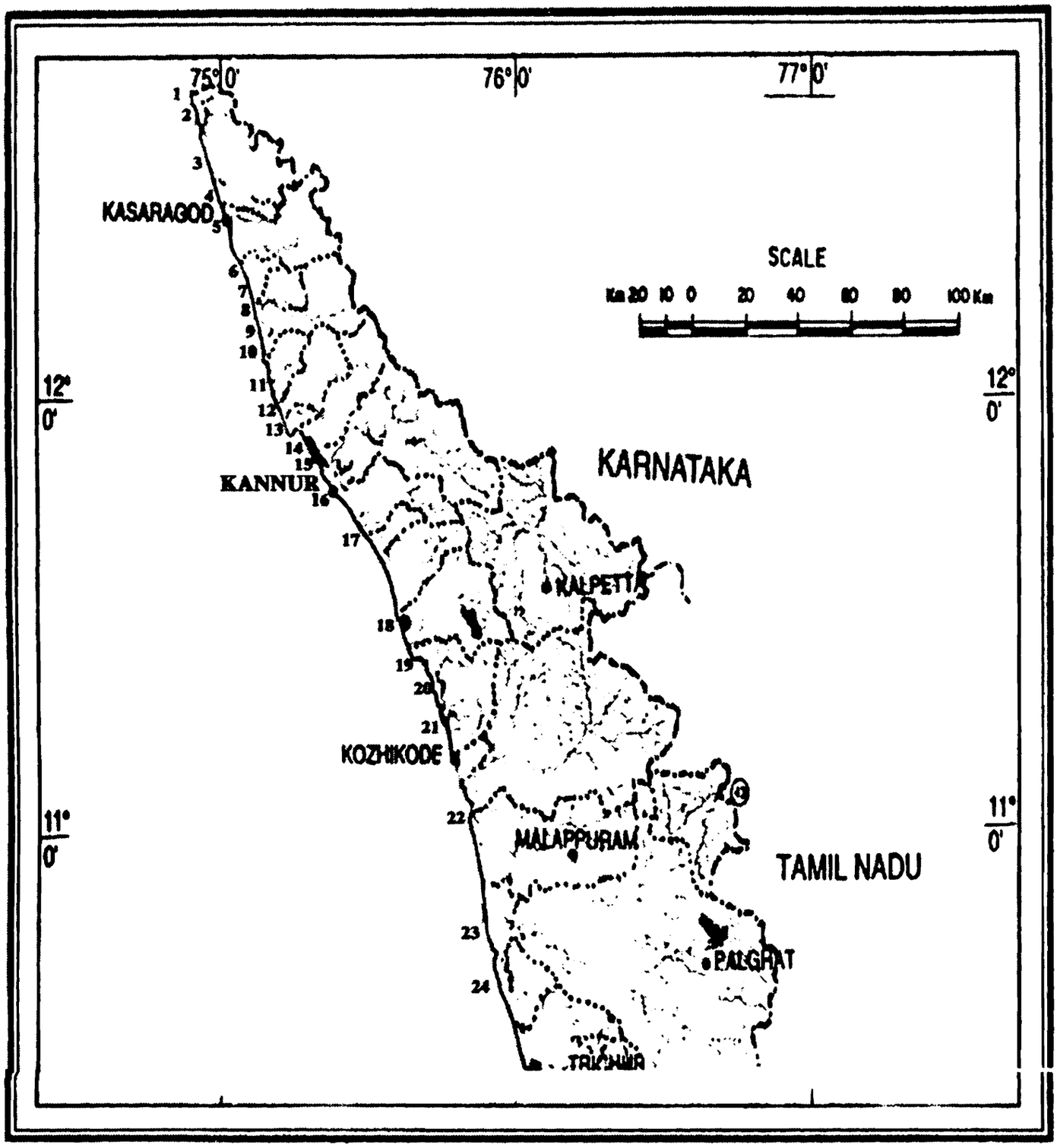
The Olive Ridley turtle is the smallest of the sea turtles of the coast of India and is the one most often found in Kerala coast. The Olive Ridley is one of the high profile species which

has received substantial media coverage and scientific attention in recent years. This is the only turtle that forms massive nesting congregations. The largest nesting population in the Indian subcontinent is at Gahrimatha in Orissa, which has been the subject of several long term studies by many scientists. During our survey along the coastal areas of Malabar, we encountered 24 nesting sites (Map 1) along the 200 km long sea coast. The most abundant nesting areas are found in between Kavvayi and Manjeswaram riverine area in Kasaragod district. Thaikadappuram in Kasaragod district, Kolavipalam in Kozhikode district and Muthiyam beach in Malappuram district are protected by Kerala Forest Department with the help of local Panchayaths and non-governmental organizations by maintaining hatcheries and giving protection to the breeding turtles. In many areas, the local fishermen and villagers reported having seen over 100 nests annually, 20 years before; but in recent years, the number of nestings have reduced considerably. According to the fishermen, sea turtle nests were not seen in the beaches other than in Kolavipalam and Payyoli of the Kozhikode district for the last five years. Jackals (*Canis aureus*), Common mongoose (*Herpestes edwardsi*) and feral dogs were the main primary egg predators at most beaches, and a number of depredated nests were seen in many areas. The turtles visit Malabar beach during September to February, every year, mainly from October to January, with a peak period in November. During 2000–'01, more than 1,600 eggs were collected and most of the hatchlings released in the sea. In 2001–'02, the number was around 5000. In Muthiyam Beach, Vallikunnu Panchayath, Malappuram district, during 1999–2000, about 2500 and in 2000–'01, 2100 hatchlings were released into the sea. The mangrove rich estuarine environment of Kolavipalam (Kozhikode district) and other beaches in Kannur and Kasargod districts attract the marine turtle *en masse* for breeding (Gopi and Radhkrishnan, 2001). The mangrove ecosystem also forms a favourtie habitat for thousands of crabs, prawns and other invertebrates, which Ridley turtles also seem to be fond of. The Olive Ridley Turtle has become endangered on account of commercial exploitation by man for its flesh, skin, leather and eggs. In Kerala alone, approximately 30,000 ridleys are consumed annually (Das, 1995). The species is protected under Schedule I of the Indian Wildlife (Protection) Act of 1972 and Appendix I of CITES.

## Asian Pond Turtles

### Family BATAGURIDAE

These are smaller, hard-shelled amphibious forms inhabiting the various freshwater bodies. They are closely related to land tortoises, but can be differentiated in not having elephantine hind feet. They are more adapted to freshwater than to terrestrial life. Two species of fresh water turtles are reported from Kerala : the Indian Pond Terrapin (*Melanochelys trijuga*) and the Cochin Forest Cane Turtle (*Geoemyda silvatica).*




**Map 1. :** Showing the marine turtle nesting sites in the Malabar Part of Kerala.

1. Manjeswaram-Bangava Manjeswar, 2. Uppala, 3. Kumbala, 4. Cherangai Kadappuram-Kasaragod, 5. Keezhur-Kalanad Kadappuram, 6. Chittari Kadappuram, 7. Athiyan Kadappuram, 8. Bhalla Kadappuram, 9. Puthiya valappu, 10. Thaikadappuram, 11. Mavilakadappuram, 12. Kottikadappuram, 13. Kavvayikadappuram, 14. Puthiyangadi Kadappuram, 15. Azhikkal, 16. Thayyil, 17. Thalasseri, 18. Kolavippalam, 19. Kozhilandi, 20. Kappad, 21. Puthiyappa Kadappuram, 22. Muthiyam beach, 23. Ponnani, 24. Koottazhi.

### Indian pond Terrapin

*Melanochelys trijuga trijuga* (Schwiegger)

Of the four subspecies recorded from India, only the *Melanochelys trijuga trijuga* is available in Kerala. It is the most common and widespread species occurring in a variety of habitats from small ponds to wells, rivers and canals. Once, the species was reported to be common in Kerala. Indiscriminate poaching by the nomadic tribals from Tamil Nadu and Andhra Pradesh has caused the population decline in Malabar. At present, the species can only be occasionally sighted. A copulating pair was observed in July 2002, in Parassinikadavu Snake Park, in Kannur district, where more than 10 individuals of this species collected from a surrounding locality were displayed in a small pond. The species is unprotected by legislation. Urgent measures should be taken to protect the species from local extinctions, since their number has declined alarmingly in the recent past.

### The Cochin Forest Cane Turtle

*Geoemyda silvatica* Henderson

This is a small batagurid attaining about 13 cm in shell length. The Cane turtle is entirely terrestrial, inhabiting evergreen, semi-evergreen and moist deciduous forests. The type locality of the species is Kavalai forests near Chalakudi, Ernakulam district, hence the species is also known as Kavalai forest turtle. Vijaya (1982) and Das (1995) provided information on the distribution of the Cane turtle. Accordingly, the species is found in Nadukani, Kothaiyar Reserve Forest, Kavalai, and Wildlife sanctuaries of Peechi-Vazhani, Chimmony, Neyyar, Parambikulam, Peppara and Idukki in Kerala. In Tamilnadu, the species is recorded from the Indira Gandhi Wildlife Sanctuary, Anamalai. It is also reported from Neria and Agumbe forests of Karnataka. The species frequents leaf-littered localities in forests,and is found often in association with the reed *Ochlandra travancorica* at an altitude range of 400–800 m. From the literature available, a record of this species from Calicut district (Groombridge *et al.*, 1983) was noted. The species is threatened mainly by the loss of its natural forest habitats. The tribals collect this turtle mainly for consuming its liver due to its alleged medicinal property in treating piles. The species is protected under Schedule I of Indian Wildlife (Protection) Act of 1972. It is also listed under Action Plan Rating 2 of the IUCN/ SSC Tortoise and Freshwater Turtle Specialist Group.

### Land Tortoises

Family TESTUDINIDAE

These are the true terrestrial and herbivorous tortoises having thick shells and completely retractile head and neck. These tortoises are having strong, unwebbed feet with comparatively shorter digits. The hind feet are club-shaped and elephantine. The family testudinidae is represented

in Kerala by two species, *viz.*,the Indian Star Tortoise (*Geochelone elegans*) and the Travancore Tortoise (*Indotestudo forstenii*). The Indian Star Tortoise is distributed over the drier zones of western and southern parts of the Indian subcontinent, and in Kerala, it is mostly found in the Chinnar Wildlife Sanctuary, Idukki district. The Travancore Tortoise is distributed over the forested tracts of Western Ghats, including the Malabar region.

### The Travancore Tortoise

***Indotestudo forstenii*** (Schlegel and Muller)

It is endemic to the Western Ghats and known to occur in Kerala, Tamil Nadu and Karnataka states. Bhupathy and Choudhury (1995) provided information on the distribution of this species from various localities. Accordingly, the Travancore Tortoise is recorded from Neyyar, Peppara, Peechi, Parambikulam and Idukki Wildlife Sanctuaries, the Silent Valley National Park, the Periyar Tiger Reserve as well as the Chalakudy and Karulai forests of Kerala. Subsequently, Radhakrishnan (1998) reported the species from Goodrickal range of Ranni forest division in Pathanamthitta district. In Tamil Nadu, the specie is found in Kothaiyar reserve forest and the Indira Gandhi Wildlife Sanctuary. In Karnataka, the species occur in Yellapur, Neriya, Gundia, Chadibiri, Subrahmanya and Agumbe forests, besides the Dandeli, Sharavathi and Mookambika sanctuaries. During the turtle survey, we encountered a pair of specimens, brought from Kudiyanmala Hills of Kannur district, kept in the Parassinikadavu Snake Park. The Kudiyanmala area is on the western slope of Western Ghats adjoining the Coorg district of Karnataka and about 65 km north east of Kannur town. The species is protected under Schedule IV of the Indian Wildlife (Protection) Act of 1972 and listed in Appendix II of CITES. It is listed under the "Insufficiently Known" category in the IUCN Red Data Book and placed under Action Plan Rating 2 of the IUCN/SSC Tortoise and freshwater Turtle Specialist Group.

### Soft shell Turtles

Family TRIONYCHIDAE

Trionychidae comprises of the modern, flattened, soft-shelled, carnivorous and highly aquatic turtles. Head and neck are capable of complete retraction within the shell. The neck is quite long, and jaws are markedly sharp and hidden below the soft lips. Being mostly aggressive in nature, it is capable of inflicting serious injury to its handlers. The limbs are clawed and webbed and modified into swimming paddles. Trionychid turtles are represented in India by four genera namely, *Lissemys, Aspideretes, Pelochelys* and *Chitra*. The first three are represented in Kerala by three species as follows.

**Indian Flapshell Turtle**

***Lissemys punctata granosa*** (Schoepft)

It is one of the most abundant freshwater turtles in the Indian region with a range from Pakistan eastward through India, Nepal, Bangladesh to western Myanmar (Das, 1995). The species is highly adaptable and found in varying aquatic habitats like backwaters, rivers, ponds, ox-bow lakes, streams, paddy fields, canals, *etc.* Locally, the species is called 'Vellaama' or 'Palaama', meaning white turtle or milk turtle respectively, due to its pale colour and soft-shelled appearance. A number of these turtles were kept in a turtle pond for display along with other species of turtles at the Parasinikadavu Snake Park, Kannur, Kerala, where the courtship behaviour was observed once, on 25-th May, 2002. A male was seen chasing the female and mounting it within the shallow pond. During our local faunistic survey, on 5-th May, 2001, we collected an albino Flap-shell Turtle from Kovur, about 9 km from Calicut city. In the albino turtle, the morphological characteristics were observed to be the same as those of normal turtle, except that the colour of the carapace was yellowish with a white tinge.

A good number of Indian Flapshell Turtles are protected with the belief of sanctity in the temple pond of Meloth Kavu near Bedakam in Kasaragod district. Similarly, the temple pond of Meenkulam Srikrishna Temple at Olayambadi in Kannur district also holds hundreds of flapshell turtles. Both these perennial ponds, are situated on a laterite hill. The devotees offer rice and other food items to the turtles for prosperity and good fortune.

The Indian Flapshell turtle is often hunted during rainy season from the paddy fields in Kannur and Kasaragod districts for its flesh by the locals. The Flap-shelled turtle is protected under Schedule I of Indian Wildlife (Protection) Act of 1972.

**Asian Giant Softshell Turtle**

***Pelochelys cantorii*** (Gray)

The species is a rare and, little known soft-shelled turtle mostly found in the east coast of India. It is characterized by its huge size, depressed shell and unusually smaller head and snout. In India, the species is distributed along the east coast in West Bengal, Orissa and Tamil Nadu. The Asian Giant Softshell Turtle is also known from Bangladesh, Myanmar, Thailand, Malaysia, Indonesia, China and Vietnam (Das, 1995). On the west coast of India, the species is known only from the Thiruvananthapuram district (Nair and Badrudeen, 1975) and Valapattanam river, Kannur district of Kerala (Jafer Palot & Radhakrishnan, 2002). The Valapattanam specimen was caught from Mangadavu region of Valapattanm river (11°57'N and 75°20'E) by a local fisherman. The collection site was about 7 km inland from the sea mouth of Azhikkal estuary. The specimen measured about 90 cm in length, 55 cm in width and weighed about 45 kg. In April, 1999, one more specimen was caught from the same locality and brought to the Parassinikadavu Snake Park,

but it survived only for a few days. The species is protected under Schedule I of Indian Wildlife (Protection) Act of 1972, prohibiting its trade, capture or possession. The species is also listed under Action Plan Rating 3 of the IUCN/SSC Tortoise and Freshwater Turtle Specialist Group.

**Leith's Softshell Turtle**

***Aspideretes leithii*** (Gray)

The species is known from Madhya Pradesh, Maharashtra, Karnataka, Andhra Pradesh, Orissa and Tamil Nadu (Das, 1995). Recently, the species has been recorded from the Chaliyar river near Nilambur, Malappuram district (Thomas *et al.* 1997). Normally, The Leith's Softshell Turtle is a species of riverine habitat, including the reservoirs. Though widely distributed in Peninsular India, data on its status, distribution and general ecology are rather scarse. The species is protected under Schedule IV of Indian Wildlife (Protection) Act of 1972.

**Reasons for the decline of Turtles :**

Uncontrolled mechanized fishing in areas of high sea turtle concentrations, illegal near-shore trawling and operating gill nets result in heavy mortality of adult sea turtles. Indiscriminate sand mining along the sandy beaches of coastal Malabar is a great threat to the breeding population of turtles. Developmental activities of man such as construction of buildings in the coastal areas, illuminating the nesting beaches by artificial lights, discharging industrial effluents into the sea, planting of *Casuarina* in some of the beaches, destroying the mangrove vegetation along the estuarine areas *etc* pose great threat to the survival of sea turtles. Besides, collection of eggs and adults for meat and medicine by locals and depredation of eggs and juveniles by jackals, feral dogs, mongooses and crows take heavy toll.

Clearing of lowland evergreen forests and reed beds, illegal fish collection by poisoning and dynamiting, indiscriminate killing for meat and alleged medicinal properties, construction of dams, sluices and weirs and excessive use of pesticides and chemical fertilizers are some of the reasons for the decline of land and freshwater turtles.

## CONSERVATION MEASURES

Using Turtle Excluder Devices (TED) by trawlers operating in the coastal waters beyond 5 km of the shore line, strict enforcement of Coastal Regulation Zone Act, guarding the nesting sites to minimize predation, declaring major nesting sites as protected areas and generating awareness among the local communities as well as involving them in conservation programmes are some of the measures required to be implemented to protect the sea turtles.

As far as the land and freshwater turtles are concerned, the protection measures required to be implemented include legislation to upgrade the existing Wildlife Protection Act (since many of the

turtles are currently placed in the lower Schedules of the Act) and preventing further encroachment of man on lowland evergreen and riparian forests.

## CONCLUSION

As no systematic survey to assess the status of turtles has been done in Kerala, this should be a priority area of research by those concerned in conserving the turtles. Objectives should be to trace the remnant/fragmented populations of marine and freshwater turtles and to identify the breeding sites of these turtles for undertaking conservation measures. Strict enforcement of the ban on near-shore mechanized trawling, and co-operation from the local Panchayaths and other non-governmental organizations, should be ensured in the conservation programmes. Educational and awareness programmes involving the local people, especially the fishing communities and tribals, are necessary for the effective implementation of turtle conservation efforts. Only through committed and dedicated action, the turtle fauna can be saved from extinction.

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