

BHABANI®

FRESHWATER

TURTLES & TORTOISES

OF SOUTH ASIA



Jayaditya Purkayastha
Indraneil Das
Saibal Sengupta

FRESHWATER
TURTLES & TORTOISES
OF SOUTH ASIA



Jayaditya Purkayastha
Indraneil Das
Saibal Sengupta

FRESHWATER TURTLES & TORTOISES OF SOUTH ASIA

Written by

Jayaditya Purkayastha, Indraneil Das, Saibal Sengupta

Published by

BHABANI BOOKS

An imprint of Bhabani Offset Pvt. Ltd.

Bhabani Complex, Hatishila, Panikhaiti, Guwahati-781 026, Assam

Phone: (0361) 2522222, 2738837, 2524056, 2528155, Fax: (0361) 2450797

E-mail: books@bhabani.com, bhabani@bhabani.com

First Published: August, 2015

Distributed by

BHABANI BOOKS

Opp. Don Bosco Church Provincial House

ARB Road, Panbazar, Guwahati-781 001, Assam

Phone: (0361) 2738837, Fax: (0361) 2450797, E-mail: books@bhabani.com

© Authors, 2015

Photographs © Individual photographers with names stamped alongside pictures

Illustrations © Somlec Gupta

Map © IUCN Tortoise and Freshwater Turtle Specialist Group, based on work by John Iverson, Peter Paul van Dijk, and Anders Rhodin

Line Diagrams © Her Majesty The Queen in Right of Canada, Environment Canada, 1999; Reproduced under License from Environment Canada (*B. baska*, *C. amboinensis*, *C. mouhotii*, *C. gemeli*, *G. hamiltonii*, *M. trijuga*, *M. emys*, *T. horsfieldii*, *A. cartilaginea*, *C. indica*, *L. punctata*, *N. nigricans*)

© Swiss Federal Food Safety and Veterinary Office (*G. elegans*, *L. punctata*, *I. elongata*, *N. hurum*, *N. gangetica*, *P. tectum*, *G. hamiltonii*, *M. tricarinata*)

All rights reserved.

No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior written permission of the authors and publisher.

The views expressed in this book are those of the Author, and not necessarily that of the publisher. The Publisher is not responsible for the views of the Author and authenticity of the data, in any way whatsoever.

ISBN:

Front Cover: Red-crowned roofed turtle (*Batagur kachuga*) by Joel Sartore / Photo Arc

Back Cover: Indian star tortoise (*Geochelone elegans*) by Anirban Chaudhuri

Layout & Design : Biru Mani Das

Printed in India at

BHABANI OFFSET PVT. LTD.

Bhabani Complex, Hatishila, Panikhaiti, Guwahati-781 026, Assam

Phone: (0361) 2524056, 2528155, Fax: (0361) 2450797

Website: www.bhabani.com



Map of South Asia



Acknowledgements

We would like to thank Rufford Foundation and The Mohamed bin Zayed Species Conservation Fund for financial assistance for the production of this project. Jayaditya Purkayastha is indebted to Rufford Small Grants for supporting throughout his active conservation and research career.

We thank Help Earth for continued support during the preparation of this book.

We thank the following departments and institutions for supporting in different stages of the production of this book: Forest Department of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram and West Bengal; Assam State Biodiversity Board, Assam State Zoo cum Botanical Garden, Zoological Survey of India, Arya Vidyapeeth College, Assam Science Technology and Environmental Council, Mizoram University, Gauhati University, Turtle Survival Alliance, US National Park Service, management bodies of temple ponds with turtles across the state of Assam and Universiti Malaysia Sarawak.

'Thank you' Environment Canada and Swiss Federal Food Safety and Veterinary Office for providing consent to publish the line diagrams of turtles; and the IUCN Tortoise and Freshwater Turtle Specialist Group for providing the species distribution maps.

We thank the following persons for their generous contribution of photograph: Abhijit Das, Shailendra Singh, Joel Sartore/PhotoArk, S. Harikrishnan, Arpita Dutta, Anirban Chaudhuri, Avrajjal Ghosh, Ruchira Somaweera, Shahriar C. Rahman, Vladimír Motycka, Gyanendra Deka/Sumit Das, Shashwat Sirsi/TSA-India, Peter Praschag, Deepak. V., V.L. Hrima

We thank the following individuals for facilitating the production of this book: Uwe Fritz, Peter Paul van Dijk, Brian D. Horne, Anders G.J. Rhodin, Peter Praschag, Sushil Kumar Dutta, Kartikeyan Vasudevan, Abhijit Das, Nikhil Whitaker, Shailendra Singh, Anirban Choudhuri, Arpita Dutta, H.T. Lalremsanga, V.L. Hrima, Lallawmsanga Tetea Zeon, Zodina Fanai, Hriatzuala Sailo, Chittaranjan Baruah, Mathias Lörtscher, Jacinthe Bélec, Shailendra Singh, Raja Mandal, Sumit Das, Gyanendra Deka, Bhim B. Biswa, Suraj S. Chauhan and Somlee Gupta.

Thanks Madhurima Das and Prince Choudhury for proof reading and enhancing the quality of the book.

We acknowledge the following person for their support: Parimal C. Bhattacharjee, Anwaruddin Choudhury, Abhai K. Johari, Chandan K. Bora, Nripen Kalita, Aaron M. Bauer, Gernot Vogel, Patrick David, Annemarie Ohler, Saipari Sailo, Kaushik Deuti and Channakeshava Murthy.

Thank you Somlee Gupta for preparing the illustrations for the book.



Foreword

South Asia is a hotspot of turtle diversity. With more than 30 species, the region is home to nearly 10% of global freshwater and terrestrial chelonian diversity. The well-watered areas of Northeast India and Bangladesh are especially rich. Humans have long had a complex relationship to turtles. They are revered for their longevity and fecundity but also exploited as pets, as a food source and as ingredients in the pharmacopeia of traditional medicine. In addition, turtles must share the earth and water with an ever increasing human population and its insatiable demand for resources. As a consequence, most of the turtles of South Asia are under threat and many are endangered or critically endangered; the Black Softshell Turtle, *Nilssonia nigricans*, is even extinct in the wild. How do we halt the seemingly inevitable loss of these fascinating reptiles? Certainly education is a key component to any conservation strategy. People will only care for the things they value and value the things they understand. Thus, an accessible guide to the freshwater and terrestrial chelonians of India and adjacent countries is a critical need. This concise book fills this need precisely. In addition to an overview of chelonian biology and human-turtle relationships, it delivers accounts for every species occurring from Afghanistan to Sri Lanka. Each account is illustrated with colour photos and drawings and a map, and each provides species specific data on identification,

distribution, reproduction, ecology, behaviour and conservation status. Simple keys supported by clear diagrams ensure that anyone can correctly identify both the hard- and softshell turtles of South Asia. The quality of information presented is guaranteed by the impressive team of authors, all of whom I am proud to call friends and colleagues: Jayaditya Purkayastha has established himself as a leading educator and champion of reptile conservation in Northeast India, Saibal Sengupta is an expert on the ecology, taxonomy and conservation of the herpetofauna of Assam and surrounding regions, and Indraneil Das is a world leader in the study of tropical Asian amphibians and reptiles, with a special interest in turtles. Together, these authors provide a wealth of information that will reveal the diversity of chelonians to readers and contribute to the public's appreciation of our responsibility to protect and conserve these imperiled survivors of an ancient lineage.

Prof. Aaron M. Bauer

Editor, *Hamadryad*

Villanova, Pennsylvania, USA

August 2015

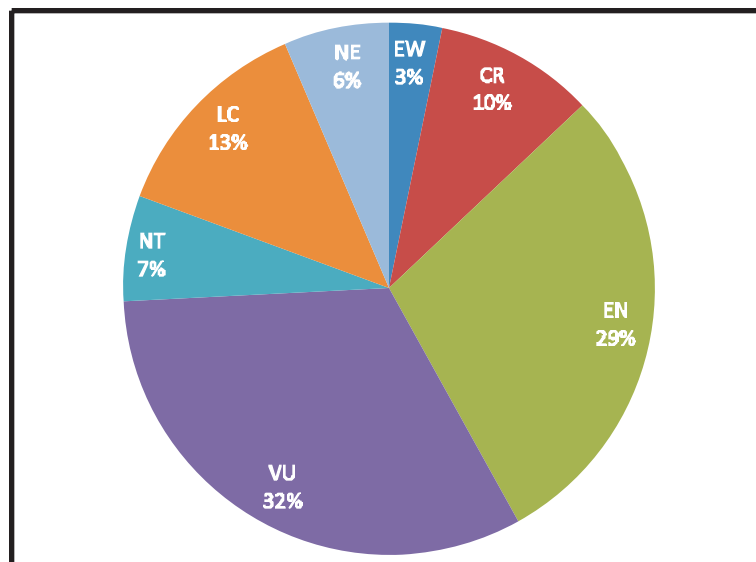


Preface

South Asia includes eight countries, namely Afghanistan, Pakistan, India, Maldives, Sri Lanka, Bhutan, Nepal and Bangladesh. The region has four global biodiversity hotspots (Eastern Himalaya, Indo-Burma, Western Ghats and Sri Lanka). All countries in South Asia are developing economies with India as one of the emerging economies. To keep the machinery of development running, pressures on natural resources are understandably enormous, often resulting in the loss of biodiversity. Freshwater turtles and tortoises are losing ground as a result of this.

Freshwater turtles and tortoises are one of the more threatened groups of vertebrates. About half of the 341 species worldwide are threatened with extinction. Numerous factors contribute to their present conservation status and apart from natural factors, turtles face threats from human-generated activities. Sand mining, construction of dam on rivers, filling up and degradation of wetlands and heavy fishing are some of the factors which disturb the environment as well as the biological requirement of turtles and have long-term effect on the turtle populations. Additionally, many turtle species have been literally eaten to extinction or are on the verge of extinction. Along with the demand for flesh, there exists a market for turtle eggs as well.

Although turtle meat and eggs trade are illegal in most countries, the practice and markets exist. There are 31 species of freshwater turtles and tortoises found in South Asia (Afghanistan [2 species], Bangladesh [24 species], Bhutan [6 species], India [28], Maldives [1], Nepal [15], Pakistan [11], Sri Lanka [3]). Of these 31 species, over 70% are threatened species (Extinct in the Wild:1, Critically Endangered:3, Endangered:9, Vulnerable:10, Near Threatened: 2, Least Concern:4, Not Evaluated: 2; source: IUCN redlist). International trade pertaining to threatened species is monitored by CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) and Appendix I and Appendix II listing are given to seven and twenty turtle species respectively; the remaining four species are not listed.



Status of the 31 species of freshwater turtles and land tortoises found in South Asia.

In this dismal phase of history of an ancient and long-lived group of animals, steps to stop their decline are urgently needed to be taken. In doing so, identification as well as knowledge of their biology are key components, particularly to formulate relevant conservation policies and to halt illegal trade.

This book is designed to help in the identification of the freshwater turtles and tortoises found in South Asia, besides providing basic information on their biology, distribution and conservation status.

Contents

Introduction	1
What is what?	15
Country wise checklist of turtles of South Asia	30
Key to species: Hardshell turtles of South Asia	23
Key to species: Softshell turtles of South Asia	27
Northern River Terrapin (<i>Batagur baska</i>)	33
Three-striped Roofed Turtle (<i>Batagur dhongoka</i>)	37
Red-crowned Roofed Turtle (<i>Batagur kachuga</i>)	40
South-east Asian Box Turtle (<i>Cuora amboinensis</i>)	43
Keeled Box Turtle (<i>Cuora mouhotii</i>)	47
Indian Leaf Turtle (<i>Cyclemys gemeli</i>)	50
Spotted Pond Turtle (<i>Geoclemys hamiltonii</i>)	53
Crowned River Turtle (<i>Hardella thurjii</i>)	56
Cochin Forest Cane Turtle (<i>Vijayachelys silvatica</i>)	59
Indian Eyed Turtle (<i>Morenia petersi</i>)	62
Three-keeled Turtle (<i>Melanochelys tricarinata</i>)	65
Indian Black Turtle (<i>Melanochelys trijuga</i>)	68
Brown Roofed Turtle (<i>Pangshura smithii</i>)	73
Assam Roofed Turtle (<i>Pangshura sylhetensis</i>)	76
Indian Roofed Turtle (<i>Pangshura tecta</i>)	79
Indian Tent Turtle (<i>Pangshura tentoria</i>)	83
Arakan Forest Turtle (<i>Heosemys depressa</i>)	86
Elongated Tortoise (<i>Indotestudo elongata</i>)	89
Travancore Tortoise (<i>Indotestudo travancorica</i>)	92
Asian Giant Tortoise (<i>Manouria emys</i>)	95
Indian Star Tortoise (<i>Geochelone elegans</i>)	98
Central Asian Tortoise (<i>Testudo horsfieldii</i>)	101
Asiatic Softshell Turtle (<i>Amyda cartilaginea</i>)	104
Indian Narrow-headed Softshell Turtle (<i>Chitra indica</i>)	107
Sri Lankan Flapshell Turtle (<i>Lissemys ceylonensis</i>)	111
Indian Flapshell Turtle (<i>Lissemys punctata</i>)	114
Indian Peacock Softshell Turtle (<i>Nilssonia hurum</i>)	118
Ganges Softshell Turtle (<i>Nilssonia gangetica</i>)	122
Leith's Softshell Turtle (<i>Nilssonia leithii</i>)	126
Black Softshell Turtle (<i>Nilssonia nigricans</i>)	129
Asian Giant Softshell Turtle (<i>Pelochelys cantorii</i>)	133



Introduction

The Order Testudines ('Chelonia') includes turtles, tortoises and terrapins. They comprise of animals with bony or cartilaginous elements that developed from ribs. The name Chelonia is true to its meaning, and is derived from the Greek word "Kelone", which denotes interlocking armour or shield. These three words, turtles, tortoises and terrapins are quite often interchangeably used and are related to their habitat, although the usage of the terms may vary from country to country. Typically, turtles include all aquatic and semi-aquatic species that tend to be carnivorous but also feed on some vegetation. Tortoises are land-



Indotestudo elongata eating cucumber



Introduction

dwelling mostly subsisting on a vegetarian diet. The term terrapin is used for freshwater turtles that are semi-aquatic. However, more commonly, these animals are together referred to as turtles.

Turtles are considered contemporaries to the Dinosauria. The earliest fossils are from the late Triassic (ca. 200 mya). They reached the peak of diversity by the end of the Cretaceous, and include two main taxonomic units- Cryptodira and Pleurodira. Cryptodira includes about three fourth of the known turtle species and is characterised by their ability to lower the neck and withdraw the head back into the shell. The pleurodiran turtles are popularly known as side-necked turtles and they fold the neck sideways along the body under the shell margin. Presently, there are 341 species of turtle representing 14 families. Turtles are abundant in the tropics, but may also be quite diverse in temperate regions. Fossil of freshwater tropical Asian turtle has even been recovered from the Arctic region.

Extant reptiles fall under two clades *Archosauria* and *Lepidosauria*. Until recently, turtles, due to their primitive anapsid skull (without fenestra), were considered as an out-group to all other reptiles, and close to extinct and primitive group of reptiles. Recent nuclear-DNA analysis reveal that the anapsid skull condition is a secondarily derived character from diapsid skull condition. Thus, turtles are placed firmly in a group with their closest relatives, the birds, crocodiles and dinosaurs.

Based on their sauropterygian relations, and paleobiogeographic and stratigraphic considerations it is suggested that the turtles have an aquatic origin. *Odontochelys* were probably the first turtle which crawled in shallow marine water of eastern Asia, around 220 million years ago. This soft-shelled turtle showed a full set of teeth, a condition subsequently lost. Approximately 210 million years ago, the first true turtle *Proganochelys*, appeared, whose fossils from

Germany and Thailand have been discovered. This large turtle had a true shell, the ribs and vertebrae fused to dermal bones to form the carapace and the pectoral girdle components fused with the dermal bones to form the plastron. *Proganochelys* lost teeth on the jaws, but retained teeth on the palatines. Major groups of turtles appeared by late Triassic and became abundant; their fossil records suggested that they have remained unchanged for at least the last 150 million years. However their ancestry remains unknown.

Currently there are more than 10,000 species of reptiles, which make the group one of the species-rich groups amongst the vertebrates (fish 32,900; amphibians 7,348; reptiles 10,120; birds 10,425; mammals 5,513). In comparison to two main groups of reptiles, namely, the snakes (3,548 species) and lizards (6,199 species), the turtles are not speciose (341 species) but display variation in size, some are gigantic (over 2 m carapace length), while a few are tiny (~ 0.06 m). The variety of body size is matched by their diverse behaviour, ecology and physiology and reflects their adaptations to a multitude of environment.

Turtles have characteristic bony shell that completely encases the limb girdles. The shell is unique to the group, but the function and morphology of the shell are variable between the species. The



Bony shell of *Pangshura sylhetensis*



Introduction

dorsal shell, called the carapace, is composed of dermal bones with contribution from the vertebrae and ribs. The ventral shell is called the plastron, which is formed anteriorly from clavicles and interclavicles, and posteriorly from abdominal ribs. In some, the carapace and the plastron fit tightly together, protecting limbs and head completely. Neurals, suprapygal, pleurals, nuchal and peripherals are the major bones that form the carapace. The shell of hard-shelled turtles are enclosed by scutes namely, vertebrals (middorsal row of scutes), costal (paired rows of scutes on either side of the vertebrals), marginals (outermost row of scutes), nuchal (a small scute at the anterior most end between the marginals: it may be absent in some and is an important taxonomic feature to differentiate some closely-related species, such as *Indotestudo elongata* and *Indotestudo travancorica*. Gular, humeral, pectoral, abdominal, femoral and anal are scutes which form the plastron of hard-shelled turtles. The plastron callosities and the femoral flap are vital characters of soft-shelled and flap-shelled turtles, respectively. The shape of the turtle shell provides significant evidence of their habits. Most aquatic turtles have flat and streamlined shell which helps them to swim with least resistance in water. The land tortoises have highly ossified, dome shaped carapace, a protection against the predators who are frequently unable to crush the shells of adults between their jaws. Turtles which are found in the leaf litter have mostly depressed shell (*Cyclemys gemeli*, *Vijayachelys sylvatica*), which enable them to hide in leaf litters. The shell not only provides protection to the internal soft body parts and facilitate defense, in some it also acts as “Calcium Bank”. During period of quiescence (aestivation and hibernation) when the metabolic acids are expected to rise, the blood is buffered by Ca^{++} and other cations withdrawn from the carapace and plastron. It is also suggested that in reproductively active females, the eggshell forming around the follicle in the

oviducts receives calcium drawn from the carapace and plastron.

Turtles have anapsid skull with a large semicircular quadrate, which is exposed laterally on the cheek, supporting the external ear; while squamosal is restricted to the dorsal part of the cheek. The teeth are totally absent and the premaxilla, maxilla and dentary bones are covered by horny grinding surface. Composition of the vertebral column is almost constant in turtles; all extant turtles have eight cervical vertebrae, the variable neck length of different species of turtles are due to elongation or shortening of these vertebrae. The trunk vertebrae are 10 in number and except the first and last vertebrae which are attached to the carapace, all the middle eight vertebrae are firmly co-ossified with the neural bones of the carapace. The two sacral vertebrae are connected to the pelvic girdle. However the number of caudal vertebrae is variable. The skin of turtles shows similar basic vertebrate organization, having connective tissue packed dermis and an overlying epidermis. The epidermis has a basal stratum germinativum above with layers of differentiating cells and a final layer of stratum corneum. In hard-shelled turtles, the surface is made up entirely of keratin except in some where the limb scales have a keratin surface. However, in soft-shelled the skin surface is entirely keratinized.

The limbs are pentadactyl, and in most, all the digits of forelimb are clawed while the hind limbs have four clawed digits and a reduced clawless digit. However, in all softshell turtles (family *Trionychidae*), both the limbs have three



Three clawed limb of *N. hurum*

Introduction

clawed digits, and in the leatherback turtle (*Dermochelys*), claws are absent altogether. Land dwelling turtles have well developed claws. Further, freshwater turtles have webbing between digits to facilitate swimming while land turtles have no or very little webbing.

Turtles are ectotherms, i.e., their body temperature depends on external sources, such as sunlight or a heated rock surface. Thus, there is a constant need on the part of the turtles to bask for maintaining optimal metabolic activities, to deny parasitic



A group of turtles basking, Ugratara Temple, Guwahati, Assam

infestation and to produce vitamin D. Being ectotherms, their body temperature remains close to the external environmental temperature and turtles, therefore, cannot remain active during extreme temperatures. Hence, aestivation in summer and hibernation in winter is common amongst turtles in seasonally hot and cold climates, respectively. The turtles have various types of dietary habits. They may be herbivorous, feeding on large array of plant materials (certain land tortoises and sea turtles), carnivorous, feeding on live or dead animals (most aquatic soft-shelled turtles),



but mostly, they are omnivorous. Few marine turtles have unusual dietary habits, the Hawksbill is a sponge specialist, while the Leatherback consumes Jellyfish that may have stinging nematocysts, and the Green Sea Turtle has a diet mainly of algae and sea weed. Turtles that feed on mollusk have broadly expanded jaws for crushing the prey; while those who consume fast moving prey use hyoid apparatus to suck in prey, similar to a vacuum cleaner. The mechanism of breathing in turtles is unique. With a rigid shell, turtles cannot perform the same type of breathing activity as performed by the other reptiles, by changing the volume of the chest cavity. The expansion and compression of the body cavity for breathing is carried out by the posterior abdominal muscles and muscles associated with the pectoral girdles. When the abdominal muscles contract the inner volume of the shell increases, air rushes to fill the lungs. The muscles of the pectoral girdle cause compression and force air out of the lungs. Many turtles employ buccal pumping by raising and lowering the floor of buccal cavity. By lowering the floor of the buccal cavity, they suck in air and by raising the floor, force the air into the lungs. In addition to the gaseous exchange at the lung surface, exchange of respiratory gases also occurs in the cloaca. The turtles can withstand a high concentration of carbon dioxide in the blood. This characteristic feature enables them to remain underwater for long periods without taking in air. Turtles have two types of cones and a single type of rod in their retina. Due to presence of large number of rods, they have excellent night vision. Because of various types of cones in the retina, they also have colour vision. The turtles show different types of behavioural state like alertness, feeding, sleeping, walking / swimming / scanning, basking, aggression and defense. In male-male combat, the dominant male shows an aggressive posture, while its opponent shows defensive posture, by withdrawing his head and moving the anterior portion



Introduction

of the carapace downward. Another form of defense exhibited by both the sexes in many turtles is defecation to deter the enemy. Various species of land turtles are known to produce varieties of sounds. They may emit hissing sound to show aggression and also for advertising the territory. When threatened, the Giant Musk Turtles barks; the Three Striped Roofed Turtles croaks and the Indo Chinese Big Headed Turtle growls. The turtles are also reported to produce sound during courtship or to attract mate. Nesting Leatherback females make burping howl and their unhatched toddlers coordinate with each other by producing sound. Mating may occur with or without much courtship. South American Red Footed Tortoises make clucking sound like chicken, the Star Tortoises grunt, Galapagos Giant Tortoises and the Asian Brown Tortoises roars. The Travancore Tortoises emits high pitched whine and also produce chorus during rainy nights probably to attract mate. In Crowned River Turtle the male produces drumming sound and in Keeled Box Turtle popping sound is produced during courtship. Aggressive mating is also exhibited by males of South-east Asian Box Turtle and Asian Brown Tortoise. Male-male combat may also be found in the Cochin Forest Cane Turtle and Malayan Box Turtle. Turtles are oviparous, they lay eggs ranging from a single egg to around 200 eggs. The Malayan Box Turtle lays 1 to 6 eggs, the Cochin Forest Cane Turtle lays 1- 4 eggs. The Olive Ridley may lay 160 eggs and the Narrow-headed Softshell Turtle, around 170 eggs. The eggs are more or less spherical in larger species while in others these are oval to elongate shaped. In several species the eggs are laid in several clutches throughout the year or even in the same nesting season. The turtles construct nests for laying eggs. In aquatic and semi aquatic species nests are constructed by excavating holes with the hind limbs. The Indian Black Turtle uses left hind limb to dig and the right hind limb to push away the excavated earth. The nest may



Olive Ridley (*Lepidochelys olivacea*) laying egg

be of various shapes; it is bowl shaped in Spotted Pond Turtle and cone shaped in Cantor's Giant Softshell turtle. Most terrestrial species construct nests on forest floor. The Cochin Forest Cane Turtle lays eggs in small depression and cover the eggs with leaf litter. The female of Asian Brown Tortoise engages both the fore limbs and hind limbs to gather the leaf litters to form a mound. The female deposits eggs inside the mound and sit on top of the mound for days. During the period the female even exhibits aggressive postures to the intruders. It has been discovered that the sex of most species of turtles is determined by environmental factors, most important of which is the temperature of incubation.



A clutch of eggs of *L. punctata* incubated artificially

Hatching depends upon the nest temperature and varies amongst species. It may take few weeks to more than a year. Hatchlings are replicas of the adult and are independent. Most aquatic turtle hatchlings move en mass

Introduction

towards the water after hatching.

Most of the turtles of the world are highly threatened. Hunting for human consumption is the greatest threat to survival. Pet trade also has adverse affect. Most aquatic and semi-aquatic turtles are facing the problems



Hatchling of *T. punctata*

of reduced space for nesting, depletion of food stock due to overexploitation by humans, pollution, river traffic and sand mining. Damming of rivers, conversion of water bodies into



A Pet *Trachemys scripta*

agricultural land, seasonal drying up of streams and other water bodies are also posing as threat for the turtles. Cleaning of primary forest, habitat fragmentation, shifting cultivation are the major threats for the land dwelling species.

Turtle species are utilized as food, for traditional medicine and as pets. Turtle meat, calipee (Softshell Turtle) and the eggs are consumed as delicacy. The shell and flesh are used by different

ethnic population of North-east India for different purposes on the basis of their traditional practices, cultures and beliefs. The turtles for the flesh and calipee are smuggled out to the leading market for turtle meat in Asia. The charred shell of *Indotestudo travancorica*, mixed with oil is used as a traditional medicine in curing skin diseases. Both the flesh and eggs of turtles are believed in many cultures to be a remedy for gout and arthritis. The carapace of roofed turtle (*Pangshura*) is also used as traditional medicine for various ailments including asthma.

In mythology turtles feature as objects of creation. The turtles feature in many cultures to be a symbol of longevity, patience and wisdom. In Hindu Mythology “*Kurma*” (meaning turtle), one of the Avatar of Lord Vishnu, helped to churn the milky ocean creating the ambrosia of immortality and in the victory of good (Devas) over the evil (Asuras). The Kurma also carries four



Lord Vishnu in *Kurma* (Turtle) Avatar

elephants on its back to support the planet Earth. In Sufism, the returning of the hatchling of the sea turtle to the water symbolizes going back to god under God's guidance.

Turtles in many cultures are considered symbols of longevity, good fortune, patience and wisdom.

In many religious shrines of Buddhists, Muslims and Hindus, pilgrims release turtles in the name of God for long healthy life and good fortune. Many tribal and non-tribal communities hang turtle



A turtle being released in a temple pond