

2. Protocol for the Turtle/Tortoises Monitoring

A monitoring protocol and data collection sheets have been developed by the study team (Aryal *et al.* 2009) in consultation with experts. This book can be used by conservation organizations, as environmental education material and by researchers/students to further enhance their work on turtles/tortoises.

2.1 Monitoring Objectives

Reasons for monitoring

1. All the turtles are killed for food and medicinal uses (Shah & Tiwari 2004), their eggs are collected (Shrestha 2001) but their status and current distribution of populations is poorly known (CEPF 2005).
2. Although, trade and exploitation of turtles are documented (Mitchell & Rhodin 1996; Shrestha 2001; Schleich & Kastle 2002) and even the populations are said to be in decline, demographic studies are lacking, creating information gap in conservation assessment for which basic biological data are required; including status survey, ecology, conservation systematics, threat determination among others (Rhodin 2005).
3. Except the single land tortoise *Indotestudo elongata*, all the turtle species more or less depend on wetlands. Encroachment, draining, deforestation, pollution, siltation are the major problems to the wetlands of Nepal (Bhandari 1995) thus ultimately affecting the turtle habitats and populations.

Conservation objectives

To provide information on the trends of turtle diversity, abundance, habitat change, status of globally and nationally threatened species, threats to turtles/tortoises and their habitats.

Prerequisite training

Familiarity with species (general morphological characters and distinguishing features of each species) and their habitats, habit, their activity pattern, reproduction timing.

Equipments

Species monitoring - Binoculars, Global Positioning System (GPS), Vernier Callipers, Weighing Instruments (digital weighing machine is preferred), Cameras, Measuring Tape/s, Monitoring Data Sheets, Marking Equipments (for Mark-Release-Capture studies), Traps including appropriate baits (to capture live specimens). Identification of species is done with the key identifying features. The key parts of the carapace and plastron are depicted in figure 2 in page 8. The technic to measure turtle carapace length and estimating its age using scutes are depicted in figure 3 and 4 in page 9.

Habitat monitoring Thermometer, pH Meter, Measuring Tape/s, Gloves and Water Boots, Boats.

2.2 Monitoring Methods

Sampling techniques *observation* (species and habitats including nesting sites), *noodling/wading* (moving/walking in water bodies along the banks on foot), *transect walk* in large water bodies, *trapping* (for population studies viz. density, abundance and frequency),

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jungle walk (along transect/s or block survey to monitor terrestrial species tortoises), *market survey* to account and monitor trade (interview and group discussions) in local markets and settlements.

Observation techniques include direct observation, observation from banks in and around basking sites, time constraints observation.

Observation priority for species monitoring - in flowing water (rivers) observer will select important areas (nesting sites, basking sites) based on interviews and consultation and observe during high activity periods while in standing waters (ponds, lakes) time constrained surveys are preferred depending upon the size of the habitat. Selection of appropriate baits and size and design of traps for capturing live specimens to study morphological features and ecological studies (density, abundance, frequency) needs to be taken cautiously. Terrestrial turtle (*Indotestudo elongata*) prefers sal forests along the foothills of Tarai, survey for this species should consider humid areas avoiding hot hours. Owing to its sensitive nature, rapport building with fishing communities and vendors is important to conduct trade and exploitation survey. Appropriate checklist should be in hand.

Observation priority for habitat monitoring - turtle habitats (wetlands) are being encroached, disturbed, fragmented and deteriorated, surrounding land uses are important for turtle survival. The threats arising from the physical disturbance at sites like grazing, mechanical ploughing, aquaculture practices using fertilizers and pesticides, connectivity of sites (for standing waters) should be quantified. The quantification of disturbance frequencies and intensities viz frequency of mechanical ploughing, number of grazing livestock, pesticide-herbicide applied, should be measured. Monitoring of water pollution from the settlements and industries in surrounding can help in new information. Fragmentation of forests, fire events and deforestation should be considered for terrestrial species. For running water bodies, the area covered by the sand quarrying sites and major utility sites under human pressures like boating, fishing should be well observed. The species encounter frequencies and variations in sightings can be interpreted with disturbance regime.

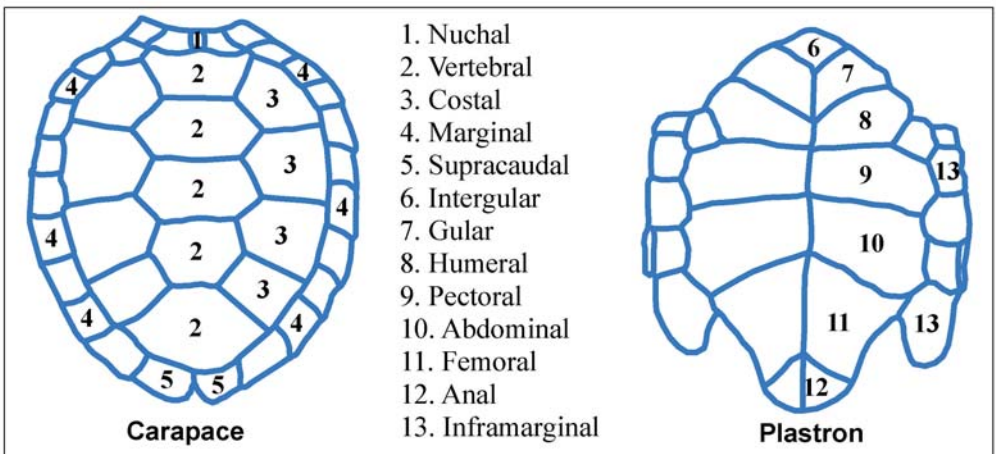


Fig. 2: Nomenclature of the turtle shells (Adapted from Shah & Tiwari 2004)

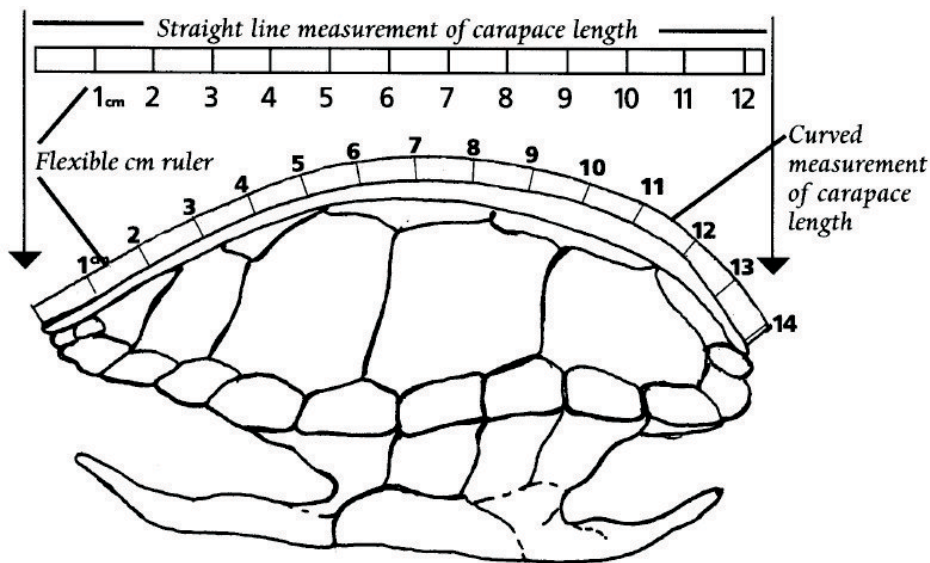


Fig. 3: Measuring carapace length

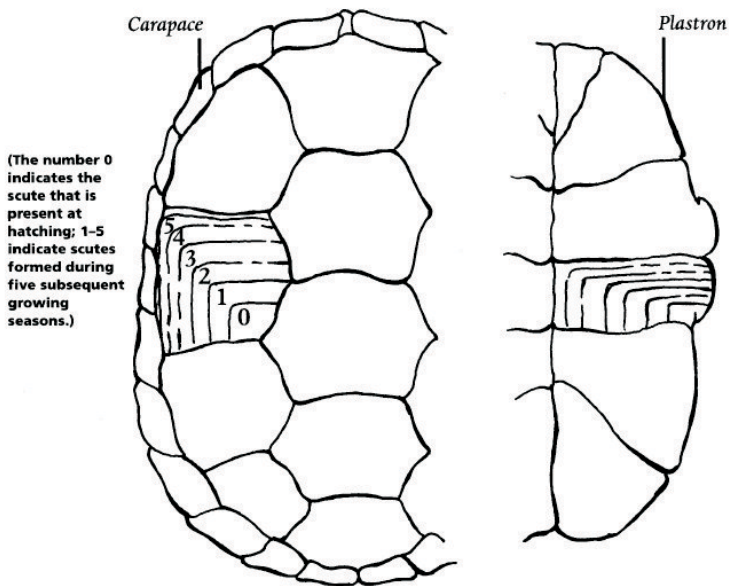


Fig. 4: Estimating turtle age from scutes

Source: www.teachervision.fen.com/tv/printables/0873551974_45_46.pdf