

# Species Accounts and Distribution of Turtles with Notes on Exploitation and Trade in Tarai, Nepal

Prakash C Aryal<sup>1,2,3,4</sup>, Man K Dhamala<sup>1,2,4</sup>, Bed P Bhurtel<sup>1,3,4</sup>, Madan K Suwal<sup>1,3,4</sup> & Bishal Rijal<sup>3,5</sup>  
E-mail:bpsept2@gmail.com, dmankumar@gmail.com

**Abstract :** *The turtles in Nepal, Tarai had received little attention in terms of conservation and scientific studies. The ambiguity in species occurrence, lack of threat assessments amidst the perceived risks of population declines under thriving exploitation and trade have created gaps to status know how. This study designed with exploratory and explanatory approaches to map the species accounts, distribution status and threats with focus on demographic study of Indian eyed Turtle (*Morenia petersi*) confirmed occurrence of 16 species; including subspecies. The species on focus is confirmed lost from the only site described for its occurrence. The first live specimen record of *Hardella thurjii* was made from the location not described earlier. The species distribution is mapped; threats in terms of exploitation and trade presented. Exploitation and trade are ongoing and the threats are even rising; outside protected areas. With unidentified impacts, due to lack of scientific information on populations and habitats, and awareness in local people, turtles are in peril.*

**Key words:** *turtles; distribution; exploitation; trade; conservation*

## INTRODUCTION

### Background and Objectives

Despite the establishment of five protected areas to conserve the biodiversity in Tarai, Turtles and other reptiles as well as amphibians were never a priority group (Schleich & Kastle 2002). In general, and in Nepal's case too, the conservation of amphibians and reptiles depends either on their incidental presence in PAs which have been set up for other reasons or on individual- species action (Gogger et al. 2004). Management of protected areas in Nepal is oriented mainly towards protection of large mammals, the gharial and some birds (Schleich & Kastle 2002).

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). Since freshwater turtles in Nepal have received little scientific attention (Mitchell & Rhodin 1996; Schleich & Kastle 2002), the available taxonomic information in most of the cases is rather tentative and speculative. Neither references nor records are yet available for a taxonomical identification; really confirmed records are extremely rare. Except the *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; degradation, the reduction in area and even loss of wetlands are underway (National Research Council 1995). The previously successful survival adaptations of turtles have left turtle populations vulnerable to new, potentially devastating threats posed by human exploitation and development related pressures (Turtle Conservation Fund 2002). Although, trade and exploitation of turtles are documented (Mitchell and Rhodin 1996; Shrestha 2001; Schleich & Kastle 2002) and even the populations are said to be in

<sup>1</sup> Environmental Graduates in Himalaya (EGH), Lalitpur School of Natural Sciences,

<sup>2</sup> Trinity College Dublin, University of Dublin, Ireland

<sup>3</sup> Companions for Amphibians and Reptiles of Nepal, Kathmandu

<sup>4</sup> Central Department of Botany, Tribhuvan University, Kathmandu

<sup>5</sup> Melamchi Water Supply Project, Kathmandu, Nepal

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). This study was, therefore, aimed at updating the species accounts, distribution and status of turtles with a specific focus on Indian eyed turtle (*Morenia petersi*) in Gainda Tal, Rupandehi. Assessing threats to the survival of turtles especially with relation to turtle exploitation and trade in Nepal and the region was important part of the study.

## Study Area



Fig 1: Study area

Tarai is one of the three ecological zones of Nepal covering 23.1 percent of the total area and 20 districts including the foothills (CBS/GoN 2003). The core study area, covering 14 percent of total area of the country, lies at an altitude of between 60-300m forming a part of the alluvial Gangetic plain (HMGN/MFSC 2002). The major river systems of Nepal, numerous smaller rivers and rivulets pass through the Tarai making it a suitable area for aquatic biodiversity. The variety in habitat conditions of wetlands, forests and grasslands in the area have been reported to hold the turtle species recorded so far from Nepal (Schleich & Kastle 2002).

Tarai is characterized by tropical climatic conditions (Bhandari 1998). It includes 10 ecosystems with diversity of species and habitat conditions in the domain of Eastern Himalaya Eco-region. Six protected areas (PAs), covering all ecosystems of region (CBS/GoN 2008), two World Heritage Sites and four Ramsar Sites lie in the area.

## METHODOLOGY

### Research design

This study used explanatory and exploratory approaches in two distinct phases. The first phase focused on review analysis covering all the wetlands of the Tarai, the second phase focused on detail field study. Intensive field study was conducted in the prioritized wetlands sites and turtles habitats. For the rapid survey, the Tarai was divided in three sections viz. western (Gainda Tal to Shukla Phanta Wildlife Reserve), central (Parsa Wildlife Reserve to Gainda Tal) and eastern (East of Parsa Wildlife Reserve). At least a month was spent in each section.

### Field Methods

#### *Rapid Survey for Species Accounts and Distribution*

Species presence/absence was determined by rapid sweep surveys that consisted of walking along the

wetland's entire shoreline and wading through the water when necessary by a team of two to three individuals, occasionally using binoculars. Observations from boats and wetland banks were carried in large rivers and lakes for basking or swimming turtles. The forest surveys were carried in assistance of local people. The settlements near the wetland or forest sites were visited in search of live turtles and/or shells exploited from the respective sites. The size of the live/dead turtles and complete shells were measured using Vernier Callipers (25 cm and error =  $\pm 1.0$  mm) and measuring tape (50 cm and error =  $\pm 3.0$  mm). The species encountered were identified using field guides and color photographs following (Das 1985; Shah & Tiwari 2004). Live individuals and shells were examined, photographed and identified. GPS was used to locate the sites with species occurrence.

*Turtle Trapping Attempts* - Turtle trapping attempts were made in Gainda Tal and surrounding areas to establish baseline data on the *Morenia petersi* population. Two types of traps were used to capture turtles during this study: baited hoop traps (also called netted hoop traps) and basking traps. A procedure was developed for trap placement, trapping strategies, turtle handling and marking procedures following Pennock (2003).

*People's Perceptions* - Semi structured questionnaire were the main tool to document the people's perceptions regarding the turtles and conservation issues. The questions were in Nepali language and local assistants worked as interpreters. The conflicting questions were asked only after the respondents were confident to reply without hesitation, after a rapport.

*Exploitation and Trade Surveys* – With prior informed consent, trade surveys were carried in the markets known for turtle trade based on the local information and past reporting (Schlish and Castle 2002, Shrestha 2001; Shah and Tiwari 2004). Three participatory workshops titled “**Turtles of Nepal: Species Accounts and Threats**” were organized in Kailali, Nawalparasi and Saptari. The issues of species, habitat and threats were presented by the team members. The workshops were organized in collaboration with local organizations.

## **Data Analysis**

The estimations of exploitation were made through the people's response and shells observed. The trade quantifications and estimation were made. The qualitative analysis was opted for people's perceptions. The GPS positions of the sites of species occurrence were plotted in map of Nepal using Arc GIS 9.2. Species size distribution was calculated as mean, standard deviation and range and presented in tabular and graphical forms.  $\chi^2$ - test was used for statistical inference.

## **RESULTS**

### **Species Accounts and Distribution Status**

Altogether 161 sites in 20 districts including wetlands, forests inside and outside protected areas (PAs), and sites having turtles in captivity were visited. The turtles were recorded from 138 sites. A total of 16 species (1- Critically Endangered, 3-Endangered and 4- Vulnerable), including subspecies, were recorded (Table 1, Figure 2) and the localities of species occurrence were mapped.

The most encountered species was *Lissemys punctata andersoni* (132 sites) followed by *Aspideretes hurum* (60 sites), *Pangshura tecta* (36 sites) and *Aspideretes gangeticus* (31 sites). These four species were afforded as “widely occurred”. The “least encountered species” were *Kachuga dhongoka*, *Pangshura smithii palledipes* and *Cyclemys oldhamii* recorded each from single site. *Pangshura smithii smithii* was recorded from the Koshi River and *P. smithii palledipes* from the Karnali River only. The first live specimen record of *Hardella thurjii* was made from Pyara Tal, Kanchanpur. The focus species of the study, Indian eyed Turtle (*Morenia petersi*), which was reported earlier from Gainda Tal, Rupandehi was not observed. There are no other records on its occurrence elsewhere. Occurrence of land turtles *Indotestudo elongata* and *Melanochelys tricarinata* were made from the forests, mostly from west and central region, and records were made from 9 and 19 sites respectively including the PAs.

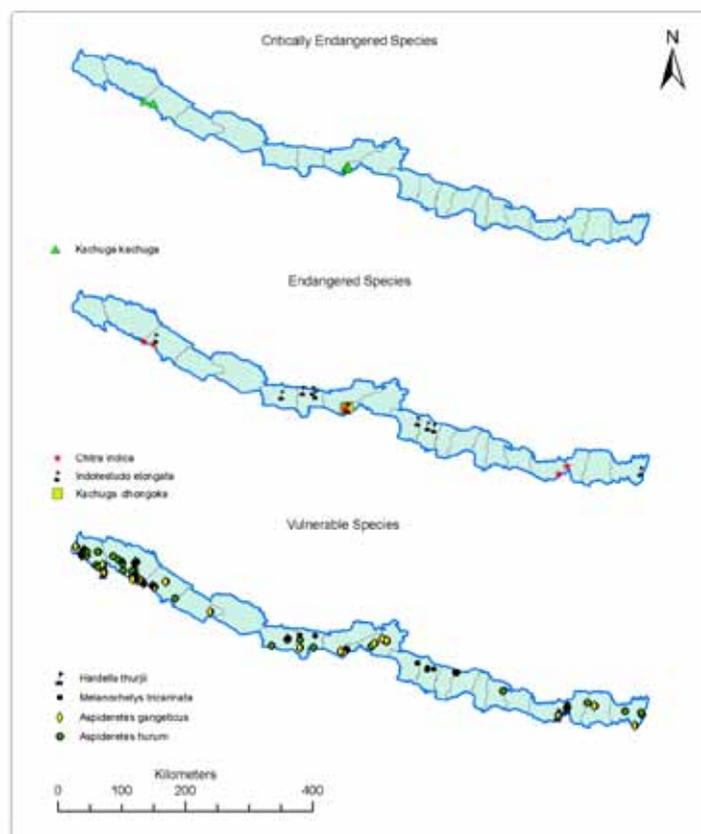


Fig 1: Distribution of threatened species

In this study, neither live specimens of *Kachuga kachuga* and *Kachuga dhongoka* nor their shells were recorded. However, fishermen and locals explained the features and identified the photographs near Karnali (*K. kachuga*) and Narayani (*K. kachuga* and *K. dhongoka*) and said the species were ‘rare’ these days. Similarly, for *C. indica* except two broken shells (as informed by locals who caught the turtles in Koshi) recovered from West Kusaha, Sunsari, no live specimen was observed. Expert believed the occurrence of *Cyclemys oldhamii* but was not recorded during the study. Except for aforementioned four species, confirmation was made through the live specimens and/or shells recovered from the area.

Among protected areas, Bardia National Park is the site with highest number of turtle species (13), followed by Chitwan National Park (11), Koshi Tappu Wildlife Reserve (9), Suklaphanta Wildlife Reserve (6) and Parsa Wildlife Reserve (2). Pyara Tal, Kanchanpur has been the habitat for 6 species of turtles the single reported habitat of *Hardella thurjii* but is not protected. Captive turtles were observed in Chitwan and Bardia National Parks, Manimukundasen Park and Shankarnager Community Forest

(Rupandehi), and Bhadrapur (ARCO-Nepal/Environment Conservation Society, Jhapa).

### Exploitation and Trade

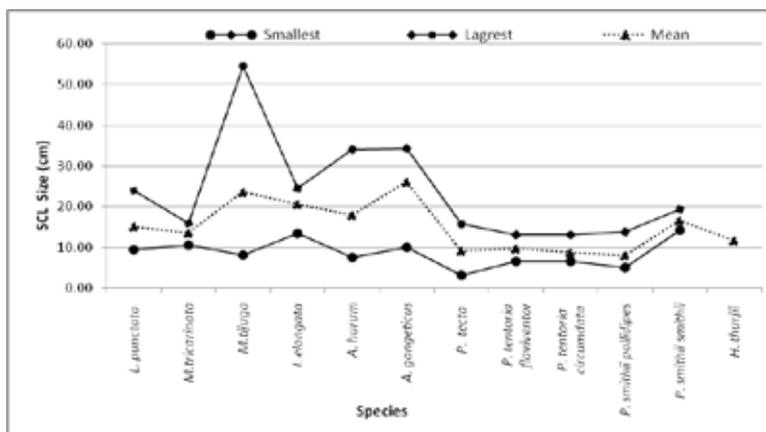


Fig 3: Size distribution of exploited turtles

Observations made on-site, nearby settlements, local markets and the interactions with the local people revealed the exploitation and trade scenario in the Tarai. The exploitation of turtles was prevalent in over 75% of the sites (118 wetlands) and land turtles were exploited from all natural sites assessed outside PAs. In all instances, the local people were involved in exploitation. Fishing was the dominant activity (80% of the respondents) and confirmed turtle catch while fishing. Of the 102 respondents interviewed, over 95% replied to have consumed turtles. On recall based queries, 40 turtles in the week, and 1120 turtles were consumed each year, averaging around 11 turtles per year/household from the settlements adjoining wetlands and forests.

Observations of 10 species exploited either alive or killed were made which included- *L. punctata*, *H. thurjii*, *K. tecta*, *P. smithii pallidipes*, *P. smithii smithii*, *P. tentoria circumdata*, *A. gangeticus*, *A. hurum*, *M. tricarinata*, *I. elongata*. The exploitation was non selective. People collected and hunted turtles of all age, sex and sizes indiscriminately (Fig 3).

#### Trade

Turtle trade surveys conducted in the markets mainly in Kailali, Kapilbastu, Rupandehi, Nawalparasi, Sunsari and Saptari districts. The live turtles on trade were obtained from Rupandehi, Kapilbastu and Sunsari. We found 25 Kg of turtles in Rupandehi, 12-25 kg in Kapilbastu, 15 kg in Sunsari. The Kapilbastu trade was monitored for 4 weeks during which 95 kg turtles were sold in the markets by a single trader who obtained turtles from India. The annual trade volume in Kapilbastu was estimated to be something above one and half tones. The turtle imports occurred in Kanchanpur as well. Trade on *L. punctata* topped all. *P. smithii* and *A. hurum* were also sold in Koshi while Kapilbastu had *A. gangeticus* and *A. hurum*. There were no fixed market places for turtle trade in Nawalparasi and Kanchanpur but the fishermen generally traded the turtles whenever caught in nearby settlements or neighboring villages. The live specimens were not found in Kanchanpur but the shells of traded *M. trijuga*, *A. gangeticus* and *A. hurum* were recovered.

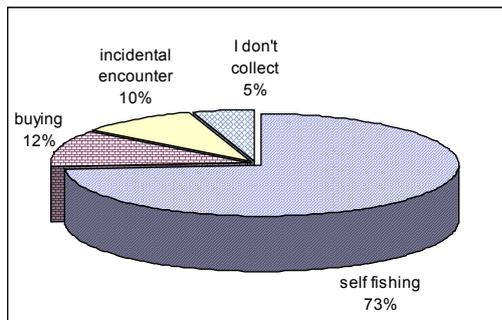


Fig 4: Methods of turtle access

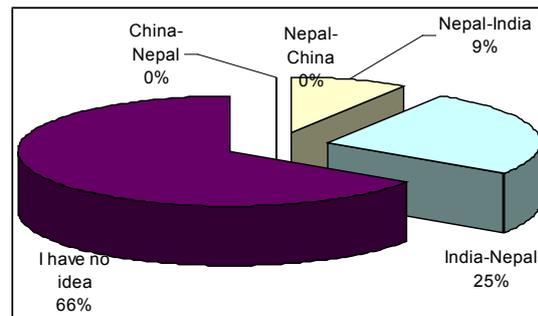


Fig 5: Cross border trade scenario

Cross border trade of turtles was revealed from the villages in Tarai bordering India. Nepal-China trade was not evident through the personal descriptions. However, Nepal-India trade and vice versa was claimed by the people and markets. The imports of turtles were more as expressed by 25% respondents compared to exports (9%) [Fig 5].

## DISCUSSION

### Species accounts and distribution

The explanations for species distribution and occurrences were attempted in different times although the studies have always remained low in number and coverage. Lately, different studies (Moll 1987, Dinerstein *et al* 1988 in Mitchell and Rhodin 1996; Shah 1995 in Bhujju *et al* 2007; Biodiversity Profile Project 1995; Schleich and Kastle 2002; Rai 2004) have contributed records of new species to Nepal. However, results are not consistent many times in terms of number of species and locations; space has been left for speculation. For example, Mitchell & Rhodin (1996) confirmed the occurrence of 11 species, and mentioned 6 potential species by observing the shells found in Kathmandu. Confirmation of species occurrences have not been sought after in many cases like occurrence of three species of turtles in Bedkot Tal, Kanchanpur (Bhujju *et al.* 2007), *Kachuga kachuga* in Koshi Tappu Wildlife Reserve (Thapa & Dahal 2009). Surprisingly, Shrestha (2001) published the occurrence of *Geoclemys hamiltonii* and *Aspideretes leithi* without type locality and included *Kachuga kachuga* in Koshi Tappu. The instances appear evident because the freshwater turtles of Nepal have remained poorly researched (Mitchell and Rhodin 1996). The occurrence of *Melanochelys tricarinata* is reported several instances (Biodiversity Profile Project 1995; HMGN/MFSC 2002; Schleich & Kastle 2002; Shah & Tiwari 2004; Shrestha 2001) with proven records from different parts but still questioned other times as of Asian Turtle Trade Working Group 2000 (2008b). The range extension of *M. tricarinata* was observed; Shah and Tiwari (2004) showed the eastern range of this species to Chitwan, but shell records from Bara district confirmed the extension of eastern distribution in the current study. The species' further east range record was from Chatara area in Sunsari District (personal communication, Kalu Ram Rai). As the evolution of turtle research greatly lagged behind other large animal species, little information is available about other aspects of the turtle species and habitats. The information about the localities and species occurrence were always hardly enough to evaluate the status of species distributions and incorporating the turtles in conservation issues. Thus, whenever required, the turtle group, species and/or the numbers have been mentioned *ad hoc*.

Although *K. dhongoka* was reported, in literature, to occur in Chitwan National Park and Kailali District, Schleich & Kastle (2002) opted the specimen photographs from India and mentioned no proven records of the species from Nepal. The distribution of some species *H. thurjii*, *K. kachuga*, *Geoclemys hamiltonii* (Schleich & Kastle 2002) including other two exotic species *Cyclemys dentata*

and *Pyxidea mouhotii* were left as probable (Mitchell & Rhodin 1996) in absence of convincing data whereas DNPWC/WWF (2005) among others reported Ghodaghodi area supported populations of *K. kachuga* and *K. dhongoka*. The proven site locality of *Hardella thurjii* was not reported from Nepal but current study made observations of *H. thurjii* in Koshi River and a live specimen in Kanchanpur, Nepal.

Asian Turtle Trade Working Group 2000 (2008a) mentioned uncertain occurrence of *M. petersi* in Nepal although it was recorded for the first time by Biodiversity Profile Project (1995) team and appeared in literature afterwards (Bhujju et al. 2007; CEPF 2005; HMG/N/MFSC 2002; Shah & Tiwari 2004; Shrestha 2001) without second attempt to provide the backup information. During this study, despite great search efforts in Gainda Tal- Rupandehi, no individual and/or shell was observed. Moreover, the local people around the Gainda Tal could not confirm the presence. Hence, the species is confirmed “locally extinct” at least from known site of its occurrence with no record elsewhere. The current study did not confirm the presence of *K. kachuga*, *K. dhongoka*, *C. indica* and *Cyclemys oldhamii* through live specimens. The inferences were made through the expert communications and public information (photograph identification and species features explanations) except for fresh shells of *C. indica* in Koshi area. It is not prescribed to the loss of these species, but undoubtedly, despite no demographic studies to confirm so, the rare encounter meant populations might have declined.

### **Exploitation and Trade**

The start of turtle exploitation and consumption can not be said with time reference, however, trade is explained recent to Nepal’s turtles (Shrestha 2001) and seems frightening in the absence of species status information. Turtle exploitation in Tarai is a common practice throughout and even within the PAs. All the turtle species are exploited year round for meat, particularly, and for medicinal proposes. Shrestha (2001) described that large turtles were most cited for consumption because the value they fetch in market of settlements in terms quantity of meat; Shah & Tiwari (2004) reported *C. indica* to be the most preferred turtle but no such information was obtained compared to other softshell turtles. Furthermore, the size ranges of exploited turtles (Fig. 3) indicated exploitation is indiscriminate and non-selective.

Many wetlands, outside PAs, are either contracted for aquaculture or are freely accessed by locals. The forests, particularly the national forests, and even community forests did not have practice of restrictions to control turtle exploitation. This study made an estimate of consumption of over 11 turtles by a person (household) in the vicinity of turtle habitat per year. The shells obtained from the houses of respondents, in the neighborhood of turtle habitats, were significant to explain the correlation with the number of turtles consumed in a year ( $r = 0.49$ ,  $p = 0.01$ ) but not strong enough to explain the intensity. Turtle exploitation in the Tarai can not be said sustainable in absence of site specific demographic information and exploitation levels, population declines due to over collecting could be going undetected.

The domestic trade in turtles is spread in major town areas throughout Tarai. The trade, however, as documented earlier for Asian turtle markets (Shakya 2004) and shell trade for curio markets (Mitchell & Rhodin 1996) were not evident. Trans-border trade between India and Nepal is evident and ongoing without being noticed due largely to porous border, lax security, and low priority matter for concerned authorities. The efforts were made to survey illegal trade and collection only through identification of weekly *haat bazaars* and *de-facto* traders in the Tarai. The information to analyze the trade quantities

and species involved did not exist from the past works and whatever obtained in short period of survey is not sufficient to generalize the whole scenario. As long as the trade is in low volume and commonly occurring species are involved, the risk is considered low. But such guess are underestimates if the trade involved high volumes of threatened species with small populations. And the risk is higher, in case of the Tarai, due to indiscriminate exploitation and consumption at local levels with trade being additional on the turtles; worst with smaller populations.

Trade and exploitation has been described as threats of endangered flagships as WWF (2008) but turtle trade has not received recognition. Some scholars (Mitchell & Rhodin 1996; Schleich & Kastle 2002; Shrestha 2001) had already made warnings on the threats resulted from exploitation and trade. The increase in wildlife trade is described due to lack of coordination between enforcement authorities and low concerns outside PAs, lack of basic facilities, and trained human resource (Aryal 2004). Nepal still has to pass the CITES bill (HMGN/MFSC 2002) and turtles are not provided status “protected” through NPWC Act, 1973 and successive amendments, all making the trade regulations and control out of frame.

## CONCLUSION

Turtle diversity in Nepal, from 138 sites in Tarai, comprised occurrence of 16 species and subspecies. The species accounts presented through distribution mapping of threatened species (1- CR, 3-EN, 4-VU) clearly shows the occurrence of threatened species only in a few sites. Since the populations of long-lived species like turtles can persist for decades after reproduction has ceased, resulting in effective population extinction (Gerlach 2008), the records made through such populations can be risky in absence of follow up studies on demography and threats. The cases of *C. oldhamii* records made through 2 live individuals (and 2 shells) by Rai (2004), current record of *H. thurjii* from Kanchanpur, due to site specificity, may suffer the same if no information is worked out. Perhaps, the population of *M. petersi* recorded by Biodiversity Profile Project (1995) team from Gainda Tal, Rupandehi has undergone the same fate. More than 450 local participants of the interactions and workshops, of the Tarai, were informed about the issues of turtle species and threats. Issues of population status, conservation and threats were less-known for people as obtained through the interactions and workshops. Low conservation priority from government, conservation organizations and community levels were identified responsible for uncontrolled exploitation of turtles and their habitats. On going exploitation and trade, in absence of population studies are undergoing to make turtles’ survival crisis.

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