



INNSPUB

RESEARCH PAPER

Journal of Biodiversity and Environmental Sciences (JBES)

ISSN: 2220-6663 (Print) 2222-3045 (Online)

Vol. 6, No. 5, p. 228-233, 2015

<http://www.innspub.net>**OPEN ACCESS**

Morphometric studies of the fresh water turtles from Rawalpindi Islambabad Region of Pakistan

Samah Bashir Kayani^{1*}, Maqsood Anwar¹, Muhammad Ashfaq², Iftikhar Hussain¹, Tariq Mahmood

¹Department of Wildlife Management, PMAS-Arid Agriculture University Rawalpindi, Pakistan

²PMAS-Arid Agriculture University Rawalpindi, Pakistan

Article published on May 20, 2015

Key words: Morphometry, Fresh Water Turtles, Pakistan.

Abstract

Freshwater turtles are members of order Testudines in class Reptilia and being scavengers, carnivores as well as herbivores, they play a vital role in aquatic ecosystems. Freshwater turtles are facing illegal trade due to their demanded as food, pets and their use in medicines. Various studies in the last two decades have highlighted that their population is declining in different parts of the world including Pakistan. The present study identified and characterized the Pakistani freshwater turtles found in Rawalpindi – Islamabad area at morphological level and the parameters used for morphometric measurements were; length from muzzle to tail, body weight, body height, length and width of carapace and length and width of plastron. In the present study, 20 specimens belonging to three species of fresh water turtles i.e., *Lissemys punctata*, *Nilssonina gangetica* and *Pangshura smithii* were collected from 13 different sites or transects. Among these three species of freshwater turtles *Nilssonina gangetica* (Indian Soft Shell Turtle) was biggest and heaviest species with 30.42 cm and 2276 g measurements. While *Pangshura smithii* was smallest and lightest in weight with 18.08 cm and 510 g measurements. Similarly average carapace lengths were 18.98 cm., 23.17 cm. and 14.84 cm., respectively while the average carapace widths were 17.16 cm., 16.98 cm. and 13.49 cm., respectively; average plastron lengths were 16.80 cm., 16.25 cm. and 11.92 cm., respectively and average plastron widths were 14.67 cm., 13.88 cm. and 10.09 cm., respectively for *Lissemys punctata*, *Nilssonina gangetica* and *Pangshura smithii*.

*Corresponding Author: Samah Bashir Kayani ✉ samahashfaq@gmail.com

Introduction

Fresh water turtles, "Testudines" occur in six genera and eight species in Pakistan. Family Emididae consists of four species of hard - shelled turtles; spotted pond turtle (*Geoclemys hamiltoni*), crowned river turtle (*Hardella thurjii*), brown river turtle (*Kachuga smithii*) and Indian roofed turtle (*Kachuga tecta tecta*). These are distributed in Pakistan, India, Bangladesh, Nepal, Burma, Thailand, Vietnam, Malaysia and Sumatra (Moll, 1987). Family Trionychidae comprises of soft -shelled turtles, also represented by four species; Indian narrow-headed soft-shell turtle (*Chitra indica*), Indian soft-shell turtle (*Aspideretes gangeticus*), Indian peacock soft - shell turtle (*Aspideretes hurum*) and Indus mud turtle (*Lissemys punctata*). These are larger in size as compared to hard - shelled turtles and occur in temperate eastern North America, tropical south and Southeast Asia, in countries of the Mediterranean region, and Africa (Khan, 2004; Khan, 2006; Akbar *et al.*, 2006). Both of these families of freshwater turtles have been recorded from rivers of the Punjab province, Pakistan (Mahmood *et al.*, 2012; Noureen *et al.*, 2012).

Fresh water turtles play an important role in the health of aquatic ecosystem and considered as important biodiversity component of the ecosystem, and provide benefits to animals and plants. They are herbivores and carnivores (Rhodin *et al.*, 2011), clean up water resources by scavenging on dead organic matter and help to maintain healthy populations of fish (Lovich, 1994).

The plastron of the soft shell is commonly useable portion of the turtles, which comprised of 32 % protein, 7 % collagen, and 50 % calcium carbonate. These are mostly used for eating and medicine purposes in Asian countries, China and southeast Asian countries because their shells are also highly effective for purifying blood and cure many diseases (Zuberi, 2007; Lo *et al.*, 2006). The classification of turtle and tortoise trade consisted of three main categories which are traded for human food, trade for

pets, and traditional medicine (Van Dijk *et al.*, 2000). Many species of fresh water turtles have become extinct because of their illegal trade. Generally, turtles are identified on the bases of size, colour, shape and stripes of the shells (Lo *et al.*, 2006; Van Dijk *et al.*, 2000). However, the threatened status of some populations and species makes destructive sampling of turtles for research more difficult to justify. The exploitative use of turtles for food, traditional medicine, religious purposes, and pets ironically creates new opportunities for collecting research samples from non-standard sources (Burke *et al.*, 2007).

Present study aimed to identify the fresh water turtles present in surroundings of Rawalpindi Islamabad on the basis of morphometric measurements. These morphometric studies be used as taxonomic character for researchers and could be useful with great importance in the field of turtle taxonomy and species conservation.

Materials and methods

Study Area/Sampling Sites

Present study was conducted from September 2012 to July 2013 in Rawalpindi-Islamabad area where sampling sites included Simly Dam, Rawal Dam, Korang River, Nala Lahi and Soan River. Identification of the species in the field was done with the help of published research literature. The study area lies in monsoon region where two rainy seasons occur annually, one in winter from January to March and other is in summer from July to September (Meteorological Department Rawalpindi Region 2012).

The source of water in Simly Dam is Soan River, in Rawal Dam is Korang River and Nala Lahi contained mostly sewage water which is so much polluted. The Korang River and its tributaries re also polluted at many places due to human activities. Mostly the freshwater turtle species are found where polluted and clean water is mixing in most of waters bodies.

Study design

For data collection, 13 different sites or transects in potential habitat of freshwater turtles in study area were selected (Table 3.1). Each transect was one kilometer long and 300 m wide and area was 0.3 Km. At each site several hours were spent to find as many specimen as possible. It was observed that there almost all transect sites contained abundant herbs and shrubs, insects, small fishes, so population of the turtles was satisfactory except in few areas. Their exact location was recorded with the help of G.P.S.

Sampling and morphometric measurements

Freshwater turtles were caught by cast net which was made up of Nylon rope, its radius was 130 cm with 5 cm mesh size and funnel shaped hand nets, using meat of chicken as bait. Specimens were identified on

the basis of diagnostic morphological characters (Khan, 2006). The morphometry of captured turtle specimens were recorded, the parameters of morphometry included length from muzzle to tail, body weight, height of body, length and width of carapace and length and width of plastron. Each study site was visited 3-5 times for capturing freshwater turtle specimens.

Results and discussion

Study area and sampling of turtles

The freshwater turtles caught at different sites were 20 in number from 13 transects that was selected in the present study area which comprised of the following coordinates, major vegetations and water status (Table 1).

Table 1. Sampling locations and details for Freshwater Turtles of Rawalpindi - Islamabad Area.

Transect No.	Location	Coordinates	Water Status	Major Vegetations
1	Rawal Dam Spillway across Bridge of NARC Colony, Islamabad	N 33°41.245' E 73°07.547'	Contaminated water with sewage coming from NARC colony but before the bridge the water is not polluted.	<i>Parthenium hysterophorus</i> , <i>Dalbergia sissoo</i> , <i>Xanthium indicum</i> , <i>Cynodon dactylon</i> , <i>Solanum nigrum</i> , <i>Euphorbia prostrata</i> .
2	Simly Dam, Islamabad	N 33°38.519' E 73°16.389'	Good quality of water	<i>Woodfordia fruticosa</i> , <i>Solanum nigrum</i> , <i>Polygonum barbatum</i> , <i>Cyperus rotundus</i> , <i>Cannabis sativa</i> , <i>Euphorbia hirta</i> .
3	Margalla Town, Islamabad	N 33°39.941' E 73°06.458'	Polluted water with sewage coming from houses of town.	<i>Convolvulus arvensis</i> , <i>Verbena tenuisecta</i> , <i>Cannabis sativa</i> , <i>Solanum pseudocapsicum</i> , <i>Chenopodium ambrisiodes</i> .
4	Water Body near COMSAT Institute of Information Technology, Park Road after Chak Shehzad under bridge, Islamabad	N 33°39.215' E 73°09.389'	Polluted water due to sewage coming from near houses and institute.	<i>Cynodon dactylon</i> , <i>Solanum nigrum</i> , <i>Chenopodium ambrisiodes</i> , <i>Cannabis sativa</i> .
5	Nala Lahi near New Katariyan Bridge, Rawalpindi	N 33°38.457' E 73°03.117'	The whole contaminated water body due to sewage of vicinity houses and superb areas and factories polluted water.	<i>Eleusine indica</i> , <i>Cynodon dactylon</i> , <i>Amaranthus spinosus</i> , <i>Solanum nigrum</i> .
6	Saroba Village near Chakri Road on G.T. Road (Soan River), Rawalpindi	N 33°20.467' E 73°49.456'	Good quality of water.	<i>Convolvulus arvensis</i> , <i>Polygonum barbatum</i> , <i>Solanum pseudocapsicum</i> , <i>Cannabis sativa</i> , <i>Dalbergia sissoo</i> , <i>Ziziphus jujuba</i> .
7	Soan River on Japan Road bridge near Kahuta at Mehfoz Shaheed Road.	N 33°34.044' E 73°15.253'	Good quality of water.	<i>Convolvulus arvensis</i> , <i>Cannabis sativa</i> , <i>Solanum nigrum</i> , <i>Cynodon dactylon</i> , <i>Dalbergia sissoo</i> .
8	Near Burma Bridge at Lehtrar Road, Islamabad	N 33°38.07' E 73°07.86'	Un-disturbed water area, polluted water due to sewage coming from adjacent houses.	<i>Cannabis sativa</i> , <i>Phragmites karka</i> , <i>Cynodon dactylon</i> , <i>Achyranthus asper</i> .
9	The junction of Soan and Korang River near Highway Soan Bridge, Rawalpindi	N 33°33.20' E 73°06.32'	Contaminated water with sewage coming from nearby houses.	<i>Medicago polymorpha</i> , <i>Cannabis sativa</i> , <i>Datura metel</i> , <i>Echinochloa colonum</i> , <i>Parthenium hysterophorus</i> .
10	Water Body near Federal Urdu University, New Lake Campus, New Mal Sharqi Viilage, Islamabad.	N 33°40.813' E 73°10.152'	Non-polluted water.	<i>Convolvulus arvensis</i> , <i>Solanum nigrum</i> , <i>Cannabis sativa</i> , <i>Ziziphus jujuba</i> .
11	Water Body near Ojhari Khurd Village, Islamabad, at Faizabad Bridge.	N 33°39.357' E 73°55.504'	Polluted water due to mixing of sewage from vicinity houses.	<i>Cannabis sativa</i> , <i>Ziziphus jujuba</i> , <i>Cynodon dactylon</i> , <i>Convolvulus arevensis</i> , <i>Solanum nigrum</i> .
12	Water Body near NLC Pearl factory, Islamabad	N 33°40.676' E 73°09.510'	Polluted water due to sewage of factory and houses found nearby.	<i>Dalbergia sissoo</i> , <i>Amaranthus spinosus</i> , <i>Solanum nigrum</i> , <i>Cynodon dactylon</i> , <i>Cannabis sativa</i> .
13	Lohi Bher WildLife Park (Korang River), Rawalpindi.	N 33°35.20' E 73°08.20'	Undisturbed area but sewage is coming from nearby houses and of park, here was mixing of clear freshwater and sewage.	<i>Prosopis glandulosa</i> , <i>Nerium oleander</i> , <i>Cynodon dactylon</i> , <i>Solanum nigrum</i> , <i>Cannabis sativa</i> , <i>Ziziphus jujuba</i> , <i>Desmostachya bipinnata</i> .

Table 2. Morphometry of *Lissemys punctata* (Indus mud turtle) captured from study area.

S. No.	Transect No. From which Turtle captured	Sex of Turtle	Age Group Of Turtle	Total Length From Muzzle to Tail (cm)	Body Wt. (g)	Height (cm)	Carapace (cm)		Plastron (cm)	
							Length	Width	Length	Width
1	I	Female	Adult	42	2000	16.25	26.25	23.75	24.25	18.25
2	I	Female	Adult	24.2	720	5.52	17.23	15.5	15.21	13.12
3	III	Male	Adult	26.15	930	6.3	19.2	17.56	17.02	15.1
4	III	Male	Adult	22.4	660	4.84	15.45	13.35	13.06	11.84
5	V	Female	Adult	27.36	1325	8.6	22.64	20.75	19.86	17.65
6	V	Female	Adult	24.55	858	5.9	18.05	16.2	15.85	13.22
7	VI	Male	Adult	23.2	790	5.2	17.5	16.03	15.26	13.3
8	VIII	Male	Adult	22.75	610	4.58	16.01	14.75	14.07	13.83
9	IX	Female	Adult	24.86	910	6.13	18.4	16.7	16.13	14.67
10	XIII	Male	Adult	26.45	945	6.36	19.11	17	17.08	15.76
Mean				26.39	974.8	6.94	18.98	17.16	16.80	14.67

Morphometry of the captured turtle species

The freshwater turtles which were captured from different sites of study area were as follows: in transect 1, two individuals of *Lissemys punctata*, one individual of *Nilssonia gangetica* and two individuals of *Pangshura smithii*; in transect 2, no specimen was found; in transect 3, two individuals of *Lissemys punctata*, two individual of *Nilssonia gangetica* and one individual of *Pangshura smithii*; in transect 4, no specimen was found; in transect 5, two individuals of *Lissemys punctata*; in transect 6, one individual of

Lissemys punctata; in transect 7, no specimen was found; in transect 8, one individual of *Lissemys punctata* and one individual of *Nilssonia gangetica*; in transect 9, one individual of *Lissemys punctata* and one individual of *Pangshura smithii*; in transects 10, 11 and 12 no specimen was found and in transect 13, one individual of *Lissemys punctata*, one individual of *Nilssonia gangetica* and one individual of *Pangshura smithii*. Most of the species of freshwater turtles were found in this transect where clear freshwater and sewage was mixing.

Table 3. Morphometry of *Nilssonia gangetica* (Indian Soft Shell Turtle) captured from study area.

S. No.	Transect No. from which Turtle captured	Sex of Turtle	Age Group Of Turtle	Total Length From Muzzle To Tail (cm)	Body Wt. (g)	Height (cm)	Carapace (cm)		Plastron (cm)	
							Length	Width	Length	Width
1	I	Female	Adult	28.75	2200	6.5	22.1	15.12	13.2	11.5
2	III	Female	Adult	37.47	3510	8.75	31.46	22.52	19.86	17.4
3	III	Male	Adult	36.25	3175	10.25	30.6	21.56	19.87	17.3
4	VIII	Not Clear	Juvenile	13.25	695	3	7.95	6.2	5.8	5.2
5	XIII	Female	Adult	36.4	1800	10.75	23.75	19.5	22.5	18
Mean				30.42	2276	7.85	23.17	16.98	16.25	13.88

Table 4. Morphometry of *Pangshura smithii* (Brown River Turtle) captured from study area.

S. No.	Transect No. From which Turtle captured	Sex of Turtle	Age Group Of Turtle	Total Length from Muzzle to Tail (cm)	Body Wt. (g)	Height (cm)	Carapace (cm)		Plastron (cm)	
							Length	Width	Length	Width
1	I	Not Clear	Juvenile	12	100	2	9	8	7	3.5
2	I	Male	Adult	18.95	485	5.86	15.75	14.2	12.3	11.45
3	III	Male	Adult	21.2	865	6.8	18.16	15.35	14.7	11.1
4	IX	Female	Adult	19.75	580	5.9	16.1	15.2	13.32	12.87
5	XIII	Male	Adult	18.5	520	5.6	15.2	14.7	12.3	11.55
Mean				18.08	510	5.23	14.84	13.49	11.92	10.09

A total of 20 specimens of fresh water turtles were captured from the study area which were morphologically recognized to belong to three species

i.e., *Lissemys punctata*, *Nilssonia gangetica* and *Pangshura smithii*. These results are in agreement with Siddiq (2010) who reported similar three species

from Rawalpindi-Islamabad area based on their morphological characters. On the other hand Azam *et al.* (2005) reported six species from Indus River while Akbar *et al.* (2006) discussed eight species from different barrages of Punjab.

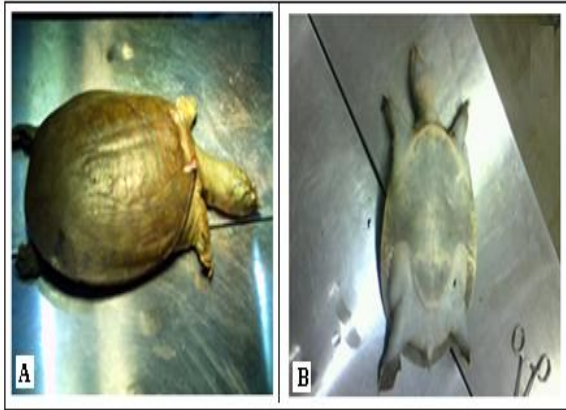


Fig. 1. Specimen of *Nilssonia gangetica* captured from study area (A) Front view of carapace (B) Plastron.



Fig. 2. Specimen of *Pangshura smithii* captured from study area (A) Front view of carapace (B) Plastron.

Nilssonia gangetica (Indian soft shell turtle) is dark greenish purple coloured, carapace having dark green reticulation, plastron was ivory. Head consisted of black oblique stripes. Its neck was small as compared to Indian mud turtle. It has great biting habit (Figure 1). Similar morphological characters were described by Siddiqe (2010) from Rawalpindi and Islamabad area. *Pangshura smithii* (Brown river turtle) has olive carapace with three black or dark brown vertebral stripes in the centre of the carapace. On each plastral

scute, a single large black spot present. Head was olive coloured having a reddish brown spot behind each eye. Neck and limbs consisted of yellowish spots (Figure 2). These morphological features were the same as described by Mertens (1969) and Siddiq (2010). *Lissemys punctata* (Indian mud turtle) has olive green carapace consisted of bright yellow round dashed spots which were scattered on the whole carapace. Plastron was of cream colour. Head and neck consisted of bright yellow spots. It consisted of long neck (Figure 3). These features are the same as discussed by Siddiq (2010).

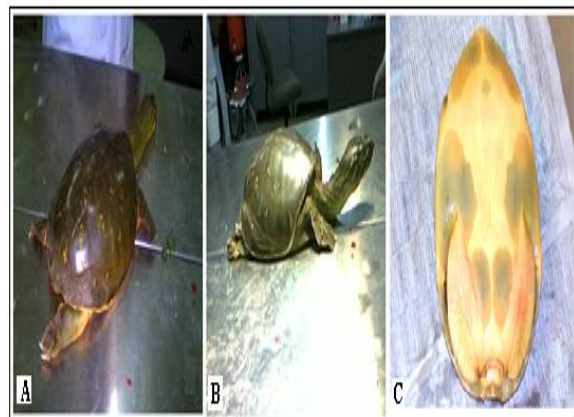


Fig. 3. Specimen of *Lissemys punctata* captured from study area. (A, B) Front view of carapace (C) Plastron.

The Morphometric measurements of captured specimens of freshwater turtle were recorded. A total of 20 individuals were measured for their body parameters which included length from muzzle to tail, body weight, height of body, length and width of carapace and length and width of plastron. For *Lissemys punctata*, *Nilssonia gangetica* and *Pangshura smithii*, the average lengths from muzzle to tail were 26.39 cm., 30.42 cm. and 18.08 cm., respectively; average body weights were 974.8 g, 2276 g and 510 g, respectively; the average height of the captured freshwater turtles from the ground were 6.94 cm., 7.85 cm. and 5.23 cm, respectively. Similarly the average carapace lengths were 18.98 cm., 23.17 cm. and 14.84 cm., respectively while the average carapace widths were 17.16 cm., 16.98 cm. and 13.49 cm., respectively; average plastron lengths were 16.80 cm., 16.25 cm. and 11.92 cm., respectively

and average plastron widths were 14.67 cm., 13.88 cm. and 10.09 cm., respectively for *Lissemys punctata*, *Nilssonina gangetica* and *Pangshura smithii*.

Morphometric measurements of captured 20 specimens of freshwater turtles showed that among the three species of freshwater turtles *Nilssonina gangetica* was the biggest and heaviest species with largest body weight as 3510 g. Morphometry of collected fresh water turtle species are presented in Tables 2, 3 and 4.

References

- Akbar M, Hassan MMU, Zaib-u-Nisa.** 2006. Distribution of freshwater turtles in Punjab, Pakistan. *Caspian Journal of Environmental Sciences* **4**, 142-146.
- Azam MM, Fakhri MS, Saifullah.** 2005. Some observations on the distribution and abundance of freshwater turtles in the river Indus. *Records Zoological Survey of Pakistan* **16**, 46-51.
- Burke RL, Ford LS, Lehr E, Pritchard PCH, Mockford S, Rosado JPO, Senneke DM, Stuart BL.** 2007. Non-standard sources in a standardized world: Responsible practice and ethics of acquiring turtle specimens for scientific use. *Chelonian Research Monographs* **4**, 4-8.
- Khan MS.** 2004. Annotated checklist of amphibians and reptiles of Pakistan. *Asiatic Herpetological Research* **10**, 191-201.
- Khan MS.** 2006. Amphibians and reptiles of Pakistan. Krieger Publishing Company, Malabar, Florida, USA, 311 p.
- Lo CF, Lin YR, Chang HC, Lin JH.** 2006. Identification of turtle shell and its preparations by PCR-DNA sequencing method. *Journal of Food and Drug Analysis* **14**, 153-158.
- Lovich JE.** 1994. Biodiversity and zoogeography of non-marine turtles in Southeast Asia. In: Majumdar SK, Brenner FJ, Lovich JE, Schalles JF, Miller EW, eds. *Biological diversity: Problem and challenges* Pennsylvania Academy of Science, Easton, P A, 381-391 p.
- Mahmood T, Siddiq MK, Rais M, Nadeem MS.** 2012. Distribution and relative abundance of freshwater turtles in Korang River Islamabad-Rawalpindi. *Pakistan Journal of Zoology* **44**, 889-893.
- Mertens R.** 1969. Die Amphibian and reptilian West-Pakistan, Stuttg. Beitr. Naturk **197**, 1-96.
- Moll EO.** 1987. Survey of the fresh water turtles of India. Part II: The genus *Kachuga*. *Journal Bombay National History Society* **84**, 7-25.
- Nooreen U, Khan A, Arshad M.** 2012. Exploring illegal trade in freshwater turtles of Pakistan. *Records of Zoological Survey of Pakistan* **21**, 19-24.
- Rhodin GJ, Walde AD, Horne BD, Dijk PPV, Blanck T, Hudson R.** 2011. Turtles in trouble: The world's 25+ most endangered tortoises and fresh water turtles. Presented by Turtle Conservation Coalition. Lunenburg, MA, USA, 58 p.
- Siddiq KM.** 2010. Population, distribution and breeding habits of the turtles inhabiting Korang River, Rawalpindi. M. Phil thesis. PMAS- Arid Agriculture University, Rawalpindi: 89 p.
- Van DPP.** 2000. The status of turtles in Asia. *Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia*. *Chelonian Research Monographs* **2**, 15-23.
- Zuberi B.** 2007. Pakistani turtles in danger. All things Pakistan. www.Solar-Arid.Org. Updated 25 Feb 2007 and accessed at 30 June 2009.