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Occurrence and habitat type of seven non marine chelonian species in some parts of Odisha, India

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ABSTRACT

Seasonal investigation on seven species of fresh water turtles was done from July 2013 to June 2014 in some parts of Odisha. Analysis of variance with three factors as place, species and season showed significant differences among themselves F = 2852.1,198.61 and 509.38,P ≤ 0.01). Seasonally the four species of turtles like Lissemys punctata, Nilsonia gangeticus, Chitra indica and Pangshura tentoria were observed abundantly in basking condition along riverbank of Mahanadi in Cuttack district during winter whereas another three species Melanochelys tricarinata, Melanochelys trijuga, Geochelone elegans were reported in grassland of Gajapati district. The present investigation concluded that except Lissemys punctata all other species were very few in number and either threatened or vulnerable (IUCN Redlist) due to poaching, habitat destruction and climate change and there is an urgent need of conservation and management.

Key words: Turtle, vulnerable, habitat, basking, riverbank

INTRODUCTION

Odisha, the maritime state in the eastcoast of India is rich in habitats and biodiversity and correspondingly rich in both marine as well as non marine Chelonian species. The Chelonian fauna of Odisha comprises of 17 species (4 marine turtle, 11 freshwater turtle and 2 land tortoises) [1]. Of the 11 species of freshwater turtles, nine were recorded in the Mahanadi river. The later drains an area of around 141,600 square km and has a total course of 885 km long. The river traverses Cuttack district in the East West direction, just before entering Cuttack it gives of large distributaries called Kathajodi. The river stretch is a unique representative of different land use with identical river bank and vegetation.

The ecology and history of fresh water turtles have been studied by several workers around globe [2,3,4]. But little was known about the turtles of Mahanadi river and their conservation strategies. Hence the present study is designed to provide a stronger predictive basis for anticipating distribution and abundance of freshwater turtle species along Mahanadi river and conservation actions in this habitat.

Anthropogenic activities are one of the major threats affecting Chelonian population and their distribution in Mahanadi river. Majority of these species are being exploited for traditional trade. Threats may be direct by poaching for meat, removal of eggs for consumption or may be incidental catch in fishing nets. Indirect threats include change in habitat disturbance (by dragging sands) along the river basin and pollution.

MATERIALS AND METHODS

Study Animals and field Methods

Opportunistic observations were made in forest trail, aquatic edges and grass lands of Mahanadi coast. Seven study sites as Kandarpur (station-1), Kakhadi (station-2), Dhabaleswar (station-3), Jobra (station-4), Madaguda (station-5), Kathaguda (station-6) and Paralakhemundi (station-7) were selected in the upper Mahanadi near Cuttack region ($20^0 23^{'}$N to$85^0 47^{'}$E) and some forest parts of Gajapati district ($18^0 45^{'}$E to$85^0 48^{'}$N) of Odisha state, India for observations. Out of seven stations four stations (st-1 to st-4) were the river basin of Mahanadi where as other three stations (st-5 to st-7) were temple ponds of both Cuttack and Gajapati district. Nocturnal and diurnal searches for individual samples were conducted from July 2013 to June 2014 along aquatic edges without causing any harm to the individuals. Information was collected from direct sighting and questioning the forest staffs and fishermen in fringe areas. The records are presented under each species which consist of locality, date, nature of record, sex and habitat.

RESULTS AND DISCUSSION

Seven types of turtles were observed along seven stations during exploration including both hard shelled and soft shelled.

1. *Lissemys punctata* (Lacepede 1788)

Present study

Observed basking in sand deposit in Mahanadi river bank. The species was reported from all the seven sampling stations (st-1 to st-7).

Morphological identification

The carapace is circular in juveniles but more oval in adults. Adult females are larger than males [5,6].The carapace and soft body parts are olive green to brownish. The plastron has well developed callosities on all bones except that the isolated entoplastral callosity varies greatly in size [5] and may be absent.

Fig.1 *Lissemys punctata* (Lacepede,1788)

Distribution

The species is restricted to the Indian sub region.The subspecies *Lissemys punctata andersoni* occurs in Pakistan, northern India and southern Nepal, East of Bangladesh and Myanmar. But *Lissemys punctata vittata* was noticed in Peninsular India from Gujrat south to Karnataka, Odisha and Andhrapradesh [7].

Habitat

Inhabit a wide range of habitat like rivers, ponds, lakes, canals, waterlogged paddy fields. Feed on frogs, tadpoles, fishes, prawns, molluscs and aquatic plants.

Conservation status

IUCN 2013[8] Red list: Near threatened. CITES: Appendix II: Indian wildlife (protection) Act, Schedule I.

2. *Nilsonia gangeticus* (Cuvier 1825)

Present study

It was recorded from Mahanadi river banks (including four sites).The major threat to this species is poaching by local villagers for meat. Thus needs conservation by awaring local communities.

Morphological identification
Carapace is flat, oval and covered with a thin layer of skin. Head greenish with several oblique black stripes on the sides and above. Plastron is cream or pink in color. Five callosities present.

Fig.2 *Nilsonia gangeticus* (Cuvier 1825)

Distribution
Found mostly in India along with Bangladesh and Nepal. Commonly known as Indian soft-shell turtle.

Habit and Habitat
Strictly aquatic found in rivers and wetlands. Feed on fishes, frogs, birds, molluscs, insects as well as aquatic plants, fruits and carrion.

Conservation status
IUCN 2013 [8] Redlist: Vulnerable, CITES: Appendix I: Indian wildlife (protection) Act, Schedule I.

3. *Chitra indica* (Gay 1831)

Present study
The species was observed in the river bank sites of Mahanadi (st 1-4) in basking condition. The species was exploited by local people for meat. Hardly 10-15 individuals were reported at once.

Morphological identification
Flat and oval carapace. Gray to dull olive colored with wavy and dark brown pattern stripes on neck. Eyes positioned dorsally. Snout short and small. Plastron white with four callosities.

Fig.3 *Chitra indica* (Gay 1831)

Distribution
Confined to Indian sub region. Also reported from Bangladesh, Nepal and Pakistan.

Habit and Habitat
Diurnal, remain buried at bottom under sand. Rarely seen on land or in basking condition. Feed on fishes and molluscs.

Conservation status
IUCN 2013 [8] Redlist: Endangered, CITES: Appendix I: Indian wildlife (protection) Act, Schedule I.

4. *Pangshura tentoria* (Gray 1834)

Present study

The species was abundantly observed in st- 4 along Mahanadi river bank. They were non aggressive. Commonly found in basking condition on logs and sand bars. Major threat is poaching by local fishermen. It is the most abundant species observed along the Mahanadi river bank in the district of Cuttack.

Morphological identification

Brownish olive dorsally with a pink or lighter pleuro-marginal ring. Reddish post ocular spot between eye and tympanum.

Fig.4 *Pangsura tentoria* (Gray 1834)

Distribution

Found mostly in Indian sub region including Pakistan, Nepal and Bangladesh.

Habit and habitat

Inhabit in large as well as small rivers. Commonly found in basking state on logs or rocks. Males and juveniles are carnivorous whereas females are vegetarian.

Conservation status

IUCN 2013 [8], Redlist: near threatened. CITES: Appendix II: Indian wildlife (protection) Act, Schedule I.

5. *Melanochelys tricarinata* (Blyth 1856)

Present study

Present study confirmed the less availability of this species. In summer 4-8 numbers of individuals were recorded from 2-3 stations along Mahanadi river whereas 8-14 numbers were found in other three stations at Gajapati district.

Morphological identification

Carapace elevated and elongated with three smooth keels. Dorsally dark brown,keels pale yellow. Plastron light yellow or orange. Three yellow lines on the carapace were distinct.

Fig.5 *Melanochelys tricarinata* (Blyth 1856)

Distribution

India, Bangladesh, Nepal and Bhutan.

Habit and habitat
Little was known about the habit and habitat of this species. Mostly inhabit grassland areas of reverine plain. Commonly herbivorous as faecal matter contains seeds of some fruits.

Conservation status
IUCN 2013 [8] Redlist: vulnerable. CITES: Appendix I and Schedule I of Indian wildlife (protection) Act 1972

6. Melanochelys trijuga (Schweigger 1812)

Present study
During study period this species was observed at station 1 (Kandarapur) along bank of Mahanadi and in the forest areas and temple ponds of Paralakhemundi. It was commercially exploited for food in these regions and hunted by tribal people and thus needed conservation measure.

Morphological identification
The carapace is elongated relatively more elevated in adults and more depressed in juveniles. The carapace is the octagonal second neural a condition more frequently found in turtles showing megacephaly [9].

Fig.6 *Melanochelys trijuga* (Schweigger 1812)

Distribution
Found more in hill ranges of the Western Ghats, south of Gujarat in India. Also it was reported in northern and north eastern part of India.

Habit and habitat
Found in ponds, slow moving streams within forest habitat [2]. The species shows a crepuscular to nocturnal life style. It is omnivorous feed on aquatic macrophytes and invertebrates along with prawn, grass, water hyacinth and fruits [10].

Conservation status
IUCN 2013 [8] Redlist: Near threatened. Indian wildlife (protection) Act 1972 CITES: Appendix I not listed.

7. ***Geochelone elegans*** (Schoepff 1795)

Present study
They were observed in the forest parts of the Gajapati district especially conserved in temple ponds and maintained. The devotees believed that offering prayers to this species can lead better and longer life. On the other hand the species were hunted by tribal people for meat. The major threat of this species was habitat destruction, agricultural practice and forest management.

Morphological identification
The carapace is very convex with dorsal shields forming humps. The plastron is large, truncated with black and yellow radiating streaks. Commonly called Indian star tortoise.

Fig.7 *Geochelone elegans* (Schoepff, 1795)

Distribution
In India mostly distributed in north of Narmada river in Gujarat state. Also found in Pakistan and Sri Lanka [11].

Habit and habitat
Found in arid and semi arid regions as the shade of grass or vegetation in the hilly regions. Mostly herbivorous and feed on grass, fallen fruit, flower and leaves of succulent plants.

Conservation status
IUCN 2013 Redlist [8], Least concern. CITES: Appendix II of Schedule IV.

Present study was based only on the above seven number of species in seven sampling stations. Analysis of variance using three factors (Place, species and season) showed significant differences between place and species ($F = 2852.21$, $P \leq 0.01$), place and season ($F = 198.61$, $P \leq 0.01$) and also between species and season ($F = 509.38$, $P \leq 0.01$). The seven sampling stations with seven numbers of species and season showed highly significant value ($F = 188.66$, $P \leq 0.01$) among themselves (Table 1).

Table 1 Analysis of variance with three factors

Source	Sum of Squares	df	Mean Square	F	Sig.
Place (7)	6837980.541	6	1139663	2894.883**	0.000
Species (7)	18268320.92	6	3044720	7733.959**	0.000
Season (4)	838407.9779	3	279469.3	709.886**	0.000
place * species	40423122.63	36	1122865	2852.212**	0.000
place * season	1407448.058	18	78191.56	198.6161**	0.000
species * season	3609618.344	18	200534.4	509.3816**	0.000
place * species * season	8021436.871	108	74272.56	188.6613**	0.000
Error	154323.3333	392	393.682		
Corrected Total	79560658.67	587			

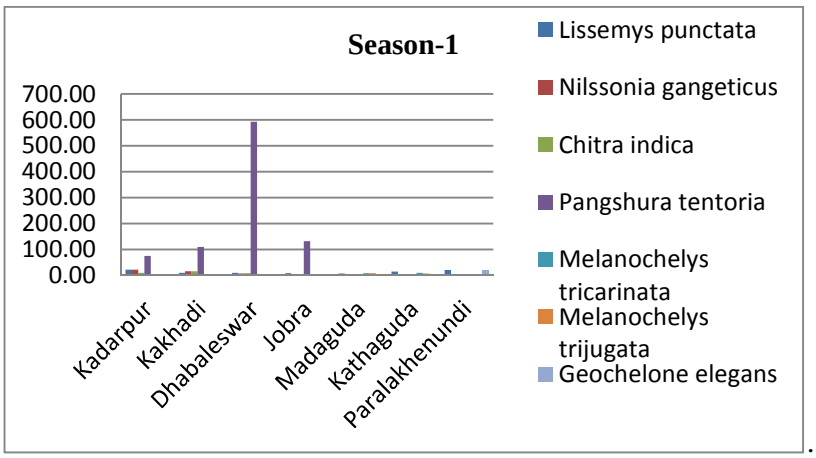

Fig.8 Abundance of turtles in summer (2013-14)

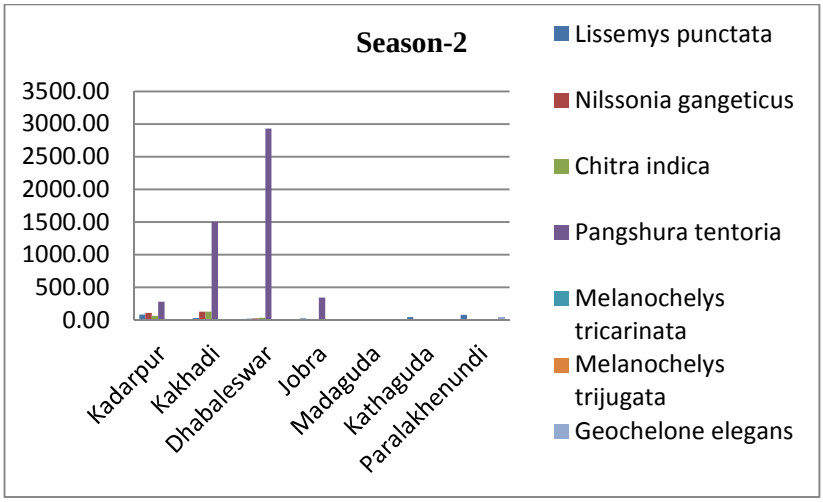

Fig.9 Abundance of turtles in winter (2013-14)

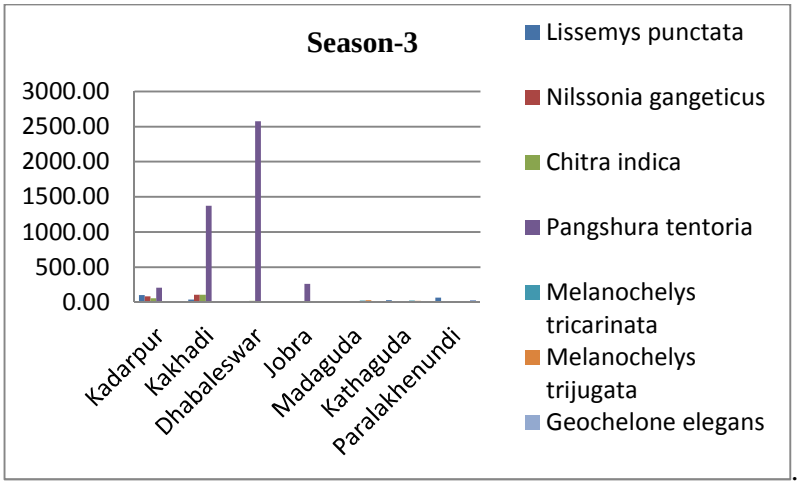

Fig.10 Abundance of turtles in monsoon (2013-14)

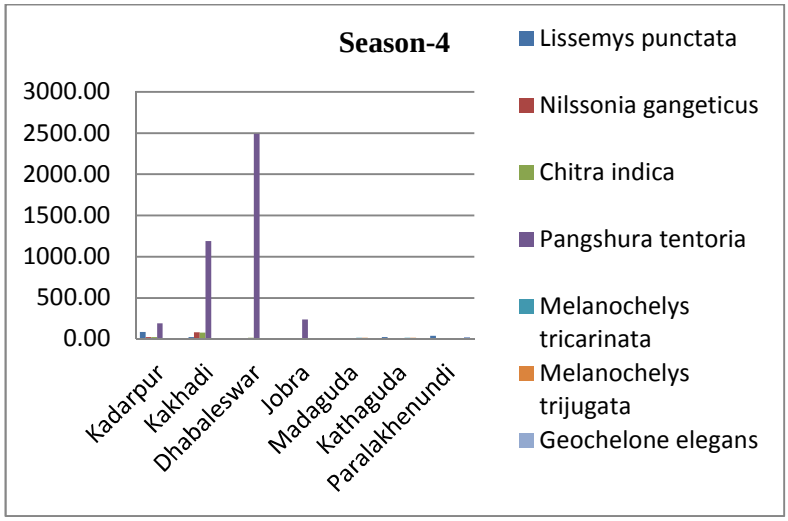

Fig.11 Abundance of turtles in postmonsoon (2013-14)

During summer the species *Pangshura tentoria* showed higher abundance (592.33) than other species at station 4 (Dhabaleswar of Mahanadi river bank) (Fig.8). The abundance value of *P. tentoria* was found to be 4 times (2933.33) during winter Fig.9). Monsoon and post monsoon showed average value (2575 and 2490) at that station (Fig.10,11).Station 2 (Kakhadi) also showed higher number of *P. tentoria* (1000-1500) in all the four seasons. But

out of seven other six species did not show higher abundance value at other five stations. Seasonally the higher abundance values were observed in winter and post monsoon. *Lissemys punctata* was observed in almost all stations where as *Nilsonia gangeticus* and *Chitra indica* were absent in Madaguda, Kathaguda and Paralakhemundi (Station 5,6 and 7).The species *Melanochelys tricarinata*, *Melanochelys trijuga*, *Geochelone elegans* were absent mostly in Mahanadi river bank stations at all the seasons (Fig.8-11) and these three were reported from forest regions (st-5 to st-7).

Occurrence of *L. punctata* was reported by Smith [7] in Odisha. Later Das [10,11] reported this species in Odisha, Andhra Pradesh, Karnataka and south Gujarat. [12,13] reported this species from the Brahmaputra flood plains, Assam, India from Barak valley of the same state. *L. punctata* occurs in a variety of aquatic habitats. Earlier reports were demonstrated that this species was appeared to tolerate salt water conditions well as it is common in brackish water lagoons in Sunderbans (West Bengal), Bhitarakanika (Odisha) and Coringa (Andhra Pradesh) of the coast [3,10,14]. Present study confirmed the presence of this species along Mahanadi river banks and studying and observing them in basking condition which is in agreement with Das [10].Winter had reported the more number of individuals at basking state (from November to February) followed by summer, post monsoon and monsoon which was also earlier reported by Das [10]. Present survey in many parts of the two districts (Cuttack and Gajapati) of Odisha has revealed that *L. punctata* is a common and most frequently observed turtle species. [10] reported that it may be the most common species in the Indian sub region.

Further *L. punctata* and its eggs are highly exploited for food. The turtle trade originating from northeast Indian states has now been stopped because of the dwindling population of the turtles including *L. punctata*. However sporadic reports on illegal harvest of this species are available in recent years. [13] recorded this species from Brahmaputra bank at Debeswari and Biswanath Ghat. Basking individuals of *P.tentoria* were observed by [13] at Brahmaputra River, Assam, India. Present study also confirmed the occurrence of *Nilsonia gangeticus* and *P.tentoria* at Mahanadi river bank, Odisha, India. Along with above species they had also reported burnt shell (= 6) of *M. tricarinata*, burned in annual grass land management burning process in the park. The observation of seven stations of Cuttack and Gajapati district confirmed that this species were mostly reported in grassland areas of Gajapati district and did not find along Mahanadi river bank. *M. trijuga* and *G. elegans* also showed this type of distribution and mostly conserved in the temple ponds of Gajapati district.

CONCLUSION

From present distribution pattern during whole study it was concluded that these species were either endangered or vulnerable and thus need conservation and management. Habitat destruction and poaching by local villagers and tribal people for meat and conversion of forest grass lands to cultivable agricultural fields are the major threats to these species. Except the *L. punctata* the other six species showed a declining number though their environmental conditions were suitable hence needs for immediate action against management plans.

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