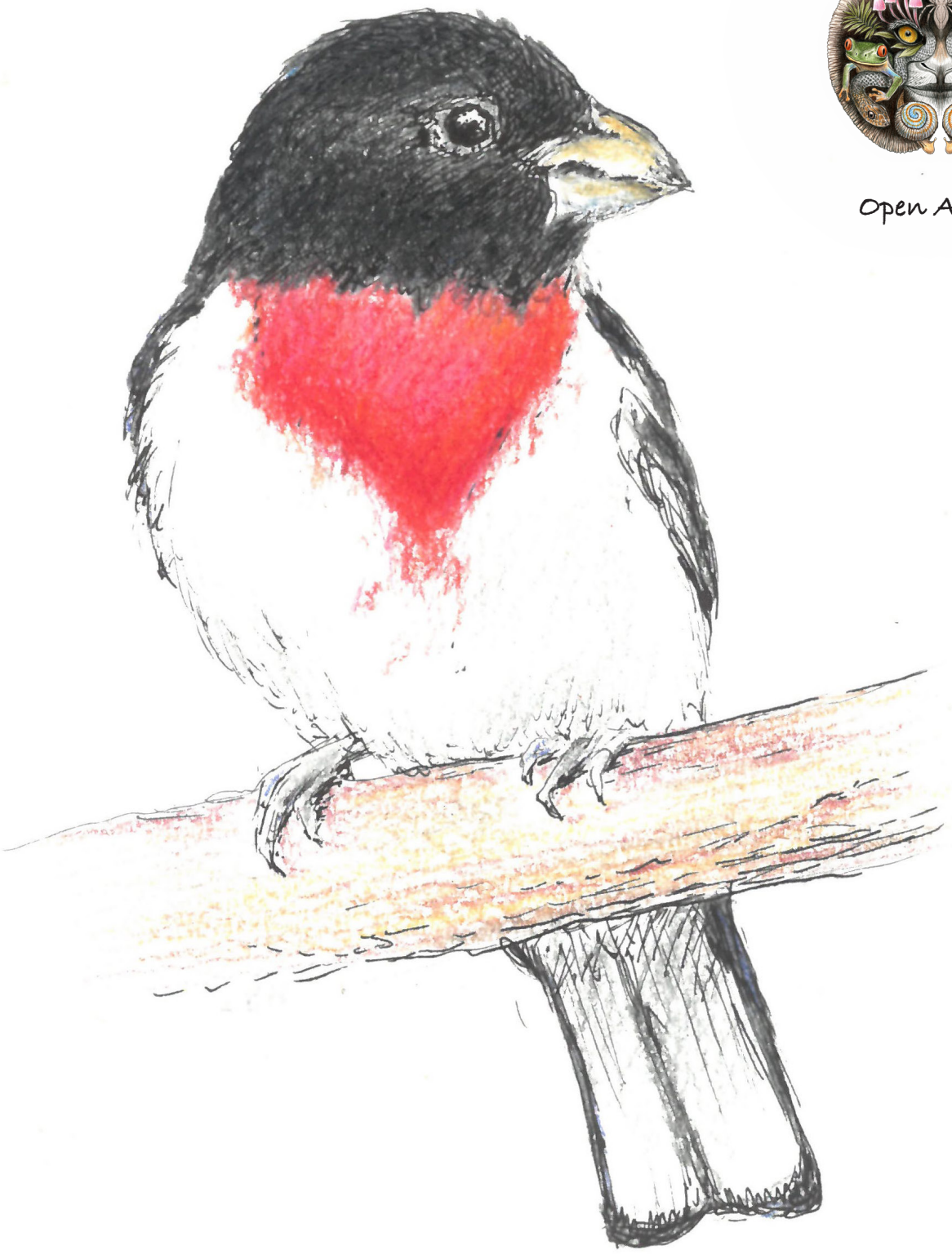
Building evidence for conservation globally

Journal of Threatened Taxa

10.11609/jott.2024.16.5.25119-25282
www.threatenedtaxa.org

26 May 2024 (Online & Print)
16(5): 25119–25282
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

Open Access



ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Registered Office: 3A2 Varadarajulu Nagar, FCI Road, Ganapathy, Coimbatore, Tamil Nadu 641006, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scope
For Article Submission Guidelines, visit https://threatenedtaxa.org/index.php/JoTT/about/submissions
For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

Cover: Rose-breasted Grosbeak *Pheucticus ludovicianus*, pen & ink with colour pencil. © Lucille Betti-Nash.

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 May 2024 | 16(5): 25147–25156

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

https://doi.org/10.11609/jott.8948.16.5.25147-25156

#8948 | Received 06 February 2024 | Final received 10 April 2024 | Finally accepted 05 May 2024

OPEN ACCESS

ARTICLE

Traditional harvesting practices employed for freshwater turtles by the indigenous communities along Shilabati River, West Bengal, India

Prasun Mandal [1], Pathik Kumar Jana [2], Priyanka Halder Mallick [3], Shailendra Singh [4] & Tanmay Bhattacharya [5]

[1] Department of Zoology, Vidyasagar University, Midnapore, West Bengal, 721102, India.
[2] Centre for Life Sciences, Vidyasagar University, Midnapore, West Bengal, 721102, India.
[3] Department of Zoology, Vidyasagar University, Midnapore, West Bengal, 721102, India.
[4] TSA Foundation India, D 1/ 317 Sector F, Jankipuram, Lucknow, Uttar Pradesh, 226021, India.
[5] Formerly of Department of Zoology, Vidyasagar University, Midnapore, West Bengal, 721102, India.
[1] prasunmandalzoo7@gmail.com (corresponding author), [2] pathikjana@gmail.com, [3] priyanka@mail.vidyasagar.ac.in,
[4] shailendrasingh.phd@gmail.com, [5] prof.t.bhattacharya@gmail.com

Abstract: A survey was conducted through semi-structured interviews, involving 38 local fishermen of three villages in the Gangani region along Shilabati River in West Bengal, India. The survey revealed that three threatened species of turtles—*Nilssonia gangetica*, *Nilssonia hurum*, and *Lissemys punctata*—were clandestinely harvested by the riverine communities. These species are also being documented for the first time from this area, popularly called Jangal Mahal. *N. gangetica* was the most commonly harvested species, followed by *L. punctata* and *N. hurum*, mostly for consumption, local sale, and as traditional medicine. The most frequently used method for capturing turtles was the 'multiple hook bait'; exclusively practiced by adult males of the fisher community, usually belonging to the age group 21–40 years, between February and June. The study indicated that the respondents knew that harvesting of turtles was clandestine, yet they continued to do so as their traditional right, as they believed minor catches will not harm local turtle populations. It is assumed that *N. hurum*, which is an endangered species, is already rare and on the brink of local extinction, whereas other two species are coping with the harvest in the specialized riparian habitat and adjacent ponds. In this study the harvesting of threatened turtle species was ardently associated with the socio-cultural customs rather than an economic compulsion but to check rising threat to these species, the uncontrolled harvest needs to be addressed urgently as a high priority conservation issue. This requires further explorations on the ecology of turtles, initiatives by enforcement agencies, and utilizing the inherent knowledge of indigenous people.

Keywords: Clandestine harvesting, conservation, riparian habitat, Soft-shell Turtle, Trionychidae, wildlife utilisation.

Editor: Raju Vyas, Vadodara, Gujarat, India. **Date of publication:** 26 May 2024 (online & print)

Citation: Mandal, P., P.K. Jana, P.H. Mallick, S. Singh & T. Bhattacharya (2024). Traditional harvesting practices employed for freshwater turtles by the indigenous communities along Shilabati River, West Bengal, India. *Journal of Threatened Taxa* 16(5): 25147–25156. https://doi.org/10.11609/jott.8948.16.5.25147-25156

Funding: Self-funded.

Competing interests: The authors declare no competing interests.

Author details: Prasun Mandal is a research scholar, Department of Zoology, Vidyasagar University. Pathik Kumar Jana is an active researcher at Centre for Life Sciences, Vidyasagar University, after completing his M.Phil. from this University. Dr. Priyanka Halder Mallick, presently associate professor and head of the department, Zoology at Vidyasagar University, is an environmentalist with research specializations in freshwater and forest ecology, environment, biodiversity conservation, etc. She is also the state coordinator of TSA Foundation India. Dr. Shailendra Singh has two decades of experience with Indian freshwater turtle and tortoise research and management. He received the Behler Turtle Conservation Award for 2021 and Disney Conservation Award 2008. Currently Dr. Singh spearheaded TSA Foundation India as its director. Dr. Tanmay Bhattacharya, former professor of Zoology, Vidyasagar University, Midnapore was a member, Wildlife Advisory Board of Tripura and Pollution Control Board of Tripura.

Author contribution: All enlisted authors have collaborated in developing and designing the paper. Supervision and administration for the research activity was offered by PHM. Drafting of initial manuscript, field data collection, visualization and analyses were done by PM with the assistance of PKJ. Final shape to the manuscript along with technical guidance was given by SS, PHM and TB. All authors have carefully gone through the final manuscript and approved it.

Acknowledgements: The authors express their gratitude to Vidyasagar University for providing necessary facilities and support. The authors are thankful to TSA Foundation India for improving the study design. They also like to extend their appreciation to the local fishermen for their cooperation. The first author acknowledges CSIR, New Delhi, for their financial support in the form of a fellowship (Ref. No: 16/06/2019(i) EU-V). Nevertheless, the research team is grateful to the West Bengal Forest Department for granting permission (vide Memo no. 2921/WL/4R-11 (Pt-XVIII)/2023) to sustain and expand the study.

INTRODUCTION

Local and indigenous people have been dependent on wildlife for their livelihood and subsistence in every corner of the globe from ancient times. Throughout the world, hunting and trafficking of animals or their parts pose serious threats to wildlife (Milner-Gulland & Bennett 2003). Hunting by indigenous people is prevalent in India and many wild regions of the world, as it is closely connected to local culture and rituals. Though hunting can provide a significant source of income for local communities, and particularly indigenous groups, it is generally considered a conservation issue (Nasi et al. 2008). Wild meat is an important source of nutrition and earnings for millions of people in developing countries (Brashares et al. 2011). In Asia, hunting practices are not well understood and research is mainly focused on trade (Banks et al. 2006). The local community around a river may rely on native bio-resources, including turtles, for food, economic support and cultural expression. However, the adoption of uncontrolled hunting practices has become more severe due to population growth, resulting in the over-exploitation of many species beyond sustainable levels (Apaza et al. 2002).

Various tools and techniques have been used for catching freshwater turtles in different regions of the world. In Mahanadi basin of India, floating hooks, harpoons and baits are used (Krishnakumar et al. 2009). In northwestern Ecuador and Chittagong Hill Tracts in Bangladesh, pitfall traps are employed (Carr et al. 2014; Rahman et al. 2015). Harpoons are used in Bangladesh (Rashid & Khan 2000) and Brazil (Fachín-Terán et al. 2004), while spear rods are utilized in Pakistan (Noureen et al. 2012). In addition to these methods, different types of nets such as gill nets and drag nets in Brazil (Fachín-Terán et al. 2004), fishing nets and hook lines are used in Pakistan and Bangladesh (Rashid & Khan 2000; Noureen et al. 2012). Baited fishing lines are employed in Indonesia (Shepherd 2000) and physical diving is a common practice in Bangladesh (Rashid & Khan 2000) and the Amazon basin (Fachín-Terán et al. 2004). Direct Hand Capture (DHC) is also a popular method used during rainy and winter seasons (Fachín-Terán et al. 2004; Carr et al. 2014). Other methods used in various parts of the world include hunting dogs (Rahman et al. 2015), wooden pole & jatica (Fachín-Terán et al. 2004), muddling (Rashid & Khan 2000), pool cleaning, turtle basket, probing (Carr et al. 2014), and electric current (Shepherd 2000). The biomass of wildlife populations has significantly decreased in areas where hunting is prevalent, leading to changes in the age distribution of species (Peres 2000). River turtles play a vital role in the local economy and ecology by dispersing seeds, controlling prey, and scavenging in aquatic ecosystems. Protecting vulnerable nesting areas and eggs is crucial for turtle conservation (Fachín-Terán et al. 2004).

Globally, chelonians are the second most endangered vertebrate group after primates in terms of their rate of extinction (Rhodin et al. 2018). Turtle populations are steadily declining due to a variety of factors, including over-exploitation of turtles and their eggs for food, traditional medicines and the global pet trade, as well as habitat degradation (Stanford et al. 2020). Hunting of threatened animals is strictly prohibited in India and carries legal consequences under the Wildlife (Protection) Act, 1972. Several turtle species are protected under this Act (Yadav et al. 2021). However, turtle hunting continues to be widespread in several regions of India even though it is refuted (Krishnakumar et al. 2009; Kanagavela & Raghavana 2013; Behera et al. 2019). Turtle harvesting is also prevalent in the Shilabati River of the Paschim Medinipur district of West Bengal, where meat consumption has led to a significant conservation issue. Three species that are being harvested in this area are *N. gangetica* (Cuvier, 1825), *N. hurum* (Gray, 1831), and *L. punctata* (Bonnaterre, 1789). According to the IUCN Red List, *N. gangetica* and *N. hurum* are 'Endangered' and *L. punctata* is 'Vulnerable' (IUCN 2024). All three species are listed in Schedule-I of the Wildlife (Protection) Act, 1972 of India and are protected live or dead and parts thereof (Yadav et al. 2021). Each of the three species mentioned belong to the Trionychidae family and are known as softshell turtles. These turtles are mostly found in the Indian subcontinent, particularly in countries such as India, Pakistan, Bangladesh, and Nepal but *L. punctata* has a wider distribution range that extends to Myanmar (Hmar et al. 2020; Yadav et al. 2021). Understanding the harvesting practices and factors that influence local harvesting is crucial for conservation of these species.

This study was designed to gather information on the techniques used to capture river turtles in the Shilabati River, and investigate the effects of turtle harvesting in the region vis-a-vis the socioeconomic and cultural backdrops of the local inhabitants for delving deeper into the conservation issue of threatened turtle species. A better understanding of harvesting practices is necessary to comprehend the socioeconomic features leading to these activities and their ecological consequences.

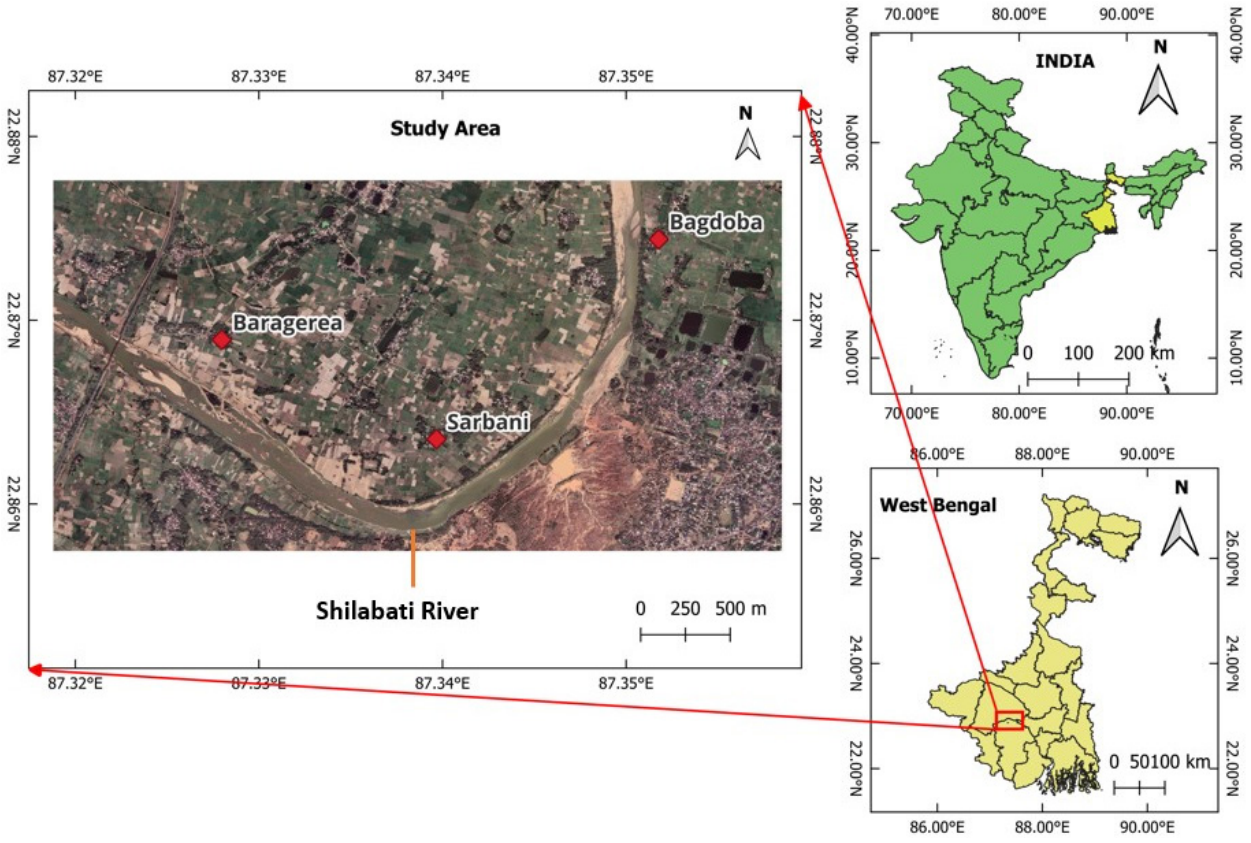


Image 1. Study area with three villages along Shilabati River.

MATERIALS AND METHODS

The study was conducted over an area spanning a 5-km stretch along Shilabati River in Paschim Medinipur District of West Bengal including three villages Baragerea, Sarbani, and Bagdoba (22.866°N, 87.323°E to 22.883°N, 87.350°E) in the Gangani area of Jangal Mahal (Image 1) inhabited by local people who mostly depend on the nearby natural resources. This area of the Shilabati River has been found to be an ideal habitat for turtles, with large submerged rocks suitable for hiding. To ensure high accuracy, the coordinates were recorded using a GPS device (Garmin Etrex- 30).

The data presented here are from 12-month surveys in 2021, and partly from an ongoing study. Weekly visits were made to gather a combination of qualitative and quantitative data through surveys and conducting semi-structured interviews, incorporating both open ended and close ended questions following Mueller & Segal (2014). Thirty-eight fishermen who came to the river on a regular basis from three different villages primarily for fishing were interviewed. All respondents agreed to be interviewed with the assurance that their identities would remain confidential and each interview was performed individually. Consent of the interviewees were obtained prior, as a part of human ethics for research. Indigenous community members involved in turtle harvesting parallel to fishing were divided into four age groups: A (11–20 years), B (21–30 years), C (31–40 years), and D (41–50 years). Our objective was to prepare a database about the harvesting practices adopted in the area including tools and techniques, targeted species, frequency, number of turtles captured, preferred season and time of harvesting, purpose of harvesting, clandestine trade, cultural practices and age-structure of fishermen.

Photographs of various Indian freshwater turtle species were presented during the survey, validating the identification of the species. Statistical analyses of data were done by SPSS-26 and illustration of results were done using MS Excel 2019. Map of the study area was designed using QGIS 3.28.2 software.

RESULTS

Our routine survey revealed occurrence of three species of turtles from Shilabati River (Image 2) and

Image 2. Photographs of the three species of turtles encountered during survey from Shilabati River: A—*Lissemys punctata* |B—*Nilsonia gangetica* | C—*Nilsonia hurum*. © Prasun Mandal.

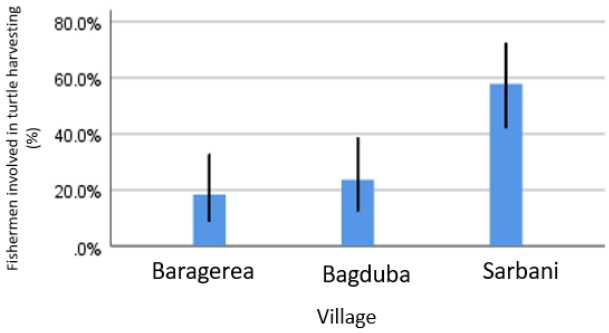


Figure 1. Number of fishermen involved in turtle harvesting (%) across three villages.

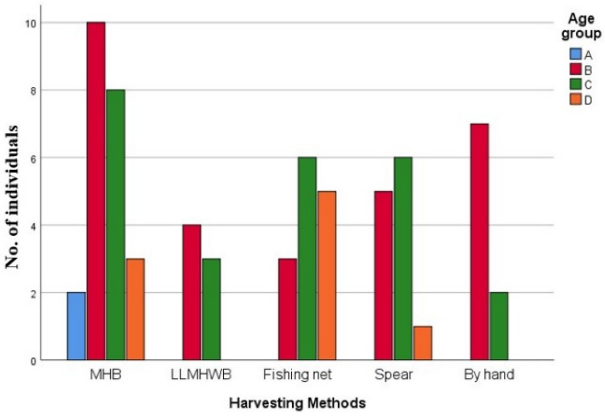


Figure 2. Age group-wise distribution A (11–20 years), B (21–30 years), C (31–40 years), and D (41–50 years), individuals adopting different harvesting techniques to catch turtles.

adjoining ponds, viz., *L. punctata*, the most common aquatic turtle in India, *N. gangetica* and *N. hurum*. The local inhabitants confessed to harvesting all three turtle species, although they knew that turtle harvesting was clandestine in general (Table 1). Kruskal Wallis test was used as an alternative to ANOVA as normality assumption was not met as far as difference in the number of individuals involved in harvesting of turtles from the three villages were concerned. Findings suggested that the number of harvesters were significantly different ($H = 53.386$, $p < 0.001$) among villages. Pairwise comparison revealed that significantly higher number of harvesters were from Sarbani village as compared to Bagduba ($H = 55.308$, $p < 0.001$) and Baragerea ($H = 54.163$, $p < 0.001$) villages (Figure 1). No significant difference, however, could be observed between the number of harvesters from Bagduba and Baragerea village ($H = -1.144$, $p = 0.895$).

During the study period of about a year, fishermen reported to encounter an average of 43 turtles per month. In total 518 turtles were reported to be harvested during those 12 months (Table 2), of which maximum number (N = 299) were captured by the residents of Sarbani village. The most common species in the study area was *N. gangetica* (N = 334) followed by *L. punctata* (N = 182). Only two *N. hurum* were reported to be captured during this period. However, there is no evidence to prove these figures beyond doubt. Of the five harvesting practices used, viz., multiple hook bait (MHB), fishing net, spears, long line multiple hook without bait (LLMHWB) and manual capture, MHB was the most preferred method (N = 225) followed by fishing net (N = 120) in that order (Figure 2). Though all age groups preferred MHB method, it was exclusively used by age group A. Most of the harvesting was done by people belonging to age groups B and C (Figure 2); 31.5% of respondents were illiterate while 60.5% had only basic schooling (Table 1). In MHB, the hooks were left with attached baits dangling in water. Baits used in MHB included snails, shrimp, small fish, crabs, earthworms and pieces of chicken

Table 1. Summary of the responses by respondents N (%).

Questions	Answer	Number (%)
Gender	Male	38 (100 %)
	Female	0 (0 %)
Age group	A (11–20)	2 (5 %)
	B (21–30)	18 (48 %)
	C (31–40)	13 (34 %)
	D (41–50)	5 (13 %)
Education	Graduation	3 (8 %)
	School	23 (60.5 %)
	Illiterate	12 (31.5 %)
Annual income	< 30000 INR	0 (0 %)
	30000–60000 INR	2 (5 %)
	60000–90000 INR	16 (42 %)
	90000–120000 INR	12 (32 %)
	>120000 INR	3 (8 %)
	No response	5 (13 %)
From which village do you belong?	Sarbani	22 (58 %)
	Bagduba	9 (24 %)
	Baragerea	7 (18 %)
Do you catch turtles in addition to fishes?	Yes	38 (100 %)
	No	0 (0 %)
Which method do you prefer most?	MHB	18 (47 %)
	Fishing net	8 (21 %)
	Spear	4 (11 %)
	LLMHWB	3 (8 %)
	No preference	5 (13 %)
Which season do you mostly catch a turtle?	Summer	26 (69 %)
	Winter	10 (26 %)
	Monsoon	2 (5 %)
Which time of the day do you prefer to catch turtles?	1000–1400 h	8 (21 %)
	1400–1800 h	21 (55 %)
	1800–2200 h	6 (16 %)
	No Preference	3 (8 %)
What for do you catch turtles?	Eating	3 (8 %)
	Selling	8 (21 %)
	Both eating & selling	24 (63 %)
	Other	3 (8 %)
What do you do if a juvenile is caught?	Release	32 (84 %)
	Keep as pet	6 (16 %)
Is turtle population increasing or decreasing?	Increasing	25 (66 %)
	Same	7 (18 %)
	Don't know	6 (16 %)
Do you know turtle harvesting is an offence?	Yes	38 (100 %)
	No	0 (0 %)
Would you continue turtle harvesting in future?	Yes	35 (92%)
	No	3 (8%)

Table 2. Turtle hunting by various methods N (%).

Method	*Lissemys punctata* (local name: 'Kachim')	*Nilssonia gangetica* (local name: 'Boro Bargol')	*Nilssonia hurum* (local name: 'Bargol')	Total
MHB	60 (26.66 %)	164 (72.88 %)	1 (0.45 %)	225 (43.44%)
LLMHWB	0 (0 %)	67 (100 %)	0 (0 %)	67 (12.93%)
Fishing net	53 (44.16 %)	67 (55.83 %)	0 (0 %)	120 (23.17%)
Spear	43 (62.31 %)	26 (37.68 %)	0 (0 %)	69 (13.32%)
By hand	26 (70.27 %)	10 (27.02 %)	1 (2.7 %)	37 (7.14%)
Total	182 (35.13%)	334 (64.48%)	2 (0.39%)	518 (100%)

intestine. One end of the rope contained five to ten baited hooks, whereas remaining hooks were left bait-free with a weight attached at the end before throwing it into the river (Image 3) and leaving it for at least two hours. Usually, hooks were baited around 1500 h and sometimes left overnight. This was the most suitable method for catching turtles particularly *N. gangetica* but not practiced during rainy season when water level was higher, animals disperse rather than congregating due to high tide conditions. LLMHB was generally used during pre-monsoon period when water level was low but never in rainy season (July–September). This method was only effective for *N. gangetica*. A total of 67 individuals were harvested by this method (Table 2). In summer, fishing nets were commonly used between 1000 h to 1430 h to avoid the afternoon. This method was stated as very effective for small-sized turtles, which was, however, not used during monsoon. A total of 53 *L. punctata* and 67 *N. gangetica* were harvested by this method. During winter and harvesting festival (locally known as 'Bartch'), spears were used to locate and capture buried turtles by the sound produced as a result of the impact of the iron tip of the spear on the carapace and captured by hand. Spears were also used to capture turtles from crevices in rocks. This method was generally not used from July to September. During bartch, a group of 10–15 people go out for harvesting in river, spend 7–8 hours or even more and harvest the riverine fauna including turtles. Harvesters mostly used turtles in addition to fishes for domestic consumption. Gravid females migrating to the breeding sites were sometimes picked up by hand following their trails.

Juveniles were never caught for consumption, and rarely kept as pets. One juvenile *N. hurum* was captured from the river bank during sand dredging but was later released back into the river. Anonymous information collected stated that sometimes large-sized softshell turtles caught from the river and were kept in small cemented tanks by tying rope on to their legs for consumption during forthcoming festivals.

Turtle harvesting was done by adult male community members, majority of which (48%) belonged to age group B followed by (34%) age group C; 69% of respondents preferred to catch turtles during pre-monsoon or summer (February–June) and the most preferred time was between 1400 h to 1800 h (55%) (Table 1). A substantial proportion of respondents (92%) wanted to continue clandestine turtle hunting; 89% of respondents used carapace as traditional medicine and hung that on the wall of cowsheds (Image 4a), around the neck of livestock as amulet (Image 4b) for their protection. Moreover, children also used them as playing tools (Image 4c). Of the interviewed, 66% respondents believed that turtle population was not declining rather increasing. Despite the fact that every family had access to other proteinaceous food sources (goat, pig, duck, and chicken), turtle meat was always esteemed over others. One-way ANOVA revealed that number of *N. gangetica* and *L. punctata* caught were significantly more ($p < 0.001$) with F value being 20.75 and 9.13, respectively, as compared to *N. hurum* ($F = 0.75$; $p = 0.599$).

DISCUSSION

Softshell turtles (Family Trionychidae) are considered to be the finest of all freshwater turtles consumed because of their low bone-to-body ratio, along with extra cartilage and gelatinous skin (Krishnakumar et al. 2009). Due to the substantial demand, these turtles are being regularly harvested and traded in Asian countries including India. Over 58,000 individuals of turtles, belonging to at least 15 different species, including 10 identified as threatened by the IUCN have been illegally harvested in India between 2011 and 2015 (Mendiratta et al. 2017). Rana & Kumar (2023) highlighted that a total of 37,267 turtles were confiscated between 2015

Image 3. Indigenous harvesting gears used for turtles: A—MHB | B—Spear | C—LLMHWB | D—Fishing net. © Prasun Mandal.

Image 4. Use of turtle carapace by local residents of the study area: A—as a good omen, hung on the wall of cow-shed | B—a piece around neck of buffalo as amulet | C—kid using carapace shaft as a toy. © Prasun Mandal.

and 2016, indicating that the government officials seized 100 individuals on an average every day. This shows that turtle harvesting is quite rampant in India. Present study also revealed that harvesting of threatened turtle species in the region under study is in vogue and needs to be checked with proper vigilance of the local authorities and stringent enforcement of the Wildlife (Protection) Act, 1972. It is hinted that clandestine harvesting might have followed secret sale by personal or online channels instead of open market, and demand for turtles from urban people for consumption, or high prices offered by smugglers, might have lured some of the poor people to take the risk of turtle harvesting and trading. These three species, although widely distributed in India (Singh et al. 2021), have been documented for the first time from Shilabati River. As such harvesting and trading of these live, dead or parts thereof is a punishable act which the local people are ignoring. Number of such fishermen were significantly more from Sarbani village as compared to remaining two villages.

The total number of individuals harvested in one year in the present study was lower than that in Punnamada in Kerala (Krishnakumar et al. 2009) but higher than that in the Western Ghats (Kanagavela & Raghavana 2013).

L. punctata is heavily exploited and trafficked at both national and international markets for its meat and supposedly medicinal value across its distributional range (Bhupathy et al. 2014; Mendiratta et al. 2017). Illegal sale of *L. punctata* in West Bengal has been previously reported by Choudhury et al. (2000) and Mendiratta et al. (2017). Sale of turtle in the markets of Midnapore Town and Purba Medinipur District have also been reported by Pratihar et al. (2014) and Mahapatra et al. (2022) respectively but they did not mention anything about source and ways of harvesting. As in the present study, use of hooks, harpoons and baits has also been previously reported from India (Krishnakumar et al. 2009; Peng & Nobayashi 2021).

The connection between indigenous festivals and turtle harvesting is common around the world. Lovich et al. (2014) highlighted that turtle harvesting is scheduled before the 'Niam' festival in July at Arizona, USA when men go for turtle harvesting that lasts for 6–7 days. Likewise, in the present study it was seen that turtle harvesting precedes Bartch festival from April to June. In Jangal Mahal area another festival, 'Bandh Bibaha' is held in which turtles, tortoise and frogs are released in ponds and dams (Sarkar & Modak 2022) for mating, which is also a positive intention of villagers towards animal conservation. Kanagavel & Raghavan (2013) in Western Ghats, India reported that larger chelonian species were consumed immediately after harvesting and smaller ones were reared until those reached the desirable size for consumption. In contrast, in the present study it was seen that large sized turtles were kept in small water-filled cemented tanks with their legs tied for consumption during the forthcoming festivals. Indigenous communities generally prefer wild meat over domesticated meat (Aiyadurai et al. 2010; Brittain et al. 2022) for the sake of taste or religious reasons. The same was found to be true in case of the Gangani region as well.

Commonly, indigenous people use turtle shells for various traditional, cultural and religious customs (Das et al. 2012; Kanagavel et al. 2016). Mahawar & Jaroli (2007) stated that carapace ash was used as traditional medicine for cure of asthma, skin burn and tuberculosis in Rajasthan. In Western Ghats, shell and fatty tissue of turtles are used for their supposedly therapeutic value for curing piles, fissure, asthma, respiratory and gastric problem as well as in boosting strength (Kanagavel et al. 2016). In Assam and Bangladesh carapace is used for livestock treatment (Khatun et al. 2013). In Assam, shells are also hung in cowsheds and sometimes inside homes. They believe that this would keep livestock healthy and bring prosperity to the household (Barhadiya & Singh 2020). In the present study also, it was observed that carapace was hung on the wall of cowshed and as amulet hung round the neck of the cattle to protect against evil eyes. Moreover, children were also seen to play with those as toy. Earlier, a similar case was observed in the Dangi tribes, Dangs, Gujarat (Vyas 2006).

The most likely cause of clandestine harvesting seems to be traditional culture. They were also not aware of the adverse legal consequences of turtle harvesting. Tosakana et al. (2010) opined that a low level of education in the community might be associated with turtle harvesting, since they found that 62% of the surveyed people had not completed their primary education. Our findings also confirmed this contention as 92% of the respondents were either illiterate or had undergone only school education. Education is widely recognized as one of the foremost factors for knowledge acquisition and learning, exerting a profound impact on individual's perspectives towards environmental conservation and the responsible use of resources (Medeiros et al. 2023). It plays a pivotal role in enhancing employment prospects and alternative livelihood strategies, ultimately reducing the direct reliance on natural resources (Kideghesho et al. 2007). Due to lack of proper education 84% people of the area believed that turtle harvesting has no adverse effect on the turtle population.

CONCLUSION

Clandestine harvesting is prevalent in the forest-dominated Jangal Mahal area of West Bengal, and in most wild regions of the world as a traditional practice. Present study was an attempt to portray the socio-ecological set-up of the Gangani region focusing on the dynamic interaction of indigenous communities with these freshwater chelonians from socio-cultural point of view which clearly revealed that the hunting of threatened turtle species in the study area was emphatically associated with the traditional customs rather than the economic compulsion, as most of the respondents were not that poor economically. Absence of awareness regarding the present situation of aquatic wildlife seems to play an important role in persisting harmful activities as indigenous communities believed that turtle populations were not declining due to their

harvesting activities. Lack of knowledge regarding wildlife laws among fishermen, particularly ignorance of the distinction between unthreatened and threatened species, might be another reason for such ignorant activities. In this view, chelonian surveys become even more vital to fill the lacunae of scientific information in the region and subsequently promote conservation. Since only two individuals of *N. hurum* were captured during the study period it may be assumed that this species is in the brink of local extirpation. The remaining two species may be regarded as rare as those are still existing in small numbers. Forest authorities kept a watchful eye and released turtles to their natural habitat whenever found by their staff. Needless to mention, ethnic people are the ones deeply connected with nature so their knowledge may be constructively used to conserve the threatened species through concerted efforts. To frame a workable management strategy, not only further exploratory study is required on the status of turtle population; but also appropriate programs to create awareness among indigenous people regarding ecological importance of turtles, needs for its conservation and environmental sustainability for their own well-being in long term by government agencies, stakeholders as well as NGOs .

REFERENCES

Aiyadurai, A., N.J. Singh & E.J. Milner-Gulland (2010). Wildlife hunting by indigenous tribes: a case study from Arunachal Pradesh, north-east India. *Oryx* 44(4): 564–572. https://doi.org/10.1017/S0030605309990937

Apaza, L., D. Wilkie, E. Byron, T. Huanca, W. Leonard, E. Perez, E. Reyes-García, V. Vadez & R. Godoy (2002). Meat prices influence the consumption of wildlife by the Tsimane' Amerindians of Bolivia. *Oryx* 36(4): 382–388. https://doi.org/10.1017/S003060530200073X

Banks, D., N. Desai, J. Gosling, T. Joseph, O. Majumdar, N. Mole, M. Rice, B. Wright & V. Wu (Eds.) (2006). Skinning The Cat: Crime and Politics of The Big Cat Skin Trade. London, Environmental Investigation Agency and the Wildlife Protection Society of India, 25 pp.

Barhadiya, G. & S. Singh (2020). Cultural Use of Turtle Shells, an Underrated Threat in Turtle Conservation: A Case Study in Assam, India. *Reptiles & Amphibians* 27(2): 213–215. https://doi.org/10.17161/randa.v27i2.14180

Behera, S., A.K. Panda, S.K. Dutta & S. Nayak (2019). Status survey of *Batagur baska* and *Pelochelys cantorii* in the state of Odisha, east coast of India. *Testudo* 9: 36–46.

Bhupathy, S., R.G. Webb & P. Praschag (2014). *Lissemys punctata* (Bonnaterre, 1789) - Indian Flapshell Turtle. *Chelonian Research Monographs* 5(76): 1–12.

Brashares, J.S., C.D. Golden, K.Z. Weinbaum, C.B. Barrett & G.V. Okello (2011). Economic and geographic drivers of wildlife consumption in rural Africa. *Proceedings of the National Academy of Sciences* 108: 13931–13936. https://doi.org/10.1073/pnas.1011526108

Brittain, S., C.T. Kamogne Tagne, D. Roe, F. Booker, M. Mouamfon, N. Maddison, S.D.N. Tsabong, S.M. Nteroupe & E.J. Milner-Gulland (2022). The drivers of wild meat consumption in rural Cameroon: Insights for wild meat alternative project design. *Conservation Science and Practice* 4(6): e12700. https://doi.org/10.1111/csp2.12700

Carr, J.L., A. Almendáriz, J.E. Simmons & M.T. Nielsen (2014). Subsistence Hunting for Turtles in Northwestern Ecuador. *Acta Biológica Colombiana* 19(3): 401. https://doi.org/10.15446/abc.v19n3.42886

Choudhury, B.C., S. Bhupathy & F. Hanfee (2000). Status information on the tortoises and freshwater turtles of India. In: van Dijk, P.P., B.L. Stuart & A.G.J. Rhodin (eds.). Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia. *Chelonian Research Monographs* 2: 86–94.

Das, K.C., S. Kundu, S.K. Ghosh & A. Gupta (2012). Traditional knowledge on zootherapeutic uses of turtle is an issue for international conservation, pp 81–89. In: Singh, K.B. & K. Lalchhandama (eds.). *Proceedings of the National Seminar on Recent Advances in Natural Products Research.*

Fachín-Terán, R., A. Vogt & J. Thorbjarnarson (2004). Patterns of Use and Hunting of Turtles in the Mamirauá Sustainable Development Reserve, Amazonas, Brazil, pp 362–377. In: Silvius, K., R. Bodmer & J. Fragoso (eds.). *People in Nature: Wildlife Conservation in South and Central America New York Chichester.* West Sussex, Columbia University Press, 480pp. https://doi.org/10.7312/silv12782-022

Hmar, G.Z., D. Zote, H.B. Ramengmawii, K.C. Das & H.T. Lalremsanga (2020). A first distribution record of the Indian Peacock Softshell Turtle *Nilssonia hurum* (Gray, 1830) (Reptilia: Testudines: Trionychidae) from Mizoram, India. *Journal of Threatened Taxa* 12(14): 17036–17040. https://doi.org/10.11609/jott.6712.12.14.17036-17040

IUCN (2024). The IUCN Red List of Threatened Species. Version 2023-1. <https://www.iucnredlist.org>

Kanagavel, A. & R. Raghavan (2013). Hunting of endemic and threatened forest-dwelling chelonians in the Western Ghats, India. *Asian Journal of Conservation Biology* 2(2): 172–177.

Kanagavel, A., S. Parvathy, P.O. Nameer & R. Raghavan (2016). Conservation implications of wildlife utilization by indigenous communities in the southern Western Ghats of India. *Journal of Asia-Pacific Biodiversity* 9(3): 271–279. https://doi.org/10.1016/j.japb.2016.04.003

Khatun, Z., P. Bhuiyan, M.S.I. Roney & M. Rahmatullah (2013). Traditional knowledge on zootherapeutic practices among some folk medicinal practitioners of Bangladesh. *American-Eurasian Journal of Sustainable Agriculture* 7(3): 155–161.

Kideghesho, J.R., E. Røskaft & B.P. Kaltenborn (2007). Factors Influencing Conservation Attitudes of Local People in Western Serengeti, Tanzania. *Biodiversity and Conservation* 16: 2213–2230. https://doi.org/10.1007/s10531-006-9132-8

Krishnakumar, K., R. Raghavan & B. Pereira (2009). Protected on paper, hunted in wetlands: exploitation and trade of freshwater turtles (*Melanochelys trijuga coronata* and *Lissemys punctata punctata*) in Punnamada, Kerala, India. *Tropical Conservation Science* 2(3): 363–373. https://doi.org/10.1177/194008290900200306

Lovich, J.E., C.T. LaRue, C.A. Drost & T.R. Arundel (2014). Traditional cultural use as a tool for inferring biogeography and provenance: a case study involving painted turtles (*Chrysemys picta*) and Hopi Native American culture in Arizona, USA. *Copeia* 2014(2): 215–220. https://doi.org/10.1643/CH-13-076

Mahapatra, A.D., A. Patra & S.K. Ghorai (2022). First report of melanism in Indian Flapshell Turtle *Lissemys punctata* (Bonnaterre, 1789) from a turtle trading market of West Bengal, India. *Journal of Threatened Taxa* 14(10): 22032–22035. https://doi.org/10.11609/jott.8025.14.10.22032-22035

Mahawar, M.M. & D.P. Jaroli (2007). Traditional knowledge on zootherapeutic uses by the Saharia tribe of Rajasthan, India. *Journal of Ethnobiology and Ethnomedicine* 3(1): 1–6.

Medeiros, A.M., L.S. de Araújo, S.L. Mesquita, N.R. Aragão, C.A. Rodrigues, E.P. Chaves, R.N. Carvalho-Neta & A.L. de Sousa (2023). Traditional Knowledge on the use of Turtles in a Protected Area of the Amazon in Maranhão (Brazil): A Conservation

Proposal. *Journal of Ethnobiology* 43(2): 165–175. https://doi.org/10.1177/02780771231176468

Mendiratta, U., V. Sheel & S. Singh (2017). Enforcement seizures reveal large-scale illegal trade in India's tortoises and freshwater turtles. *Biological Conservation* 207: 100–105. https://doi.org/10.1016/j.biocon.2017.01.023

Milner-Gulland, E.J. & E.L. Bennett (2003). Wild meat: the bigger picture. *Trends in Ecology & Evolution* 18(7): 351–357. https://doi.org/10.1016/S0169-5347(03)00123-X

Mueller, A.E. & D.L. Segal (2014). Structured versus semi structured versus unstructured interviews. *The encyclopedia of clinical psychology* 1–7. https://doi.org/10.1002/9781118625392.wbecp069

Nasi, R., D. Brown, D. Wilkie, E. Bennett, C. Tutin, G. van Tol & T. Christophersen (Eds.) (2008). Conservation and use of wildlife-based resources: the bushmeat crisis. Montreal, Secretariat of the Convention on Biological Diversity, 50 pp.

Noureen, U., A. Khan & M. Arshad (2012). Exploring illegal trade in freshwater turtles of Pakistan. *Records of the Zoological Survey of Pakistan* 21: 19–24.

Peng, Y. & A. Nobayashi (2021). Cross-cultural research comparing the hunting tools and techniques of hunter-gatherers and hunter-gardeners. *Senri Ethnological Studies* 160: 75–92.

Peres, C.A. (2000). Evaluating the impact and sustainability of subsistence hunting at multiple Amazonian Forest sites, pp 31–57. In: Robinson, J.G. & E.L. Bennett (eds.). *Hunting for Sustainability in Tropical Forests*. Columbia University Press, New York, 1000 pp.

Pratihar, S., B.C. Patra, N. Acharyya, J.B. Nath & M. Bhattacharya (2014). Illegal turtle trading in West Bengal, India. *Sonoran Herpetologist* 27: 44–46.

Rahman, S.C., S.M. Rashid, R. Datta, P. Mro & C.J. Roy (2015). Status, exploitation, and conservation of freshwater turtles and tortoises in Chittagong Hill Tracts, Bangladesh. *Chelonian Conservation and Biology* 14(2): 130–135. https://doi.org/10.2744/CCB-1146.1

Rana, A.K. & N. Kumar (2023). Current wildlife crime (Indian scenario): major challenges and prevention approaches. *Biodiversity and Conservation* 32(5): 1473–1491. https://doi.org/10.1007/s10531-023-02577-z

Rashid, S.M.A., & S.M.H. Khan (2000). Trade and conservation status of freshwater turtles and tortoises in Bangladesh. 77–85, In: van Dijk, P.P., B.L. Stuart & A.G.J. Rhodin (eds.). Asian Turtle Trade: Proceedings of a Workshop on Conservation and Trade of Freshwater Turtles and Tortoises in Asia. *Chelonian Research Monographs* 2.

Rhodin, A.G., C.B. Stanford, P.P. Van Dijk, C. Eisemberg, L. Luiselli, R.A. Mittermeier, R. Hudson, B.D. Horne, E. Goode, G. Kuchling, A. Walde, E.H. Baard, K.H. Berry, A. Bertolero, T.E. Blanck, R. Bour, K.A. Buhlmann, L.J. Cayot, S. Collett, A. Currylow, I. Das, T. Diagne, J.R. Ennen, G. Forero-Medina, M.G. Frankel, U. Fritz, G. García, J.W. Gibbons, P.M. Gibbons, G. Shiping, J. Guntoro, M.D. Hofmeyr, J.B. Iverson, A.R. Kiester, M. Lau, D.P. Lawson, J.E. Lovich E.O. Moll, V.P. Páez, R. Palomo-Ramos, K. Platt, S.G. Platt, P.C. Pritchard, H.R. Quinn, S.C. Rahman, S.T. Randrianjafizanaka, J. Schaffer, W. Selman, H.B. Shaffer, D.S. Sharma, S. Haitao, S. Singh, R. Spencer, K. Stannard, S. Sutcliffe, S. Thomson & R.C. Vogt (2018). Global conservation status of turtles and tortoises (order Testudines). *Chelonian Conservation and Biology* 17(2): 135–161. https://doi.org/10.2744/CCB-1348.1

Sarkar, M. & B. K. Modak (2022). Rituals and festivals of indigenous people of Chota Nagpur plateau of West Bengal: A positive correlation with the environment, pp 465–491. In: Chatterjee. U., A. Kashyap, M. Everard, G. K. Panda & D. Mahata (eds.). *Indigenous People and Nature*. Elsevier, 621 pp. https://doi.org/10.1016/B978-0-323-91603-5.00020-8

Shepherd, C.R. (2000). Export of live freshwater turtles and tortoises from North Sumatra and Riau, Indonesia: a case study. *Chelonian Research Monographs* 2: 112–119.

Singh, A., A.M. Khalid & S. Singh (2021). Diversity distribution and bathymetric preferences of freshwater turtles in Lower Sarju River, North India with special reference to *Hardella thurjii*. *Journal of Experimental Zoology India* 24(2): 1803–1809.

Stanford, C.B., J.B. Iverson, A.G. Rhodin, P.P. van Dijk, R.A. Mittermeier, G. Kuchling, K.H. Berry, A. Bertolero, K.A. Bjorndal, T.E. Blanck, K. A. Buhlmann, R.L. Burke, J.D. Congdon, T. Diagne, T. Edwards, C.C. Eisemberg, J.R. Ennen, G. Forero-Medina, M. Frankel, U. Fritz, N. Gallego-García, A. Georges, J.W. Gibbons, S. Gong, E.V. Goode, H.T. Shi, H. Hoang, M.D. Hofmeyr, B.D. Horne, R. Hudson, J.O. Juvik, R.A. Kiester, P. Koval, M. Le, P.V. Lindeman, J.E. Lovich, L. Luiselli, T.E. McCormack, G.A. Meyer, V.P. Páez, K. Platt, S.G. Platt, P.C. Pritchard, H.R. Quinn, W.M. Roosenburg, J.A. Seminoff, H.B. Shaffer, R. Spencer, J.U. Van Dyke, R.C. Vogt & A.D. Walde (2020). Turtles and tortoises are in trouble. *Current Biology* 30(12): 721–735. https://doi.org/10.1016/j.cub.2020.04.088

Tosakana, N.S., L.W. Van Tassell, J.D. Wulfhorst, J. Boll, R. Mahler, E.S. Brooks & S. Kane (2010). Determinants of the adoption of conservation practices by farmers in the Northwest Wheat and Range Region. *Journal of Soil and Water Conservation* 65(6): 404–412. https://doi.org/10.2489/jswc.65.6.404

Vyas, R. (2006). Nature watch- an unusual toy. Hornbill April–June 2006: 38.

Yadav, P., A. Kumar, S. Sahoo, N. Yadav, S.A. Hussain & S.K. Gupta (2021). Identification of Gangetic turtles based on species-specific variations on mitochondrial cyt b and nuclear Cmos genes. *Forensic Science International: Animals and Environments* 1: 100035. https://doi.org/10.1016/j.fsiae.2021.100035

Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64

Print copies of the Journal are available at cost. Write to:
The Managing Editor, JoTT,
c/o Wildlife Information Liaison Development Society,
43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore,
Tamil Nadu 641006, India
ravi@threatenedtaxa.org

Journal of Threatened Taxa

www.threatenedtaxa.org

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

May 2024 | Vol. 16 | No. 5 | Pages: 25119–25282
Date of Publication: 26 May 2024 (Online & Print)
DOI: 10.11609/jott.2024.16.5.25119-25282

Publisher & Host

WILD zoo reach
Zoo Outreach Organisation

Threatened Taxa