International Journal of Global Science Research **ISSN: 2348-8344 (Online)**
Vol. 11, Issue. 2, October 2024, pp. 2438-2450 **DOI: https://doi.org/10.26540/ijgsr.v11.i2.2024.280**
***Available Online* at www.ijgsr.com**

Research Paper

New record of Spotted Northern Indian Flap-shell Turtle *Lissemys punctata andersoni* Webb, 1980 (Trionychidae: Testudines: Reptilia) from Chhatarpur district, Bundelkhand region, Madhya Pradesh (India), with distribution and zoogeography of subspecies

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Received: 12/09/2024
Revised: 21/09/2024
Accepted: 30/09/2024

Abstract: The paper deals with new records of *Lissemys punctata andersoni*, the Spotted Northern Indian Flap-shell Turtle, belonging to family Trionychidae under order Testudines and class Reptilia, from Chhatarpur district, Bundelkhand region, Madhya Pradesh (India), with its systematic account, distribution, other aspects and zoogeography of subspecies. References on reptiles of Madhya Pradesh are provided in detail for help to future workers.

Keywords: Record, *Lissemys punctata andersoni*, Chhatarpur.

Introduction:

The reptilian fauna of Madhya Pradesh has attracted the attention on various workers during the past (Cholmondeley, 1908; Agrawal, 1970, 1976, 1977a, b, 1981; Sharma, 1976; Khajuria & Agrawal, 1981; Rao, 1984, 1985, 1986a, b, 1987a-c, 1989, 1990, 1991a, b, 1992a, b, 1998, 2006; Rao & Singh, 1884a, b; Singh & Rao, 1985; Vyas et al., 1989; Kalaiarasan et al., 1991; Saxena, 1991; Sanyal & Sur, 1995; Sharma et al., 1995; Sanyal et al., 1996; Pasha et al., 2000; Ingle, 2001a, b, 2002, 2004, 2008; Chandra & Gupta, 2003; 2009; Gajbe, 2003; Vyas & Singh, 2004; Chandra & Gajbe, 2005; Chandra & Pawan, 2005; Gajbe & Gupta, 2005; Sur et al., 2007; Chakraborty et al., 2008; Chandra et al., 2008; Chandra, 2009; Khudsar et al., 2009; Ingle et al., 2009, 2011; Chandra et al., 2010; Meshram, 2010; Taigor & Rao, 2010a, b; Thakur, 2011; Amol et al., 2012; Dubey & Khare, 2013; Pragatheesh & Rajvanshi, A., 2013; Fellows, 2014, 2015; Ingle & Sarsavan, 2014; Ishaque & Sarsavan, 2014; Manhas et al., 2015a, b, 2016, 2017, 2018; Talmale et al., 2016a, b; Tripathi & Upadhyay 2016; Khare & Singh, 2017, 2018; Parveen & Ilyas, 2021).

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Dubey & Khare (2013) studied the reptilian fauna of Chhatarpur district and listed four species of chelonians but did not record *Lissemys punctata andersoni*, the Spotted Northern Indian Flap-shell Turtle from there. Recently a good number of the same were sighted and photographed and recorded here as new find for the district. It belongs to family Trionychidae under order Testudines and class Reptilia.

The subspecific identity of the *Lissemys puntuata* has been in great confusion in the past which has been clarified here on the basis of drainage system and zoogeographical distribution.

STUDY SITE: Chhatarpur district, Madhya Pradesh (India)

Location: Chhatarpur district is located on the central portion of the plateau of Bundelkhand in Madhya Pradesh, bounded by Uttar Pradesh state in north, Madhya Pradesh districts Panna in east, Damoh in south, Sagar in south-west and Tikamgarh in west and lying between Longitude 24°06' and 25°20 N and Latitude 79°59-80°26'E, covering an area of about 8,617 Km^2 with an average elevation of 180 m above msl.

The specimens were found in a pond at Nahdaura village under Rajnagar tehsil.

Climate: Av. temperature in winter (October-January) 10-27 ° C and in summer (June-September) 19-30° C; annual rainfall 1000-1200 mm (Dubey & Khare 2013).

Drainage: Betwa, Ken and Tons rivers (tributaries of Yamuna) and Dhasan river (right bank tributary of Betwa) and perennial ponds.

SYSTEMATIC ACCOUNT, DISTRIBUTION AND OTHER ASPECTS

Lissemys punctata andersoni Webb, 1980

Lissemys punctata andersoni Webb, 1980. *Bulletin de Museum National d'Histoire Naturelle*, Paris, (4) 2: 547-557 (type-locality: *Des grandes Indes* [= continental India]; restricted to Pondicherry, Coromandel Coast, India [11° 56'N; 79° 53'E, on south-east coast of India]); Bhupathy, 1989. *J. Bombay nat. Hist. Soc*., 86: 252; Verma & Sahi, 1998. *Cobra*, 34: 6-9; Hennen, 2001. *Radiata*, 10 (3): 23-28; Hallermann et al., 2001. *Russ. J. Herpetol*., 8 (1): 25-34; Saikia et al., 2007. *Reptile Rap*, (8): 6-9; Bhupathy & Buhlmann, 2010. *Cheloniens*, 18: 24-28, fig. (page 26); Bhupathy et al., 2014. In: Conservation Biology of Freshwater Turtles and Tortoises, *Chelonian Research Monographs*, No. 5: fig. 7 (sub-adult), 8; Kanaujia et al., 2017. *Biological Forum- An International Journal*, 9 (1): 123; TTWG, 2021. *Chemelian Research Monograps*, 8: 1-472.

Lissemys punctata punctata, Minton, 1966 (nec. Bonnaterre, 1789). *Bulletin American Museum of Natural History*, 134: 69-70; Talukdar, 1979 (nec. Bonnaterre, 1789). *The Indian Journal of Zootomy*, 20 (3): 181; Tikader & Sharma, 1985 (partim). *Handbook Indian Testudines*: 118-120; Bahuguna, 2010. Reptilia. In: Fauna od Uttarakhand. *State Fauna Series*, 18 (1): 446, 457.

Lissemys punctata andersonii, Artner, 2003 (in error) (vide https://en.wikipedia.org/wiki/Indian_flapshell_turtle); Das & Gupta, 2011. *Journal of Threatened Taxa*, 3: 1722, 1775, fig. 4) (in error).

QLissemys andersoni, Joseph-Ouni, 2004 (vide https://en.wikipedia.org/wiki/Indian_flapshell_turtle)

Lissemys spuntata andersoni, Ali et al., 2016. *Pakistan J. Zool*., 48 (4): 1201-1204 (in error).

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Lissemys punctata, Meshram, 2010 (nec. Bonnaterre, 1789). *Bidiversitas*, 11 (4): 211; Varadaraju & Deepak, 2018. Reptilia. In: *Faunal Diversity of Indian Himalaya*: 826.

Common Names: Spotted Northern Indian Flap-shell Turtle or Spotted Northern Turtle.

Vernacular Names: *Kasim*, *Sip Kathua*, *Til Kasim* (Bengali), *Sundri* or *Matla* (Hindi), *Pal-aamal* (Tamil).

Classification: Class Reptilia, order Testudines, suborder Cryptodira, superfamily Trionychia, family Trionychidae, subfamily Cyclanorbinae, genus *Lissemys* Smith, 1931.

Sighting: 1 example; pond at Nahdaura village, Rajnagar tehsil, Chhatarpur district, Madhya Pradesh, India; 16. viii. 2024; 1 example; same site; 01. ix. 2024; both by Spotted Northern Indian Flap-shell Turtle Spotted Northern Indian Flap-shell Turtle 2nd author (AKD).

Description:

Morphology & Colouration: Head with neck olive-green with yellow patches (tend to disappear in old individuals), moderate, snout short and stout, nasal septum without lateral ridge, jaws smooth-edged; alveolar surfaces expanded and granular; carapace broadly oval (nearly circular in juveniles), widest just anterior to hind limbs, moderately arched/humped, covered by soft skin, olive-green, greyish-green or blackish above with some or numerous black-margined or not so yellow spots of varying shapes, marginal rim light yellow; hatchlings with low and, indistinct ridges of tubercles, most prominent along lateral margins or granules forming longitudinal folds; both juveniles and adults with a complete marginal ridge; neural plates two in number, lying between first pair of costal plates; first marginal plate very large, much larger than others; plastron large but lesser than carapace, whitish, creamy or pale yellow, un-patterned, mostly cartilaginous, with prominent seven finely granulated callosities (paired epi, hy-hypo, xiphiplastral and single large ento-plastral small) and with a pair of large semicircular flaps over hind limbs (for concealing retracted hind limbs) and a smaller flap over tail; front part of shell flexible for getting closed completely for concealment of head, neck and fore-limbs; anterior part of shell; limbs uniformly pigmented, fully- webbed, with three large and thick claws in each; tail very short in both sexes; penis thickly oval, with deep dorsal cleft and four pointed soft papillae. (Smith, 1931; Minton, 1966; Webb, 1982; Tikader & Sharma, 1985; Bhupathy et al., 2014, figs. 7, 8). Tikader & Sharma (1985) mentioned, under the description of *L. punctata punctata*, that ento-plastral callosity quite small in adults, on the other hand it is very large in *L. punctata punctata* (vide web.archive.org), maybe their material (in part) belonged to *L. punctata andersoni* from northern India.

Sexual Dimorphism: There is no remarkable sexual dimorphism (Bhupathy et al., 2014). However, Yadav & Prasad (1982) observed that males mature at smaller size as compared to female and turtles with carapace length <160 mm as immature. Agarwal (1987) observed adult females larger than males. Yadav (1989) found females maturing sexually when above 170 mm in carapace length and he collected eggs of a smallest female measuring 187 mm in carapace length and body weight 684 g.

Size (as *L. punctata*): Carapace and plastron max. length in female measure 370 mm and 350 mm respectively (Deraniyagala, 1939); carapace length in hatchlings 35.0 mm (Minton, 1966); adult females larger than males (Auffenberh, 1981; Agarwal, 1987; Shrestha, 1997); maximal carapace length in males 230 mm

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(Yadav & Prasad, 1982); 24.0 cm (Tikader & Sharma, 1985); maximal (curved) carapace length in females 350 mm, estimated plastron length 334 mm (Bhupathy, 1989); carapace length 240-370 mm (Ernst et al., 1997; ENVIS); carapace length 34.8-37.0 mm (Vyas, 1996); carapace length 35.0-44.0 mm (Rashid & Swingland, 1997); max. shell length 14 inches (Haneef, 1999); 24 cm in length (Chandra et al., 2008); subadult length 10 cm, max. width 8 cm, max. length 24 cm (Bahuguna, 2010); carapace length in males up to 23 cm, in females max. around 35 cm (web.archive.org).

Albinism: Vyas (1997) reported albinism in a Gujarat specimen (*L. punctata vittata*) having uniformly yellow head, carapace and limbs, plastron pale yellow with pinkish callosities and pink eyes and Hossain & Sarkar (1999) reported an albino from Bangladesh and Praschag (vide Bhupathy et al., 2014) from western Myanmar (Arakan Mountains, western Myanmar); a rare yellow Indian Flap-shell turtle was found in eastern India (Sujanpur village, Balasore district, Odisha), which as per the experts is the product of albinism (edition.cnn.com).

Altitudinal Range: From sea level to 1,000 m (Smith, 1931; web.archive.org).

Distribution: South Asia.

Northern India: Brahmaputra, Ganga and Indus drainage systems.

Assam (Barak Valley, Cachar, Hailakandi and Kaarimganj districts; Kaziranga National Park), Bihar (Hazaribagh Wildlife Sanctuary), Haryana (Sultanpur National Par, Gurugram), Jammu & Kashmir UT, Madhya Pradesh (Banas and its tributaries joining Chambal and passing through Chambal National Park drain into Yamuna river; Ken river system a major river also a tributary of Yamuna), Meghalaya, Punjab (Harike lake), Rajasthan (Gambhir and Bangana rivers, tributaries of Yamuna river, flowing through Keoladeo National Park, Bharatpur as *L. punctata vittate* x andersoni, vide Bhupathy et al., 2014), Sikkim, Uttar Pradesh (Dudhwa National Park, Lakhimpur Kheri; Etawah; Lower Ghaghara/Sarayu river in Awadh), Uttarakhand (Banganga, Nainpur and Ranjitpur, Haridwar district; Rajaji Tiger Reserve), North-western, Western and Central Himalaya and West Bengal.

Elsewhere: Bangladesh (Mongla), Myanmar (north-western coastal), Nepal (southern) and Pakistan (Sind drainage system).

Introduced: Andaman & Nicobar Islands-Port Blair area (Lever, 2003; Das, 1991).

Intergrade Occurrences: Intergrades between *L. punctata andersoni* and *L. punctata vittata* known from Bihar, Odisha, Rajasthan and West Bengal (Webb, 1982), Madhya Pradesh (Das, 1991) and Kathiawar peninsula, Gujarat (Frazier & Das, 1994).

Shrestha (1996) found specimens with unusual markings from near Rajapur, in Nepal and considered them intermediate between *L. punctata vittata*, with black lines on head and a plain or strikingly patterned carapace and *L. punctata andersoni* with black markings on carapace. Rashid & Khan (2000) reported an unspotted subspecies, an uncommon taxon.

Habitat: Rivers (Brahmaputra, Ganges and Indus), streams, reservoirs, marshes, lakes, ponds, ditches, agricultural paddies, canals, gutters, brackish estuaries and other stagnant water bodies (Das, 1991; Haneef, 1999; Moll & Moll, 2004; Hossain et al., 2008; ENVIS; web.archive.org).

During drought/hot weather they burry themselves in mud burrows of marshes or agricultural fields during drought but many die and only some survive up to 160 days or 5 months (Auffenberg, 1981; ENVIS; web.archive.org).

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Food & Feeding: Omnivorous, feeding on both on animal (earthworms, arthropods including crustaceans/shrimps and insects, mollusks including both snails and bivalves, fish, amphibians, carrion) and aquatic plant matter (leaves, flowers, fruits, seeds, grasses and vegetation) (Sharma & Vazirani, 1977; Tikader & Sharma, 1985; Das, 1991; Schleich & Kastle, 2002; ENVIS; web.archive.org).

Breeding: Nesting generally takes place in late summer, extending into monsoon season by digging about 8-23 cm deep cup-shaped nests in loamy soil near water or about 10-30 m away; breeding takes place during monsoon months and little beyond (July-November) when female lays spherical eggs in clutches of 2-16 and buries in soil, during monsoon months, incubation period may last around 4-12 months depending on environmental conditions, hatching takes before onset or during monsoon as hatchlings and small juveniles seen during rainy season (Das, 1985, 1991; Mishra, 1986; Vyas, 1996; Ernest et al., 1997; Rashid & Swingland, 1997; web.archive.org). Duda & Gupta (1981) noticed mating in April. Sarkar et al. (1996) reported female reproductive cycle long-ranging, from March to September. Khan (2006) noted incubation period of 30-40 days, the lowest recorded and perhaps unusual.

Conservation Status: IUCN Red List- Vulnerable; TFTSG Draft Red List- Least Concern; Indian Wildlife (Protection) Act, 2022- Schedule-I, Part II; Bangladesh Wildlife Preservation (Amendment) Act, Schedule II; CITES- Appendix-II, regulating international trade.

Threats:

Poaching: Done for food (meat and eggs), medicinal use to cure various diseases, dissection material for study in educational institutes, artifact purpose, lucky charm, large-scale illegal harvesting and habitat destruction (Das, 1991; Shrestha, 1996; Whitaker, 1997; Chaudhury et al., 2000; Schleich & Kastle, 2002; Moll & Moll, 2004; Bhupathy et al., 2014).

Medicinal use in treatment of some diseases (tuberculosis etc.) has no scientific proof of such. It is only a myth that helps poachers to collect and sell them to the people affected (Chaudhary, 2019).

Predation: Aquatic predators include Mahseer fish (*Tor* spp.), Crocodiles (*Crocodylus palustris*, the Mugger and Gavialis gangeticus, the Gharial) and Indian Soft-shell Turtle (*Nilssonia gangeticus*) (Bhupathy & Vijayan, 1989; Bhupathy, 1990; Das, 1991; Schleich & Kastle, 2002), vultures (*Neophron percnopterus*, the Egyptian Vulture, *Sarcogyps calvus*, the Red-headed Vulture, *Gyps bengalensis*, the White-rumped Vulture and *Aegypius monachus*, the Cinereous Vulture), eagles (*Aquila* spp.) and crows ((*Corvus splendens*, the House crow and *Corvus macrorhynchos*, the and Large-billed Crow) (Auffenberg, 1981; Bhupathy & Vijayan, 1989); otters, mongoose, jackals and wild dogs (Bahuguna, 2010).

Potential Pollution Controllers: They play important role in reducing pollution in water bodies, especially stagnant ones, by feeding on snails, insects and rotten carcasses (Hossain et al., 2008).

Zoogeography: Three subspecies are recognized as under and distributed as per the drainage systems viz. northern, central peninsular and southern peninsular India.

Lissemys punctata punctata (Bonnaterre, 1789), the Southern Indian Flap-shell Turtle: Southern peninsular India (Kerala; Moyar river, Karnataka-Tamil Nadu border; Tamil Nadu- Mamallapuram).

Lissemys punctata andersoni Webb, 1980 (syn. *Lissemys andersoni* Webb, 1980), the Spotted Northern Indian Flap-shell Turtle: Indus, Ganges and Brahmaputra drainages: Northern India [Assam, Bihar, Chhattisgarh (?), Haryana, Jammu & Kashmir UT, Madhya Pradesh, Meghalaya, Rajasthan, Sikkim, Uttar Pradesh (Dudhwa National Park, Lakhimpur Kheri; Etawah), Uttarakhand and West Bengal]; Bangladesh (Dhaka; Mongla), Nepal and Pakistan and parts of north-western coastal Myanmar (Bhupathy & Buhlmann, 2010); *Lissemys punctata punctata* (nec. Bonnaterre, 1789) from Brahmaputra drainage, Assam (Talukdar, 1979); *L. punctata andersonii* from Barak Valley, Assam, north-eastern India (Das & Gupta, 2011; L. punctata from North-western, Western and Central Himalaya (Varadaraju & Deepak, 2018).

Lissemys punctata vittata Peters, 1854 (syns. *Emyda vittata* Peters, 1854, *Emyda granosa vittata*, *Emyda granosa intermedia* Annandale, 1912), the Central Indian Flap-shell Turtle: Central Peninsular India drainage [Andhra Pradesh, Goa, Gujarat, Karnataka (Netravati river), Madhya Pradesh, Maharashtra, Odisha (Chilka Lake; Mahanadi), Rajasthan and Telangana). Occurs naturally in south and south-west Bangladesh but in very low number (Bhupathy et al., 2014).

Note: *L. punctata punctata* and *L. punctata vittata* are very much allied as also noted by Bhupathy et al. (2014) that the carapace and soft body parts of both are olive-green to brownish in adult and greener in juveniles. The carapace may have some small dark markings but without any prominent and distinctive colour pattern, also Das (1991) observed that the dark-striped pattern on the rear of head tends to disappear with age. Further, the ento-plastral callosity in adults of both tend to be larger than in *L. puntata andersoni*. Maybe due to this fact, Praschag et al. (2011) were unable to correctly differentiate between the two unspotted flap-shells from peninsular India as being very similar in appearance. The characteristic colour pattern of *andersoni* also fades or disappear with age as recorded by Smith (1931). However, they can be separated only the basis of their occurrence in a particular drainage system.

Remarks: *Lissemys punctata scutata* (Peters, 1868), the Burmese Flap-shell Turtle, distributed in Myanmar which Praschag et al. (2011) proposed the elevation to a distinct species *Lissemys scutata* (Peters, 1868) and *Lissemys granosa ceylonensis* (Gray, 1855) from Sri Lanka to *Lissemys ceylonensis* (Gray, 1855).

Acknowledgements:
The first author feels thankful to Dr. Dhriti Banerjee, Director, Zoological Survey of India, Kolkata (West Bengal), for encouragement, Dr. Gaurav Sharma, Scientist-E & Officer-in-Charge, Northern Regional Centre, ZSI, Dehra Dun (Uttarakhand) for library facility and Dr. S. S. Talmale, Scientist-C, Western Regional Centre, ZSI, Pune (Maharashtra) for help in some literature. The second author is thankful to Mrs. Vandana Dubey, Managing Director, Godavari Academy of Science & Technology, Chhatarpur, Madhya Pradesh, India for library facility.

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International Journal of Global Science Research
Vol. 11, Issue. 2, October 2024, pp. 2438-2450
Available Online at www.ijgsr.com

ISSN: 2348-8344 (Online)
DOI: https://doi.org/10.26540/ijgsr.v11.i2.2024.280

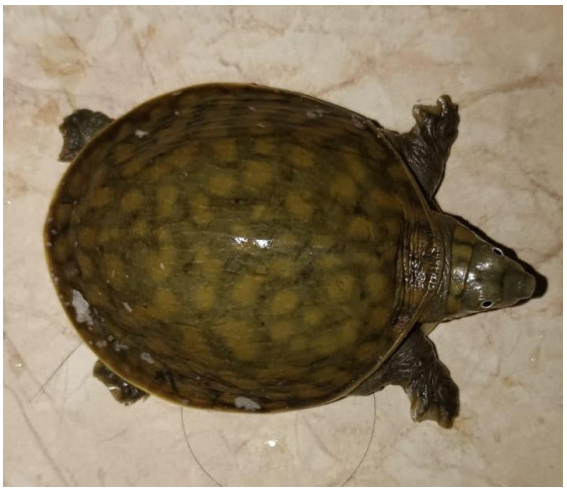

Figure 1. ***Lissemys punctata andersoni*****, dorsal view**

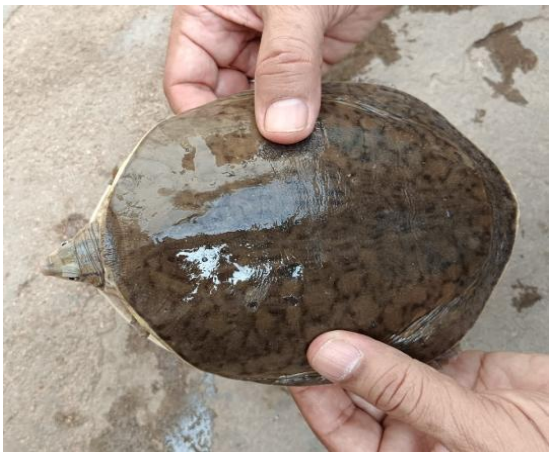

Figure 2a. ***Lissemys punctata andersoni*****, dorsal view display**

Figure 2b. ***Lissemys punctata andersoni*****, ventral view display**

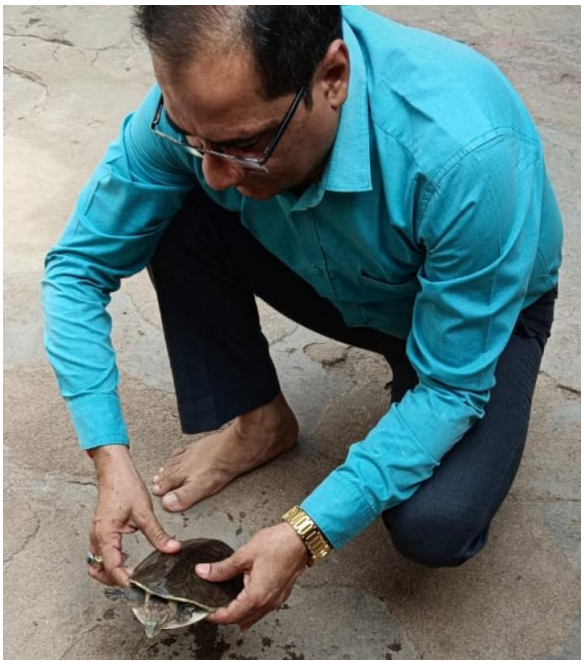

Figure. 2c. ***Lissemys punctata andersoni*****, anterior view display**

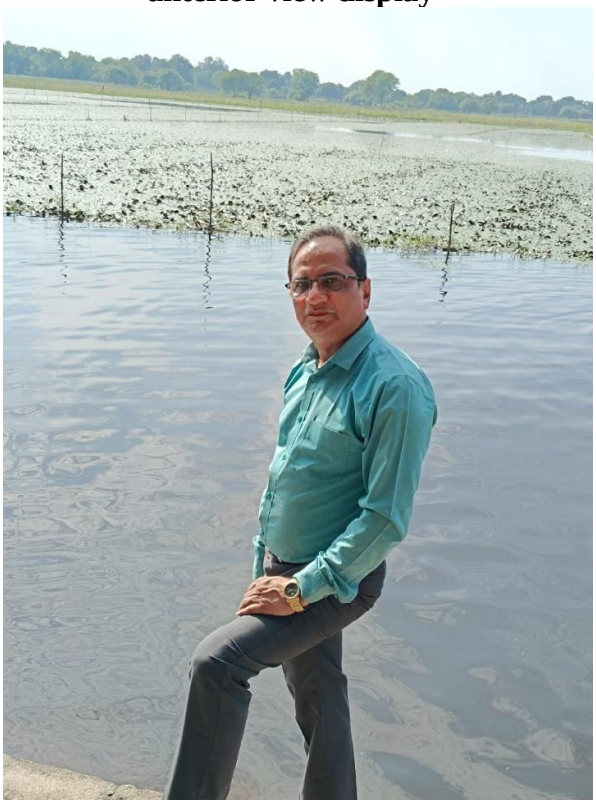

Figure 3. Pond at Nahdaura village, the study site