

Short Note

Notes on Successful Nest Relocation of *Chitra indica* (Gray, 1831) from Chitwan National Park, Nepal

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The narrow-headed softshell turtle *Chitra indica* was described as *Trionyx indica* by Gray (1830). They are among the most threatened vertebrates of the world¹ and are listed as endangered species in IUCN red list. In Nepal, their status and distributions are poorly known. The Protected Areas (Pas) of Nepal have focused on the conservation of charismatic and keystone species. More specifically, the study and conservation are focused on large mammals such as tiger (*Panthera tigris*), Greater one horned rhino (*Rhinoceros unicornis*)². However, gharials (*Gavialis gangeticus*) have received conservation attention among all herpetofauna in Nepal^{3,4}.

The record of turtles in the Pas of Nepal is incidental⁵. These turtles are consumed as luxury food items, used as ingredients in Chinese medicine, treated as a curio item⁶. Similarly, their eggs are collected by fishermen and tribal communities². Along with this, river flow modification, destruction and degradation of their habitat, and invasion of the exotic species have played a pivotal role in their population decline^{7,8}.

Chitra indica (Family Trionychidae), is a large (carapace length at least 115 cm²) freshwater chelonian feeding (ambush) mostly on fish, frog, crustaceans, and mollusks. Opportunistic observations on turtles have been recorded since 2010 while surveying gharials in the river systems of the Chitwan National Park (CNP). Based on such observations, the distribution update of turtles in the rivers of CNP was published⁹. During the regular river patrolling for gharials, we recorded three nests of *Chitra indica* on the bank of the Rapti River at the CNP. Here, we present natural history observations of turtle nests, breeding success, and their release in the wild.

Observations

The Rapti River forms the northern boundary of the CNP which is known for annual flood events (Fig 1). On 12th August 2017, there was a high flood and every year, there are small floods in this river. On 13th August 2020, and 1st and 3rd September 2020, immediately after rain, we located fresh marking of *Chitra indica* on the sandbank of Rapti River that

helped us to detect their nests at these three sites. Nests were ~ 10m from the water in the plain bank within the submergence zone during flood events.

To prevent any damage from the flood and to reduce mortality, we decided to collect all the eggs from the nest on the day of detection and to hatch them at the CNP's breeding center. The nests were flask-shaped¹⁰, and the circumference at the neck and depth at its maximum were 103.67cm and 40 cm respectively. Altogether, we collected 496 eggs from the three nests. Three weeks after collecting the eggs, on 24th September 2020, there was a flash flood in the Rapti River.

On average, the clutch size was 165 eggs per nest (maximum= 197 eggs per nest and minimum= 120 per nest) (Fig 2). Hence, though the depth was 39 cm, the egg was found ~20cm below the top layer of sand. The eggs from each nest were kept separately. The average egg length and weight was 2.7 cm and 12.5 g. The egg collection locations were 8 km, 3 km, and 1km away from the gharial breeding center. So, the eggs were carefully transported by filling one-fourth of the bucket with sands, then placing the eggs and covered with sands again. We transported it to the breeding center by a small wooden boat down the Rapti River. The eggs were collected and transported between 4pm and 5pm. At the breeding center, on the same day of egg collection, we formed three nests refereeing the measured circumference and depth of each nest in the wild. We kept eggs from each nest separately in each new nest formed at the breeding center (Fig 3).

The first (detected on 13th August) (Fig 4, Fig 5), second (detected on 1st September), and third (detected on 3rd September) nest hatched on 10th, 22nd, and 27th October 2020 respectively, i.e., the average hatchling duration was 54 days, which agreed with ² of 55 days. All the eggs were not hatched. The highest infertile eggs (30.8%) were on the second nest, followed by 29.16% in the first nest, and only 1.67% in the third nest. Though the infertile rate in the third nest was low, the number of dead after hatchling was highest in the

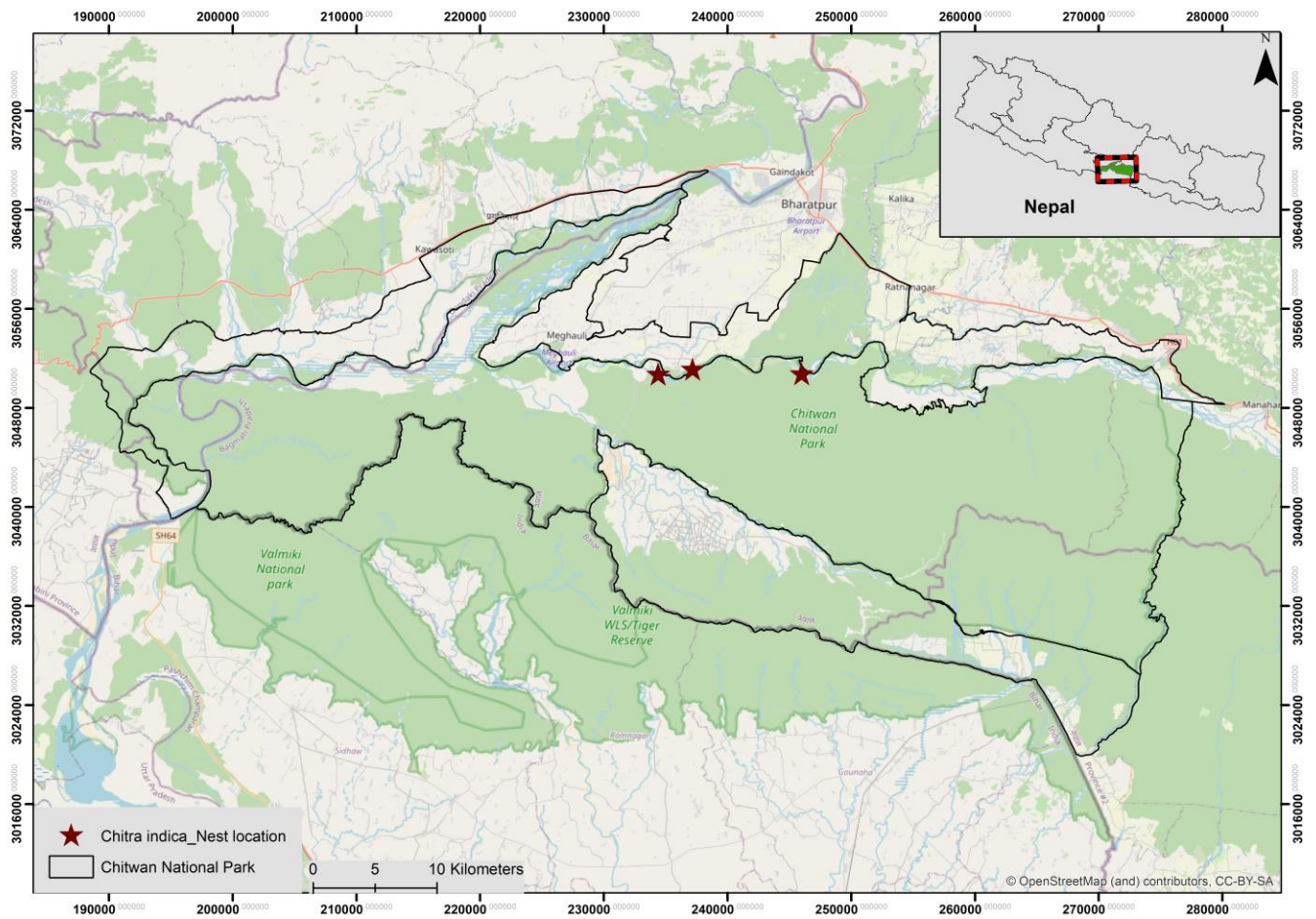


FIGURE 1. Nest location of *Chitra indica* in the Rapti River, CNP



FIGURE 2. Nest identified, and eggs collected from 3 nests detected in the wild on the bank of Rapti River, CNP

third nest (Table 1). On average, the carapace length of a hatchling was ~ 4cm. The hatchlings were released in the Rapti River, CNP (Fig 6). This is the first record of

hatching of *Chitra indica* at the breeding center of CNP, Nepal.



FIGURE 3. Nest-pit of same size for each identified nest was dug and eggs from each nest were kept separately in each nest formed at the breeding center, CNP



FIGURE 4. The 1st hatching record of *Chitra indica* at the breeding center, CNP

Conservation implications

According to the National Parks and Wildlife Conservation Act, 1973 of Nepal, 27 mammal species, 9 bird species and 3 reptile species have been accorded

the highest degree of protection. However, none of the turtle species has been scheduled on the list. But the Government of Nepal initiated a head start program for turtle conservation in Nepal by establishing a turtle



FIGURE 5. The hatchlings of *Chitra indica* at the breeding center, CNP

TABLE 1. Details of nesting ecology of *Chitra indica* from Chitwan National Park

Nest identified and eggs collected	Place Name	Pit size (Circumference (cm) X Depth (cm))	Nest location	Cluze size	Emergence date	Hatchlings number	Dead hatchling	Infertile eggs
13-Aug-20	Charahara	100.53 X 40	Fresh sandbank, 17m length from water.	120	10-Oct-2020	83	2	35
2-Sep-20	Infront of Gharial Breeding Center	103.67 X 39	Fresh sand bank, 4.60m length from water.	197	22-Oct-2020	134	3	60
3-Sep-20	Chiple Ghat, Kasara, Rapti	94.25 X 38	Fresh sandbank, 10.30m length from water.	179	27-Oct-2020	158	16	3

breeding center in Chitwan National Park and providing permission to an NGO for turtle rescue and conservation in eastern Nepal. However, the dedicated conservation interventions for turtle conservation in the wild are not the priority of the Government of Nepal. As the species is poached for eggs and flesh; conservation measures such as turtle zone must be declared within the habitat range. The resource extraction such as gravel, sand mining should be restricted from such zones⁹. Extensive conservation campaigns, along with charismatic species, should be

conducted for the survival of the turtle species in the rivers of CNP. Das and Singh (2009) reported the largest clutch with 193 eggs. The present observation with 197 eggs from the second observed nest indicates that the Rapti River of CNP has also high conservation potential for *Chitra indica* in Nepal and could serve as a source population. Hence, we propose to the park authority to declare the Rapti River inside the CNP as a 'no riverbed material extraction zone' and to limit human activities such as bathing, washing clothes, fishing, and extraction of sand and gravels, from this section.



FIGURE 6. The hatchlings were released in the wild in the Rapti River, CNP

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