

Mugger (*Crocodylus palustris*) sightings in water bodies of Bundelkhand Region, India

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Abstract

The avifaunal diversity of Bundelkhand Region is being studied since 2008. However, the Herpetofauna is poorly studied and lacks even the baseline data for most of the species. There has been no survey for aquatic reptiles in Bundelkhand region. During the research work and various surveys undertaken from 2015-2018, occurrence of Vulnerable Marsh Crocodile (*Crocodylus palustris*) was recorded at several sites including rivers, reservoirs and lakes. The observations show the possibility of a promising population of mugger in Bundelkhand region, particularly the river Betwa. *Crocodylus palustris* was sighted in Jhansi, Lalitpur, Shivpuri and Tikamgarh districts. However, secondary data reveals a population of 400-500 crocodiles in River Betwa alone. For long-term conservation of this species, there should be scientific annual counting and monitoring of crocodile populations with the involvement of local people, and create awareness for this Vulnerable according to IUCN and Schedule-I species under the Wildlife Protection Act, 1972.

Keywords: mugger, vulnerable, Bundelkhand, Betwa

1. Introduction

Among the three species of crocodiles found in India, Gharial (*Gavialis gangeticus*), fresh water marsh crocodile (*Crocodylus palustris*) and Estuarine crocodile (*Crocodylus porosus*), the most common and widely distributed is the mugger, which inhabits all kinds of freshwater habitats such as rivers, lakes, reservoirs, hill streams and village ponds ^[1]. The Mugger can even be found in coastal saltwater lagoons and estuaries ^[2]. The broad-snouted mugger crocodile is restricted to the Indian sub-continent (India, Nepal, Pakistan, Iran and Sri Lanka) and is categorized as 'Vulnerable' in the IUCN Red list of Threatened Species ^[1], falls under 'Appendix-I' of CITES and is protected under Schedule-I of the Indian Wildlife (Protection) Act, 1972 ^[3]. The Mugger is a medium-sized crocodile (maximum length 4-5 m), and has the broadest snout of any living member of the genus *Crocodylus* (Fig.1).



Fig 1: Mugger has the broadest snout of any living member of the genus *Crocodylus*

In some areas such as the National Chambal Sanctuary and Katarniaghat Wildlife Sanctuary in northern India and Nepal, Mugger tends to share habitat with Gharial (Fig.2), and are observed competing for basking and nesting sites.

The recent study on Gharial and Mugger in upstream tributaries of the Chambal River, North India shows that after an initial and slow recovery in the late 1970s-early 1990s, The National Chambal Sanctuary population has undergone two sharp declines, one in the decade prior to 2005, and the other in 2007-2008, followed presently by evidence of a robust recovery of the only open-river, self-sustaining Gharial population still extant ^[4, 5, 6, 7]. There have been several scientific studies on crocodiles, particularly the Critically Endangered gharial in the Chambal river ^[9, 10, 11, 12, 13, 14], however the Betwa river lacks even the preliminary data on the vulnerable Mugger. According to Crocodile Specialist Group (CSG) Action plan, the species has been categorized as follows ^[15].

- Availability for survey data: poor
- Need for wild population recovery: High
- Potential for sustainable management: moderate



Fig 2: Mugger and Gharial basking together in Katarniaghat Wildlife Sanctuary

In the present study the data recorded during the field visits was therefore compiled for four districts (Jhansi, Lalitpur, Shivpuri and Tikamgarh) of Bundelkhand region (Fig.3).



Fig 3: Map of study area)

Jhansi and Lalitpur districts are southern districts of Uttar Pradesh while Shivpuri and Tikamgarh are districts of Madhya Pradesh. The districts from both the States form the Bundelkhand Region.

2. Material and methods

The observations were undertaken during the surveys and monitoring of birds. So Day Count Surveys, standard method for assessing population status of *Gavialis gangeticus* and *Crocodylus palustris* was used. Surveys were carried out in the cooler times of the year when crocodilians are more likely to be basking during the day, and can be carried out on foot from the bank, or from boat [16]. Boat surveys were also carried out for more accurate data. Day count survey typically provides an index of the larger animals in the population. The Visual Observations were done using 10x50 mm binoculars while Photographical recordings and video recordings were done with the help of 7D DSLR Canon Cameras. GPS coordinates were also recorded with Garmin 20e-trex.

3. Observations

While conducting bird surveys, particularly for the migratory birds, muggers were spotted at several water bodies (Table 1). The approximate population ranged between 73-75 individuals. They were mostly observed basking on rocky mid river islands of Betwa (Fig.4a-f). Only in few cases the Muggers were seen swimming or basking on the muddy banks (Fig.5a-d). When found

together with Gharial, Mugger is known to bask on midstream rocks or muddy banks [17]. The sightings were mainly during the cooler months (November-February) of the year when they come out of the water to bask in the sun. Being poikilotherms, sun basking is an important behavior of muggers to maintain their body temperature. Gupta and Sri Hari (1989) studied basking in wild mugger at Bhorsainda Crocodile Sanctuary, Haryana State [18]. The maximum number of Mugger was observed at Matatila Reservoir followed by Jharar ghat and Nautghat. At Nautghat the local people immerse the dead bodies which cannot be burnt according to the Hindu rituals. The crocodiles scavenge on them. The secondary data reveals that the approximate population of mugger in Betwa River is around 400-500. Human-crocodile conflict (HCC) has been reported in over 33 countries spanning the tropics and subtropics, and the problem probably exists in many more [19]. Several cases of mugger-human conflicts have been reported through local newspapers. The muggers attack the villagers, particularly the herders when they approach the ponds to drink water. They also attack livestock and feral dogs. Muggers are also reported to enter the nearby villages. In a few cases, these animals were rescued and released by the Forest Department into the nearby water bodies Human-Mugger conflict has been reported from different parts of the country, indicating that it could be possibly due to increases in population and/or growing of the Muggers to larger sizes [20, 21].

Table 1: Record of crocodiles in Bundelkhand Region

S.No	Site/District	GPS Coordinates	Season	Number			
				2015	2016	2017	2018
1.	Jharar ghat/Lalitpur	N 25°07'31.45" E 78°27'00.70"	Winter	11	15	13	15
2.	Betwa river, Mahavir Swami Wildlife Sanctuary/ Lalitpur	N 24°30'37.66" E 78°14'44.49"	Winter and summer	4	3	4	5
3.	Matatila Reservoir/ Lalitpur	N 25°06'41.33" E 78°23'26.47"	Winter	28	25	27	23
4.	Sukhwa Dukhwa Reservoir/ Jhansi		Winter	8	10	11	9
5.	Betwa River, Nautghat/Jhansi	N 25°23'21.42" E 78°39'56.68"	Winter and summer	12	10	9	11
6.	Jamni River/Tikamgarh		Winter and summer	7	9	6	8
7.	Chand Pata in Madhav National Park/Shivpuri	N 25°25'34.94" E 77°42'47.74"	Monsoon	4	3	4	2
	Total			74	75	74	73



A



B



C



D



E



F

Fig 4a-f: Mugger basking on rocky mid river islands of Betwa



a & b: Mugger basking on muddy banks of Betwa River



c & d: Mugger swimming in pond and Betwa river

Fig 5a-d: Muggers were seen basking on the muddy banks or swimming in water body

The River Betwa plays a significant role in all forms of lives in Bundelkhand region. Like other major rivers, Betwa is also polluted by the industrial and urban wastes from industrial areas such as Bhopal, Vidisha and Raisen. Betwa receives a heavy BOD and COD loads from urban and industrial sources by anthropogenic activities^[22]. Apart from pollution, the sand mining is killing Betwa river every day. The Betwa carries heavy granules that are useful in building as well as road construction. The illegal sand mining business is worth hundredth billion per year. Betwa river was once the home of a variety of aquatic fauna. Agriculture and fishing culture flourished in its river basin area. Now, the 358-kilometre stretch of the river flowing through Lalitpur, Jhansi, Jalaun and Hamirpur is fast turning into a barren area due to uncontrolled sand extraction from the river bed^[22]. In March 2019, during a visit in Jhansi, Union Minister of Shipping and Water Resources Nitin Gadkari declared Betwa River as a waterway. The aim is to promote tourism in the region. This will adversely affect the faunal diversity in and along the Betwa river that is still unexplored^[23, 24].

4. Conclusion

There is no collation of data to suggest whether the overall wild *C. palustris* population is increasing or decreasing so there is an urgent need to undertake systematic population surveys at the same time of the year to quantify trends over time and to reduce the biases that may be associated. Information from such surveys is essential for informing conservation, or management programmes. Human-Crocodile conflicts have been reported from different parts of the study area. Therefore, it is essential to understand the basic processes of conflict so as to minimize destructive outcomes. The development projects such as Betwa River waterway should not be implemented without knowing the adverse effects on the biodiversity.

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6. References

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