

Notes on the Threats to the Endemic Bengal Mongoose from the Nalban Fisheries Complex in West Bengal, India

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Abstract. A lack of current data on Bengal mongoose *Herpestes palustris* in India inhibits the development of conservation strategies for this endemic wetland mammal. Structured interviews were conducted to assess the threats and examine the ecological importance of the Bengal mongoose in the Nalban fisheries complex in West Bengal for four months (May to August 2017). Over half of the interviewees perceived that the Bengal mongoose faces several threats and that its population has declined over the years. The respondents said that the removal of vegetation is the main reason for the declining mongoose numbers. The ecological importance of the mongoose was apparent among most interviewees. The results suggest that the endemic Bengal mongoose faces multiple anthropogenic hazards and emphasize the critical need for conservation efforts.

Keywords: East Kolkata Wetlands, endemic, feral dogs, local ecological knowledge, roadkill, water hyacinth, wetland.

1. Introduction

Among the 37 recognised species of mongoose in the world, seven species are found in India, the Bengal mongoose *Herpestes palustris* (Ghose, 1965) being the latest discovered (Mallick, 2009; Sahajpal et al., 2009). *H. palustris* is the only endemic member of its genus from India (Kamalakanan & Venkataraman, 2017), and the Nalbani area (currently Nalban) in East Kolkata Wetlands, West Bengal in eastern India is its type locality (Ghose, 1965). Currently, the Bengal mongoose is found in the East Kolkata Wetlands (EKW) and a few other wetlands in the North and South 24 Paraganas districts of West Bengal (Deuti, 2008; Mallick, 2011). Although endemic, the International Union of the Conservation of Nature (IUCN) classifies it as Least Concern (LC) (IUCN, 2020). It is also in Appendix III of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) as a synonym of *H. javanicus* (CITES, 2022).

Up to date information on Bengal mongooses is urgently required to implement conservation measures to safeguard them. A short study based on local ecological knowledge (LEK) was carried out in the Nalban fisheries complex, which is part of a Ramsar site: East Kolkata Wetlands, for four months in 2017, to assess the threats that this endemic mammal faces. Recommendations are made for further research on Bengal mongoose in Nalban and collaborating with different stakeholders for conservation efforts.

2. Materials and Methods

2.1. Study area

The East Kolkata Wetlands, located on the eastern outskirts of the cosmopolitan city of Kolkata, is a Ramsar site. It consists of a mosaic of wetlands covering an area of 12,741 ha which

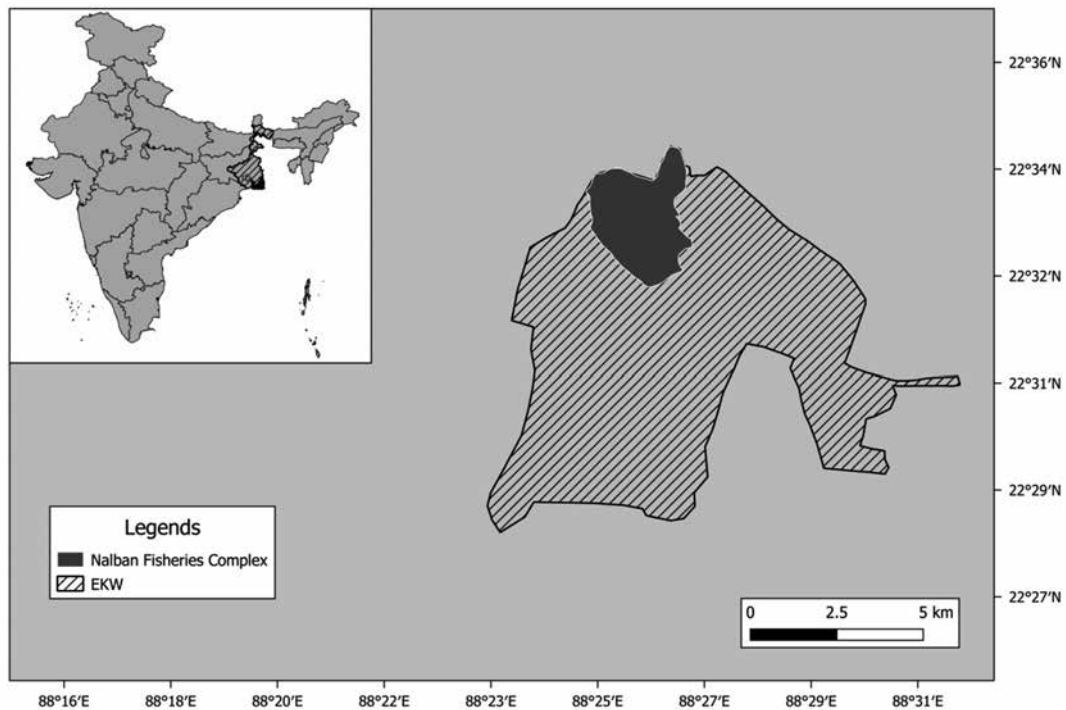


Figure 1. Map showing the study area (Nalban Fisheries Complex) in East Kolkata Wetlands (EKW) in Kolkata. Inset map showing the location of Kolkata (red arrow) in the state of West Bengal (hashed black), eastern India

is a habitat for several species of resident and migratory birds and small mammals like Jungle Cat, Fishing Cat, Common Palm Civet, Small Indian Mongoose, and Jackal (Bhattacharya et al., 2008; Bhattacharya et al., 2012). The wetland lies approximately within latitudes 22°25'N to 22°40'N and longitudes 88°22'E and 88°55'E and serves as a multifunctional site comprising sewage-fed fish farms and paddy fields (Kundu et al. 2008). The Nalban Fisheries Complex is located at 22°34'N and 88°25'E and covers an area of nearly 167 ha. It is one of the largest collections of wetlands in EKW, composed of sewage-fed water bodies locally known as 'Bheries' that are primarily used to promote piscicultural activities (Deuti, 2008; Mallick, 2013). Figure 1 displays the map showing the location of the EKW and the Nalban fisheries complex, respectively.

2.2. Data Collection

Local ecological knowledge is an efficient source of information that is an inexpensive and widely used means of collecting data for rare and elusive species. Members of a community can provide valuable insights into the current status of the studied species (Gillingham & Lee, 1999; Turvey et al., 2014). This information can aid in conservation

efforts and the technique is useful for collecting data on threats and the distribution of the target species (Mukherjee et al., 2012; Nash et al., 2016; Gray et al., 2017; Owusu Afriyie & Opare Asare, 2020).

Similarly, information on Bengal mongoose was gathered through semi-structured interviews (Appendix-A) documenting the ecological knowledge possessed by the local communities. Sampling was done based on convenience. The study was first introduced to the interviewee, and the interview preamble was read. Following this, an informal discussion was held wherein interviewees were asked whether they have come across the animal in the study area. If the interviewee answered yes, then the rest of the interview proceeded.

Based on previous literature and field observations, possible threat categories were identified and score sheets were prepared to evaluate possible threats (Appendix-B). The score sheets were handed out to the interviewees, who responded that the Bengal mongoose is facing some form of threat. A Bengali (local) language version of the questionnaire and score sheet was used in the field. Along with the interviews, short field visits were conducted to observe the animal and take notes on its habitat and habits. Photographic evidence of sightings of Bengal mongoose, their burrows and threats were collected.

2.3. Data Analysis

For the interviews conducted, descriptive statistics were used to bin response categories and graphically present them. Furthermore, the information provided by the respondents is qualitatively discussed. Field data on sightings and burrows are described with the number of observations provided in parentheses, along with photographs.

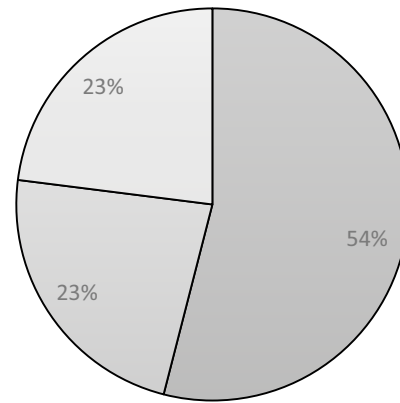
3. Results

3.1. Interviews

A total of 80 interviews were conducted, out of which more than half of the respondents (n = 43, 54%) stated that the population of the Bengal mongoose has decreased. While 23% (n = 18) said that the population has increased, the other 23% (n = 19) said that the population has remained unchanged (Fig. 2).

Among the interviewees, 55% (n = 44) responded positively to the question of whether mongoose plays a role in maintaining the environment, 35% (n = 28) responded negatively, and 10% (n = 8) said they were not sure (Fig. 3). While 30% (n = 24) mentioned mongoose preying on poultry, 70% (n = 56) of the interviewees said that there was no negative interaction with the mongoose.

Regarding the question, if Bengal mongoose faces any threat in the locality, 65% (n = 52) answered positively, and the rest, 35% (n = 28), answered negatively. From the threat



□ Decreased □ Increased □ Unchanged

Figure 2. Respondents' answers about the status of Bengal mongoose

assessment sheets, vegetation removal got the highest score of 122, followed by urban encroachment with a score of 62. This is followed by concretizing banks having a score of 54. The second last threat category was habitat fragmentation, which received a score 45. The lowest score, 36 was given to the interactions with feral dogs. The entire assessment with the respective scores is provided in Figure 4.

Opportunistic field observations led to several sightings of the Bengal mongoose. Most of the sightings (n = 29) were made on the embankments of the larger Bheries. Only (n = 2)

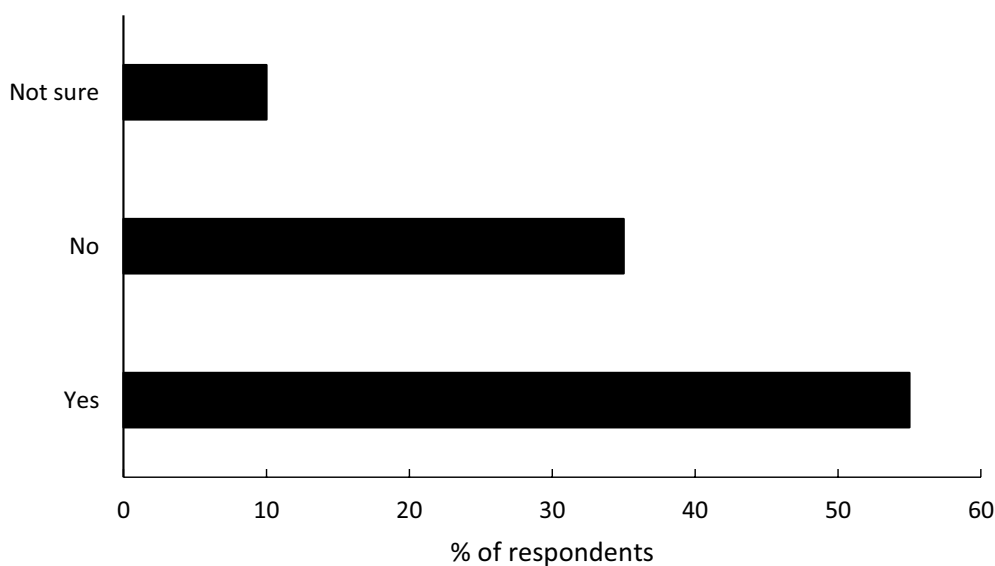


Figure 3. Interviewees' response to whether Bengal mongoose has a role in maintaining the environment

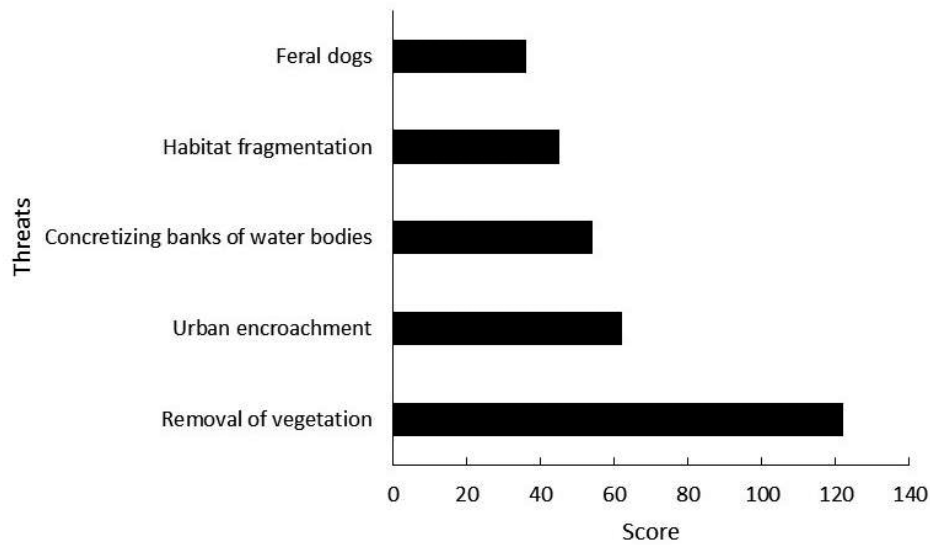


Figure 4. Cumulative threat scores

were observed near smaller Bheries. The size of the Bheries was estimated visually. Several sightings ($n = 27$) were of solitary individuals, and only in four instances, they were sighted in a pair. Mating instances ($n = 2$) were observed in early June. The most common activity during the sightings was possibly foraging. Bengal mongoose burrows ($n = 86$) were identified based on their size and the presence of broken clam and gastropod shells in the surrounding areas (Fig. 5).

4. Discussion

This is the first study to use local ecological knowledge to document the threats that the Bengal mongoose faces. Interview data conveys that the population of Bengal mongoose in the study area is declining (Mallick, 2009; Mallick, 2013). Field observations were opportunistic and allowed to observe direct and indirect signs of *H. palustris* in



Figure 5. A – Bengal mongoose, B – Mating, C – gastropod shells near Bengal mongoose burrow, D – Bengal mongoose burrow (Photos by S. Chakraborti)

the Nalban area of the East Kolkata Wetlands. The majority of the sightings were on the embankments of Bheries with substantial vegetation. Similar observations were made in previous studies (Deuti, 2008; Mallick, 2009). Burrows of Bengal mongoose were identified based on characters given by other researchers (e.g., Mallick, 2007; Deuti, 2008; Mallick, 2009). Abundant gastropods and bivalve shell found near the burrows confirm the observation made by Deuti (2008) that Bengal mongoose primarily preys on molluscs.

Fifty-four percent of interviewees ($n = 43$) said that the population of Bengal mongoose in the region has declined. A decline in population was also reported in previous studies (Mallick, 2009; Mallick, 2012). This information is important as it shows that the factors responsible for declining numbers are still present. In Nalban, the majority of interviewees (55%, $n = 44$) recognized that the Bengal mongoose plays a role in the environment. According to them, Bengal mongoose keeps the number of rodents and snakes in check. Thirty-five percent of respondents ($n = 28$) mentioned that the Bengal mongoose is not important for the environment and 10% ($n = 8$) said that they are not sure. The fact that majority of respondents consider the Bengal mongoose to be important for the environment, garnering local people's support for conservation measures might be easier.

More than half of the interviewees (65%, $n = 52$) said that the animal faces a diverse form of threats. They mentioned that vegetation removal which involves slashing and uprooting of cattails, reeds, sedges, and grasses, is the primary threat the Bengal mongoose faces. The removal of vegetation is mainly done to make areas accessible for cattle and humans. Floating vegetation comprising water hyacinth

is removed by fishers to keep the water surface clean. Removal of vegetation as a threat to Bengal mongoose has been documented by previous authors (Deuti, 2008; Mallick, 2012). Therefore the unplanned removal of vegetation needs to be checked as it received the highest score of 122 in the threat score sheet.

Urban encroachment in the form of constructions of buildings and boundary walls are also considered a threat by the locals. According to them, the encroachment results in habitat disturbance and destruction for the Bengal mongoose. This factor received a score of 114. Previous studies have mentioned similar views on urbanization being a critical factor for habitat loss (Mallick, 2007; Mallick, 2012).

The burrows of the mongoose were located on the mud banks of the Bheries. The respondents said that the animal makes burrows in the soft mud banks and one of the threats to the animal according to them is concretizing of banks for beautification and flood management purpose, received a score of 54 in the threat score sheet. It is impossible for the Bengal mongoose to dig a burrow in the hard concrete. Therefore, the construction should be mindfully done so that the mongooses can make its burrows, even artificial burrows can be considered as an alternative (Brenneisen, 2006; Sage et al., 2014).

Habitat fragmentation due to roads is also a threat and it received a score of 45 in the threat score sheet. The interviewees said that the roads are a hindrance to the movement of the Bengal mongoose and sometimes the animals get killed due to vehicular collisions. One instance of a roadkill was recorded during field observation (Fig. 6) (de Araujo et al., 2019; Özcan & Özkazanç, 2020).



Figure 6. Roadkill of Bengal mongoose (Photo by S. Chakraborti)



Figure 7. A – Discarded carcasses of the invasive catfish *Pterygoplichthys* sp., B – a feral dog feeding on a discarded catfish (Photos by S. Chakraborti)

The presence of feral dogs received the least score (36). The locals commented that sometimes feral dogs attack mongoose and other animals including birds and reptiles. It was observed that local fishers discard the carcasses of undesirable (having no economic value) fishes at the banks that attract feral dogs (Fig.7), which increases the chance of negative interactions with Bengal mongoose and other wildlife. The problem of feral dogs and their interactions with wildlife has been documented in other studies (Lenth et al., 2008; Young et al., 2011; Villatoro et al., 2019). Proper disposal of carcasses of fishes should be taken into consideration.

During field observation, pursuits like cycling, angling, birding, photography, and other leisure activities were witnessed in the habitat of the rare Bengal mongoose. However, it remains to be found if such activities negatively affects the endemic wetland mammal. The locals mentioned no poaching of mongooses from the study area (Sahajpal et al., 2009). Even though all seven species of mongooses found in India are protected under Schedule II of the Wildlife (Protection) Act, 1972 (Shrikumar, 2018), the protection accorded is for the species and not its habitat. However, in the case of the Bengal mongoose a large part of its habitat is dominated so efforts should be focused on habitat restoration and preservation.

5. Conclusion

The lack of consolidated data from this region limits accurate understanding of past abundances and recent declines. However, in this study, utilizing local ecological knowledge, information about the current status and the probable

threats of the endemic Bengal mongoose was collected. Several sightings were made during the study, which is encouraging as it shows that the species is still present in the area. However, the study also recorded presence of multiple threats in the study area. Therefore, additional data from communities around Nalban and beyond would be helpful and safeguarding the mongoose's habitat is required. The result and discussion of this study encourages key stakeholders to develop conservation action plans to conserve the Bengal mongoose and its habitat. Given the uniqueness of the area which is cohabited by the endemic Bengal mongoose and humans, uncontrolled anthropogenic activities should be regulated.

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Appendices

Appendix A. Questionnaire

1. Name
2. Gender
3. Age
4. Occupation
5. Do you think that Bengal mongoose numbers in the area has?
Increased Decreased Unchanged Not sure
6. Do Bengal mongoose play any role in the environment?
Yes No Not sure
- Supporting statement:
7. Does the species face any threat in the region?
Yes No Not sure
- Supporting statement:
8. Are Bengal mongoose problematic?
Yes No Not Sure
- Supporting statement:

Appendix B. Threat score sheet

Parameters	Scores			
	0	1	2	3
1. Removal of vegetation				
2. Concretizing banks of water bodies				
3. Habitat fragmentation				
4. Urban encroachment				
5. Feral dogs				