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SHORT COMMUNICATION

OBSERVATIONS OF BROWN MONGOOSE HERPESTES FUSCUS (MAMMALIA: CARNIVORA: HERPESTIDAE) IN THE WET EVERGREEN FORESTS OF THE WESTERN GHATS, INDIA

Vignesh Kamath & Kadaba Shamanna Seshadri

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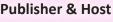
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Abstract: Brown Mongoose Herpestes fuscus is crepuscular in habit and rarely encountered. Information on its natural history and ecology is limited and consequently its conservation requirements are not well understood. We report observations of a Brown Mongoose feeding on a Nilgiri Langur Semnopithecus iohnii carcass in the Kalakad Mundanthurai Tiger Reserve, southern India. A camera trap was deployed over the Nilgiri Langur carcass over 10 nights during which, the mongoose visited the carcass on eight nights. Based on the images captured, the mongoose behaviour was broadly categorized as vigilance, feeding, walking and grooming. The mongoose was most active between 03.30-06.00 h and 19.00-00.00 h. Additionally, we report observations of a pair of Brown Mongoose foraging, and an incident of road mortality. These observations will add to the limited current understanding of the species, necessary for assessing its conservation status and identifying interventions.

Keywords: Activity pattern, animal behaviour, camera-trapping, diet, scavenging, Western Ghats.

Brown Mongoose Herpestes fuscus is endemic to India and Sri Lanka (Phillips 1984). In India, it has been recorded in the wet evergreen forests of the Western Ghats at altitudes ranging 492–2,032 m (Kumara & Singh 2007; Mudappa et al. 2008; Sreehari et al. 2013). Detailed observations about the natural history and ecology of

this species are lacking. Brown Mongoose is thought to be mostly crepuscular; it is often photographed by camera-traps between dusk (18.00h) and dawn (06.00h) from different parts of the Western Ghats (Sreehari et al. 2013; Jathanna 2014; Sreehari et al. 2016; Nikhil 2017).

Brown Mongoose was listed as Vulnerable in the IUCN Red List of Threatened Species in 2008 and subsequently re-assessed as a Least Concern species in 2015, primarily due to frequent sightings and camera trap records since the first evaluation suggesting that the species was much more common than previously assumed (Mudappa et al. 2008; Mudappa & Jathanna 2015). Information on the ecology and natural history of the Brown Mongoose is limited and the threats, if any, are not fully understood. Furthermore, there are no population estimates available across their geographic range (Mudappa & Jathanna 2015). The species has been commonly sighted in human-impacted habitats: it has been seen in coffee and tea plantations and at rubbish dumps close to human habitation (Mudappa & Jathanna 2015). Although the species' diet is yet to be fully understood, it is known to scavenge on the carrion of larger mammals

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them all.

QUbbilabs Acknowledgements: The Tamil Nadu Forest Department for providing permits to work inside Kalakad Mundanthurai Tiger Reserve. Drs. Ganesan R, Ganesh T and Soubadra Devy who permitted the use of facilities of the Agasthyamalai Community based Conservation Centre. Drs. Daniel Willcox and Devcharan Jathanna provided useful comments and helped improve the quality of this note. Mathivannan M, Saravanan A and Chian (Tamizalagan) supported us in the field. We thank like Gaur *Bos gaurus* (Mudappa & Jathanna 2015). We encountered Brown Mongooses whilst working in the Western Ghats of India. Specifically, we report the three sets of observations of Brown Mongoose. First, when a Brown Mongoose was observed to be scavenging on a Nilgiri Langur carcass; second, a pair was seen foraging alongside a road near human habitation; and third, an incident of road mortality.

MATERIALS AND METHODS Study area

The Western Ghats are an undulating mountain chain running parallel to the western coast of peninsular India for over 1,500km and is a renowned global biodiversity hotspot (Das et al. 2006). Observations of Brown Mongoose reported here were made within the Kalakad Mundanthurai Tiger Reserve (KMTR, Figure 1), located in the southern Western Ghats (8.416°N, 77.166°E to 8.883°N, 77.583°E, c. 900km²). The reserve encompasses a habitat matrix with dry scrub forests in the lower elevations and wet-evergreen forests in the

higher elevations. The area receives a mean annual rainfall of ~3,000mm year⁻¹, from two distinct monsoon seasons in June–September and in October–January (Ganesh et al. 1996).

METHODS

During field work on frogs, a partially eaten carcass of a Nilgiri Langur was encountered along a stream, amidst dense clumps of native bamboo *Ochlandra travancorica* on 11 September 2016 (8.550°N & 77.366°E, 1200m). A Reconyx HC500 hyperfire trail camera was deployed to record animals scavenging on the Nilgiri Langur carcass. The camera-trap was deployed for 10 days, set up 0.5m above ground and 1m away from the carcass and was programmed to photograph three times when triggered. Each camera trap image of the animal was considered a record and was pooled over 30 and then 60-minute intervals for analysis. The camera trap sensed the temperature and we noted the weather conditions every day. Data were analyzed using Microsoft Excel®. Foraging behaviour of Brown Mongoose was observed

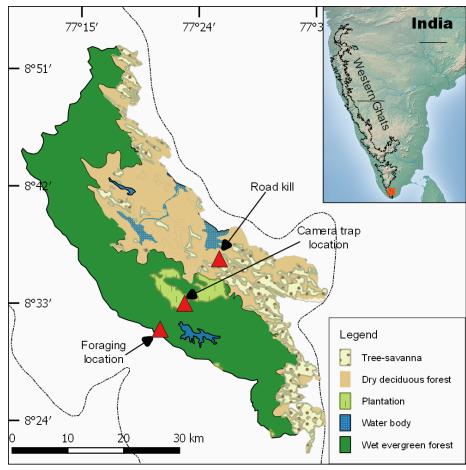


Figure 1. Kalakad Mundanthurai Tiger Reserve showing major habitat types and Brown Mongoose observation sites.

using a pair of binoculars (Zeiss Terra HD, 8X40) and recorded with a Sony® HDR-SR10 camera. Locations were marked using a hand-held Garmin ® etrex HC GPS device.

RESULTS

Brown Mongoose was observed to visit the Nilgiri Langur carcass on eight camera trap nights (501 images, Figure 3; Table 1). The mongoose was found to be most active near the carcass just before dawn (03.30–06.00 h, 312 images) and at night (19.00–00.00 h, 96 images). The mongoose was found to be active even later in the morning (08.30–09.00 h, 84 images). The temperature during this period ranged 15–20 °C. The sky was mostly clear during the day with occasional light drizzles in the evenings.

Scavenging behaviour

Using the camera trap images (n=501), we identified four behavioural aspects of the Brown Mongoose: feeding—where the animal is actively eating the carcass (Image 1a); vigilance—when the animal is alert, head raised and looking away from the carcass (Image 1b); walking-when the mongoose walked or ran into or out of the camera trap frame (Image 1c) and lastly, grooming—when the mongoose is licking or scratching itself (Image 1d). The mongoose fed on the carcass in 63% of images (Figure 4) and feeding emerged to be a predominant activity (Figure 5). Over the 10 trap nights, the mongoose was not alongside the carcass between 00.00-02.59 h, 06.00-06.59 h, 09.00-18.59 h, and 22.00–22.59 h (Figure 5). The other animals observed to be feeding on the carcass were a White-bellied Rat Rattus sp., and a Wild Boar Sus scrofa which took the carcass away. A Brown Palm Civet Paradoxurus jerdoni was also recorded near the carcass but was not feeding.

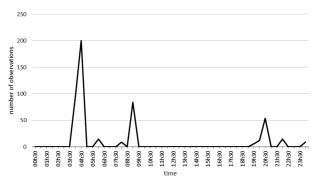
Foraging behaviour

On 26 September 2016, a pair of Brown Mongooses were observed on the Nalmukh–Kodayar road in Upper Kodayar (8.550°N & 77.350°E, 1,300m). Upper Kodayar is a small settlement with approximately 20 houses. The mongooses were observed walking on the road at 17.45h and observed until 18.00h. Initially one individual was seen and the second one emerged from the vegetation along the road verge. Both individuals were aware of our presence as they paused occasionally and stared in our direction. When amidst the grasses, they began to dig vigorously using their fore-limbs. They both appeared to be feeding before they crossed over to the other side, one after the other. They were seen to

Table 1. Hourly number of occurrences of different activities of the Brown Mongoose near the Nilgiri Langur carcass.

Time	Feeding	Vigilance	Walking	Grooming
00.00-00.59	-	-	-	-
01.00-01.59	-	-	-	-
02.00-02.59	-	-	-	-
03.00-03.59	45	27	22	3
04.00-04.59	152	36	12	-
05.00-05.59	11	2	2	-
06.00-06.59	-	-	-	-
07.00-07.59	3	-	6	-
08.00-08.59	74	8	2	-
09.00-09.59	-	-	-	-
10.00-10.59	-	-	-	-
11.00-11.59	-	-	-	-
12.00-12.59	-	-	-	-
13.00-13.59	-	-	-	-
14.00-14.59	-	-	-	-
15.00-15.59	-	-	-	-
16.00-16.59	-	-	-	-
17.00–17.59	-	-	-	-
18.00-18.59	-	-	-	-
19.00-19.59	2	6	10	
20.00-20.59	26	15	13	-
21.00-21.59	3	6	6	-
22.00-22.59	-	-	-	-
23.00-23.59	-	-	9	-

be vigilant before crossing the road and whenever they sensed our presence. They also were observed to be grooming their tails (https://youtu.be/m4QybRkLzhM). After the mongooses were gone, we walked up to the spot where they were digging and found that they had scraped into the mud, presumably looking for roots or invertebrates. It is unlikely that they were feeding on the root because we did not perceive any damage to the grass or its roots (Image 2). We had observed them to be walking past fine sand on the road and were able to locate foot prints on the sand as well (Image 3). On three nights between 12 September and 14 October 2016, we observed a solitary Brown Mongoose foraging in a small rubbish dump where three households in Upper Kodayar discard waste. This location is within a kilometre of the previous sighting where the mongoose pair was foraging.



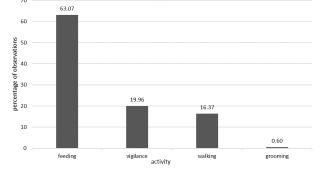


Figure 2. Half hourly observations on the activity of the Brown Mongoose visiting the Nilgiri Langur carcass over a span of 10 days based on camera-trap image captures.

Figure 3. Behaviour of the Brown Mongoose while it was near the Nilgiri Langur carcass.



Image 1. Observations of different behaviours by the Brown Mongoose while it was near the Nilgiri Langur carcass. a—feeding on the carcass | b—vigilance - looking towards one direction with its head raised | c—walking out of the frame | d—grooming itself.

Incident of road morality

On 27 September 2011, one male Brown Mongoose was found dead on the road Manimuthar-Manjolai road at 16.46h (8.606°N & 77.425°E, , 400m, Image 4). It was determined as a male because of its penis; however, the scrotal sac was indistinct (Image 4c). Although most parts of the KMTR are restricted to tourists and vehicular movement, several vehicles are allowed up to Manjolai between 06.00h and 18.00h. The other vehicle movement is from vehicles of the Bombay Burmah Tea Estate, Tamil Nadu Electricity Board, local forest

department, researchers and four public buses. One of us (KSS) was on a motorbike heading towards Upper Kodayar. Because the mongoose carcass was found in the evening, it would be unlikely that the individual was knocked down the previous night or early during the day as no other vehicle had run over it. The road passes through dry deciduous forests and Ruddy Mongoose Herpestes smithii are commonly encountered in the area.



Image 2. Scrape marks made by Brown Mongoose. A—position of scrape along road | b—close up at centre of scrape, no broken roots visible. Pen knife for scale is 90mm in length.



Image 3. Paw print of the Brown Mongoose (encircled). Arrow indicates front of paw. Pen knife for scale measures 90mm in length.

DISCUSSION

The Brown Mongoose is endemic to the Western Ghats-Sri Lanka biodiversity hotspot (Mudappa & Jathanna 2015). The ecology of this species has not been studied systematically but has been improved by anecdotal observations leading to the down listing of the threat status from Vulnerable to Least Concern as per the IUCN Red List criteria (Mudappa & Jathanna 2015). The mongoose has been sighted with in 17 locations in the



Image 4. Adult male Brown Mongoose on road before Manjolai Estate. A—carcass on road | b—close up of face | c—ventral region.

southern Western Ghats of India up to elevations 450–2,000 m (Sreehari et al. 2016). The habitat where the Brown Mongoose has been observed range from human habitations near forests; coffee and tea plantations; wet evergreen forests and upper montane evergreen forests (Mudappa & Jathanna 2015; Sreehari et al. 2016).

The Brown Mongoose was considered to be rare and nocturnal but there appears to be increasing evidence of them being active even during the day. Our observation of the mongoose actively foraging during day light hours confirms that the animal is active during early parts of the day. Furthermore, our sighting of the mongoose scavenging on a Nilgiri Langur re-affirms previous observations of the mongoose scavenging on mammal carcasses.

This report on its behaviour adds to the growing body of knowledge about such understudied taxa and could potentially aid conservation efforts in future. The Brown Mongoose was recorded in human-impacted areas and close to human habitations, including rubbish dumps. Although the animal is found near human habitations, they might continue to be threatened by vehicular movement on roads and other linear intrusions such as railway lines bisecting their habitat. Road mortality is a well-documented threat to wildlife and several solutions such as blocking vehicle movement during the night hours have been proposed and successfully adopted in India (Seshadri & Ganesh 2015). Similar measures may be necessary to protect this species, especially where they are locally abundant. Indiscriminate use and disposal of plastics and other refuse may pose an additional threat to this species where it occurs in human dominated landscapes. Individuals of Brown Mongoose are known to forage near garbage dumps, and they may end up consuming plastic and other hazardous material which could have cascading effects on other taxa. The full extent of this species' adaptation to such altered habitats remain unknown. Support for research both locally (permits) and internationally (funds) to understanding the ecology, population structure and behaviour of this species and other elusive nocturnal mammals would contribute immensely to science and conservation.

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