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SHORT COMMUNICATION

FIRST CAMERA TRAP DOCUMENTATION OF THE CRAB-EATING MONGOOSE *HERPESTES URVA* (HODGSON, 1836) (CARNIVORA: FELIFORMIA: HERPESTIDAE) IN BARANDABHAR CORRIDOR FOREST IN CHITWAN, NEPAL

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FIRST CAMERA TRAP DOCUMENTATION OF THE CRAB-EATING MONGOOSE *HERPESTES URVA* (HODGSON, 1836) (CARNIVORA: FELIFORMIA: HERPESTIDAE) IN BARANDEBHAR CORRIDOR FOREST IN CHITWAN, NEPAL

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Abstract: The systematic study in 2015 and 2016 documented the first camera trap image of the Crab-eating Mongoose *Herpestes urva* in Barandabhar Corridor Forest in Chitwan, Nepal. The corridor was divided into 88 grids, each of 1km by 1km. A pair of cameras was placed for 15 nights in each grid and the total camera trap night effort was 2,640. There were two separate events capturing three independent images and five separate events capturing seven independent images of the Crab-eating Mongoose in 2015 and 2016, respectively. Photo capture rate in camera traps were 0.01 and 0.03 respectively in 2015 and 2016. The presence of this species opens new scope for wildlife professionals and scientific communities to take further steps for its conservation.

Keywords: Camera trap ratio, camera trap survey, carnivore.

A mongoose is an agile and resilient carnivore with a long pointed face with small rounded ears, a tubular body with short legs, and a tapering bushy tail (Yonzon 2005). Four species of mongoose, namely the Small

Indian Mongoose, the Indian Grey Mongoose, the Crab-eating Mongoose, and the Ruddy Mongoose, are found in Nepal (Sharma & Lamichhane 2017). The Crab-eating Mongoose *Herpestes urva* is characterized by a white stripe on its neck that runs from its cheeks to the chest (De & Chakraborty 1995). According to the IUCN Red List of Threatened Species, the population trend of this species is decreasing. It is categorized as Vulnerable in Nepal's National Red List (Jnawali et al. 2011).

The current status of the Crab-eating Mongoose within Nepal is poorly known as only a few records have been published on the species historically or recently (Thapa 2013). Jnawali et al. 2011 mentioned that the species occurs between 100m and 1300m in regions including the protected areas of the Terai and in the lowland forests of eastern Nepal; however, none of these is associated with specific detail records. Hodgson

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(1836) mentioned that the Crab-eating Mongoose was first reported as 'Gulourva' in the central and northern regions of Nepal. Fry (1925) was the first to publish the record of the mongoose with its specific locality. Additionally, Thapa (2013) confirmed the image-validated direct sighting of the Crab-eating Mongoose in eastern Sankhuwasabha District in Nepal. Further, the camera trap image of the Crab-eating Mongoose was recorded in Parsa National Park in 2017 (Sharma & Lamichhane 2017). The recent findings of Thapa (2013) and Sharma & Lamichhane (2017) validate the details mentioned by Jnawali et al. (2011).

Sharma & Lamichhane (2017) mentioned that the priority species for camera traps are large charismatic species like the Tiger *Panthera tigris* and the Leopard *P. pardus* in comparison to smaller carnivores. In Barandabhar Corridor Forest (BCF), a camera trap survey was carried out as 'Tiger and prey base monitoring in Barandabhar Corridor Forest', focusing particularly on the Bengal Tiger *Panthera tigris tigris*. The camera trap, however, also worked as a means to disclose the photographic proof for the existence of many species including smaller carnivores like the Crab-eating Mongoose. This study presents the first image documentation of the Crab-eating Mongoose using a systematic camera trap technique. Since corridors are the cornerstones of modern conservation and act as a linear strip of habitat to facilitate the movement of species through the landscape (Puth & Wilson 2001), the presence of the Crab-eating Mongoose in BCF represents its healthy functionality. The study also supports managers and researchers for future conservation actions in BCF.

STUDY AREA

BCF (87.9km²) is the only remaining forest patch of Chitwan that joins Chitwan National Park in the south with the Mahabharat range in the north (Bhattarai & Basnet 2004). Though continuous, it is in two parts, the south and the north, from the existing Mahendra Highway. The southern part is a buffer zone and the northern part lies in the district forest area. The southern part is guarded by the Nepal Army and is enlisted as a Ramsar Site (site number 1313), as Beeshazar and associated lakes. The aim of the corridor is to mitigate the effects of local communities on conservation and vice versa (Axelsson & Andersson 2012). There are heavy populated municipalities around the corridor, namely Ratnagar Municipality in the east, Kalika in the northeast, and Bharatpur Metropolitan City in the west.

METHODS

BCF was divided into 88 grids of 1km by 1km. Camera traps were systematically placed in each grid. The whole operation was completed in two shifts due to limited resources, i.e., the southern part of the corridor (59 grids) was covered in the first deployment and the northern part (29 grids) in the second deployment. In each grid, one pair of cameras was installed locating a suitable place on each side at a distance of about 4–5 m from the midline of the trail, and the installation details with GPS points were recorded. Four models of cameras, namely Reconyx 550, Moultrie 40D, Bushnell HD, and Cuddeback, were used. Each camera was checked on alternate days to ensure its functionality. The cameras were left for 15 nights in each grid (Karanth & Nicholas 2002; Pokheral 2002; Wang & MacDonald 2009; Thapa 2013; Lamichhane et al. 2014) with a sampling effort of 1,320 trap nights. The monitoring was conducted in two consecutive years, i.e., from March to April 2015 and from January to February 2016. The same method was used in both the years and the total sampling effort was doubled from 1,320 to 2,640 trap nights. All camera trap images were downloaded. The images were considered independent events if they were 30 minutes or more apart (Silver et al. 2004; Thapa 2013). The trapping rate was calculated as the number of independent images per total number of captured images per 100 trap nights (Karanth & Nicholas 2002).

RESULTS

From a total of 44,783 camera trap images from 88 camera trap locations, we obtained seven separate events capturing 10 independent images of the Crab-eating Mongoose in BCF in two consecutive years, i.e., 2015 and 2016 (Images 1–4). In 2015, two separate events capturing three independent images of the species were recorded. One event was captured towards the south of the highway and the other was captured towards the north of the highway. Similarly, in 2016, five separate events capturing seven independent images of the species were recorded towards the north of the highway. The image was confirmed by experts in the National Trust for Nature Conservation and through the digital image archive of the Smithsonian Institute. This is the first camera trap photographic evidence of the Crab-eating Mongoose in this protected corridor. The species was captured in five different grids (Fig. 1). Seventy per cent of the total capture was from 08.00h to 12.00h, after which no camera trap images were captured (Fig. 2). The trapping ratio of 2015 was 0.01 and of 2016 was 0.03 per 100 trap nights.



Image 1. A pair of Crab-eating Mongoose captured in grid no. 67 towards north of BCF (2016).



Image 2. A pair captured in grid no. 73 towards north of BCF (2016).



Image 3. Crab-eating Mongoose captured in grid no. 18 towards south of BCF (2015).



Image 4. Crab-eating Mongoose captured in grid no. 81 towards the north of the highway (2015).

DISCUSSION

The Crab-eating Mongoose is common in southeastern Asia except for Nepal (Than Zaw et al. 2008). The primary reason for this rarity in the country remains unclear (Thapa 2013), but it has affected the study and data of the species. Sharma & Lamichhane (2017) referred to camera traps focusing only on large charismatic mammals as the apparent reason for the mongoose species being rare and localized. Wildlife research in southeastern Asia is largely donor-dependent and the probability of the acceptance of a proposal on small carnivores like Crab-eating Mongoose is low and in the case of high budget research null and void. It is the charismatic species that receive attention from the government and the media and have higher chances of acceptance in high budget proposals. Therefore, it is obvious that the selected proposal will determine the

focus of camera trap studies, as mentioned by Sharma & Lamichhane (2017).

Inawali et al. (2011) mentioned that the mongoose species inhabits tropical, subtropical, evergreen, and moist deciduous forests and the record of the Crab-eating Mongoose from the subtropical BCF in this study supports the finding. The Crab-eating Mongooses were mostly camera-trapped during morning hours, which is typical in southeastern Asia (Than Zaw et al. 2008; Thapa 2013). The species was captured only on sunny days. Chuang & Lee (1997) mentioned fishes, reptiles, amphibians, and crustaceans as the prey species of the Crab-eating Mongoose. These are all cold-blooded species and hence are active on sunny days. We do not have a single camera trap image of the Crab-eating Mongoose at night. Therefore, we may hypothesize that the activities of the predator depends on that of the

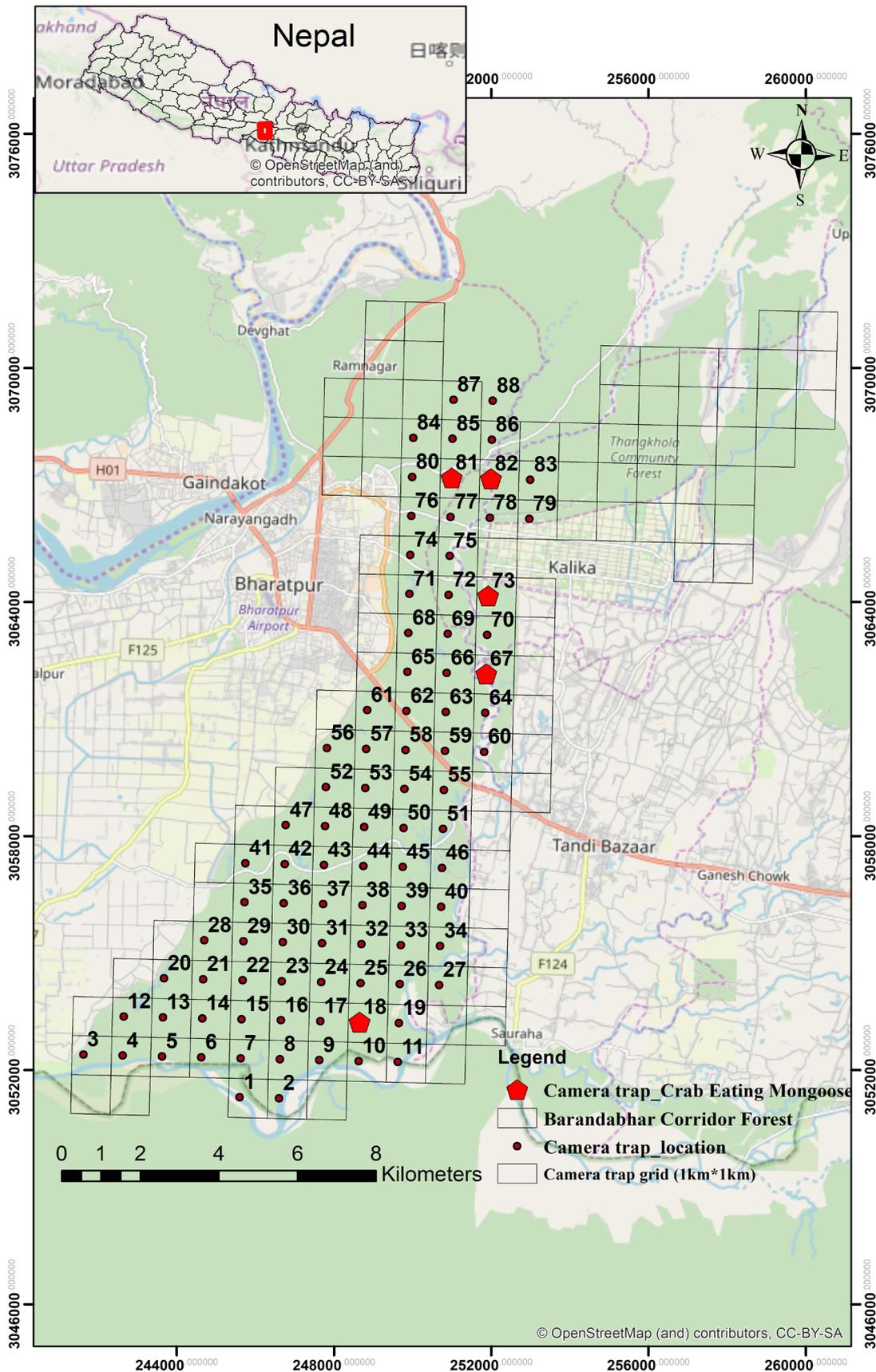


Figure 1. Barandabhar Corridor Forest in Chitwan, Nepal, with the camera trap grid.

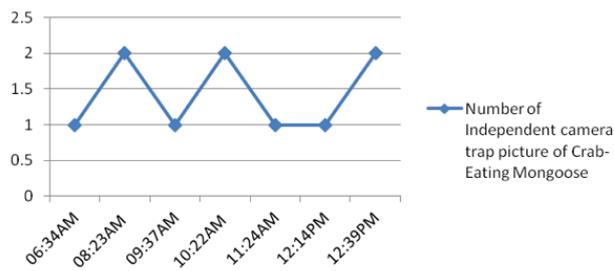


Figure 2. Camera trap time of Crab-eating Mongoose (2015 and 2016) in Barandabhar Corridor Forest in Chitwan, Nepal.

prey. This may be because the predator saves energy according to the foraging theory, i.e., to minimize energy for capturing and searching for food.

Habitat destruction and poaching of the mongoose for fur trade are considered the major threats of the species in Nepal (Yonzon 2005; Jnawali et al. 2011; Thapa 2013; Sharma & Lamichhane 2017). No evidence of poaching, however, was found in Chitwan District. Other possible threats to the species in this region are overfishing, habitat loss, and the poisoning of waterholes (a method of illegal fishing). In BCF, the result showed an increase in camera trap ratio in consecutive years. This has spread a positive message on the success of conservation and management in the BCF.

This study reveals the presence of the Crab-eating Mongoose in both the southern and the northern parts of the highway and presents the first camera trap distribution documentation of the species in BCF. It extended the present range of this species and highlights the value of the corridor in its conservation. Publication of similar records is essential for the updated status of the distribution of the species in Nepal. This data opens a new scope and base for wildlife professionals and scientific communities to take further steps for the conservation of the Crab-eating Mongoose to maintain a healthy ecosystem in BCF.

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