Envis Bulletin : Wildlife and Protected Areas (1999) 2(2), 87-91

Research Article - 2

Home Range and Habitat Use by Indian Grey Mongoose and Small Indian Civets in Nilgiri Biosphere Reserve, India

AJITH KUMAR and G. UMAPATHY

ABSTRACT

Home range and habitat use by the small Indian civet *Viverricula indica* and Indian grey mongoose *Herpestes edwardsii* were examined by using radio-telemtrey in the dry deciduous and scrub forests of Anaikatti in Siruvani hills of Niligiri Biosphere Reserve, near Coimbatore. Only one small Indian civet and two common Indian mongoose were trapped after nearly 400 trap days spreading over 121 days, showing the low abundance of small carnivores and trap shyness. These three animals were fitted with radio-transmitters but only one each of small Indian civet and common Indian mongoose could be tracked for four months. The monthly home range of the small Indian civet varied considerably, from 20.69 ha to 102 ha. The home range over the four months was 217.9 ha. thus showed very little overlap between monthly home ranges. The monthly home range of the mongoose varied only from 3.4 ha to 4.9 ha, with an overall home range of 15.5 ha. As in the case of civet, one reason for the smaller home range was that the animal was radio-tracked only for four months. There was no overlap between monthly home ranges, the overall home range being considerably larger than monthly home ranges. The radio-telemetry studies on the small carnivores have given us the first estimate of home ranges of these species in India. The studies also highlight some of the major problems of undertaking telemetric studies on small carnivores.

INTRODUCTION

There have been no previous studies on home range and habitat use pattern by small carnivores in India and very few studies elsewhere. Small size, nocturnal and solitary habit and poor visibility in their habitat have been the major reasons for this. The availability of small radio-collars which can be fitted on small sized animals such as the small carnivores has enabled us to overcome some of the above handicaps to some extent. This has enabled studies on home range size and use and activity pattern in small carnivores elsewhere; pine marten *Martes martes* in Spain (Clevenger 1993), European genet *Genetta genetta* and Egyptian mongoose *Herpestes ichneumon* in Spain (Palomares & Delibes 1993), forest mongoose in Africa (Ray 1997) and civets in Thailand (Rabinowitz 1991). However, the small home ranges of many small carnivore species, short collar-life (especially battery life) and large error polygons obtained in triangulation of animals in mountainous habitats and dense forests are still major constraints while conducting telemetry studies. In the total absence of information on home range and habitat use pattern in small carnivores in India, one objective of this study was to collect such data on a few species using radio-telemetry.

STUDY AREA

Following an initial survey on the distribution and abundance of small carnivores in the Nilgiri Biosphere Reserve (Kumar & Yoganand in this issue) we chose Anakatti forests (P.N.Palayam Forest Range, Coimbatore North Forest Division), adjoining the campus of Salim Ali

Salim Ali Centre for Ornithology and Natural History Coimbatore. 641 108, Tamil Nadu

Centre for Omithology and Natural History (SACON), as the study site. The study area in the Anaikatti forests is located at an elevational range of 500 m to 650 m. The vegetation is typically scrub thorn forest and open deciduous forest with *Caparis grandis, Randia malabaricum, Limonia alata* and *Maba buxifolia*. There are several seasonal streams. The annual rainfall is less than 70 cm, most of which is from the northeast monsoon in October-November.

Even though infrequently and seasonally sighted, the large mammal community in this area is diverse and includes elephant *Elephas maximus*, gaur *Bos gaurus*, sambar *Cervus unicolor*, chital *Axis axis*, leopard *Pathera pardus* and sloth bear *Melursus ursinus*. The small carnivores known to occur in this area include the jungle cat *Felis chaus*, common palm civet *Paradoxurus hermaphroditus*, small Indian civet *Viverricula indica*, Indian grey mongoose *Herpestes edwardsii* and ruddy mongoose *Herpestes smithii*. Parts of the study area had been severely grazed by cattle from adjacent villages.

METHODS

Equipment

Radio telemetry equipment was procured from Telonics Inc., Telemetry-Electronics Consultants, USA. This included radio transmitters (MOD-125), receiver (TR-4) and receiving antenna (RA-14K).

Trap sites

The study area was intensively surveyed for the presence and abundance of small carnivores for about one month period during July 1998 in order to identify potential sites for trapping animals. After the survey we found that the riparian habitat was a potential area for setting traps for capturing animals. Five traps (Havahart double door live traps, 90 x 27.5 x 27.5 cm, supplied by Forestry Suppliers, US) were laid on the riparian areas along the trails with bananas, dry fish and chicken as baits. Along with these a cat lure was also used to attract the animals. The traps were camouflaged with twigs. The entrance to the traps were cleaned, wet soil was spread in order to get clear foot prints or signs of animals which came to the trap. These traps were baited for about ten days prior to trapping because most of the carnivores show trap shyness. All five traps were set up in one general location to enhance the success of trapping, with a distance of 200 m to 300 m between traps. Of the five traps, two were used to trap diurnal carnivores (mongoose) and three were used in the night for trapping nocturnal animals like civet and cat. The traps were checked for animals and their signs three to four time in a day. Old baits were replaced with fresh ones every day.

Five traps were set up for a total of 121 days in August to December 1998, the total effort being 400 trap nights. During this period two Indian grey mongoose and one small Indian civet were trapped. Apart from these, several other species such as white-tailed wood rat *Cremnomys blanfordi*, *Rattus rattus*, Indian pitta and pond turtle *Melanochelys trijuga* were also trapped.

Collaring

The trapped animals were immediately moved from trapping site to the laboratory at SACON, after covering the trap with a black cloth. In the laboratory the trapped animal were shifted to another cage for tranquilising. The animals were tranqulized using a combination of ketamine hydrocloride and xylazine, injected intramuscularly. After this morphometric measurements such as body length, height, tail length and body weight were recorded before fixing the collar. It took 10 to 15 minutes for this to be completed. After full recovery, we released the animals at the trap site. The collared animals were tracked immediately following release.

Tracking

The location of the animal was estimated through triangulation. Triangulation was done from five fixed points, the latitudes and longitudes of which were taken using a GPS. Even though we tried to obtain bearing from at least three points for each location, often this was not possible due to poor reception

of signals. The interval between two readings was often only 2 to 3 minutes, and it was assumed that the animal did not move over a long distance in the 10-15 minutes that it took for making 2-5 locations. Five to six bearings were taken in a night for 15-20 days each month following the release of the animals, and only one during the daytime. Even though we tried to locate day beds by homing in, this was not possible in the thick undergrowth of lantana and other thorny plants in the habitat.

Data analysis

The computer programme CALHOME was used to estimate the home range of the animals for each month, and for the study period. A 95% minimum convex polygon was used to estimate the home range. Another parameter used was the straight line distance between two consecutive day time locations.

The monthly home range of the small Indian civet varied considerably, from 20.69 ha to 102 ha. The home range over the four months was 217.9 ha, The monthly home range of the mongoose varied only from 3.4 ha to 4.9 ha, with an overall home range of 15.5 ha.

RESULTS

Trapping success

The trapping success for capturing small carnivores was very low, three animals in 400 trapping days giving success rate of only 0.75%. The success rate for the small Indian civet was only 0.25% and for the Indian grey mongoose 0.5%. Given this very low capture rates for small carnivores it would not have been possible to get enough sample size for both the species during the project period. Some of the other small carnivore species known to occur in the study area are jungle cat and ruddy mongoose. These occur in even lower abundance than those which were captured.

Small Indian civet

Only one small Indian civet was captured during the period. This was captured on September 1, 1998. It was a mature male measuring 100 cm in body length (including a tail length of 38 cm) and 2.5 kg in body weight. This animal was radio-collared and tracked for four months up to December 1998, when the collar stopped functioning, probably due to battery failure. Even though bearings were recorded on 59 days, many of these had to be discarded, either because the error polygons were very large or because the bearings did not meet to give a location. The number of locations in a month ranged from four to seven. The monthly home range estimated for four months varied considerably from 20.69 ha in September to 102 ha in October (Fig. 1). The home range over the four months was 217.9 ha, thus showing very little overlap between monthly home ranges. The distance between successive daytime locations varied from 193.4 m in September to as high as 2260.8 m in October (Fig. 2). These two parameters seemed to be highly correlated.

Indian grey mongoose

Even though we had seen both Indian grey mongoose and ruddy mongoose in the study area, only two of the former were trapped. The first animal, a male, was trapped on 5th of October near a dry stream. This animal measured 76 cm in length, including tail length of 35 cm and 2 kg in body weight. However, the signals were erratic from the second day of tracking and by October 15 signals completely stopped. It is presumed that the collar stopped working for some reason.

On October 16, 1998 we captured another grey mongoose, which was 84 cm in length (including a tail length of 36.5 cm) and weighed 2 kg. This animal was tracked up to the end of December 1998, when the collar stopped functioning.

A total of 28 locations were taken for the second grey mongoose, of which 21 could be used to estimate the home range. The monthly home range of the animal varied only from 3.4 ha to 4.9 ha, with an overall home range of 15.5 ha. The greater cumulative home range was due to the presence of 'unused' areas between monthly home ranges (Fig. 3). The Indian grey mongoose was mostly diurnal, even though some ranging occurred during dusk.

DISCUSSION

In spite of considerable trapping effort, with over 400 trap days spread over 120 days, only three small carnivores could be captured, showing the

low abundance of this taxa. Similar data from other study sites is not available for comparison.

Data on home ranges of the small Indian civet and Indian grey mongoose from elsewhere are also not available for comparison. Rabinowitz (1991) radio-collared seven individuals of four sympatric species of civets in Huai Kha Khaeng Wildlife Sanctuary in Thailand and tracked them up to one year. Of these, one adult male *Viverricula malaccensis* (reported as small Indian civet) had a home range of 3.1 km^2 over a six month period (N=68 locations). There was considerable monthly variation, from 0.5 to 2.4 km^2 with an average of 0.83 km^2. Over 60% of the home range of *V. malaccensis* was dry deciduous forest. One female masked palm civet *Paguma larvata* had a home range of 3.7 km^2 over a one-year period, dry evergreen forest being its primary habitat. The monthly home range varied from 0.5 km^2 to over 1.4 km^2, with a mean of 0.93 km^2. The two male common palm civets *Paradoxurus hermaphroditus* showed considerable variation in home range use, owing to the erratic ranging of one of them. This male had a home range of 17 km^2 over 12 months, but monthly home range varied only from 1.8 to 6.3 km^2, with a mean of 3.2 km^2. In contrast, a young male had a home range of only 4.25 km^2 over seven months. Its monthly home range varied from 0.64 to 0.98 km^2 with a mean of only 0.74 km^2. An adult male large Indian civet *Viverra zibetha*, radio-tracked for seven months, had a home range of 12 km^2. The monthly home range varied from 2.7 to 9.5 km^2, with a mean of 5.4 km^2.

The monthly home ranges (0.21 to 1.02 km^2, with a mean of 0.65 km^2) and overall home

Fig.1. The monthly and total home range (in ha) of the radio-collared small Indian civet September to December 1998.

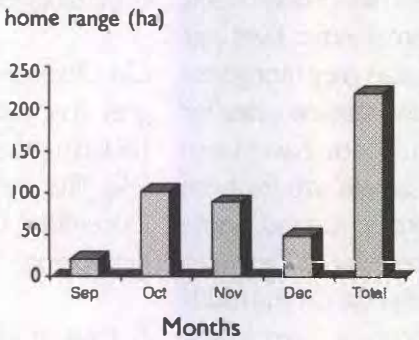


Fig. 2. The distance between consecutive daytime location of the radio-collared small Indian civet, September to December 1998.

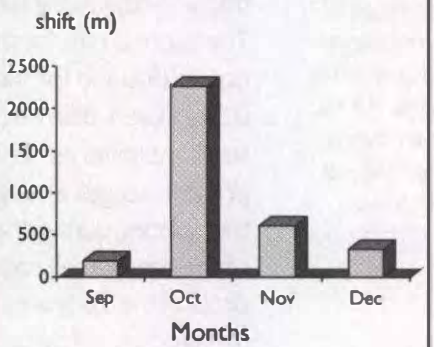
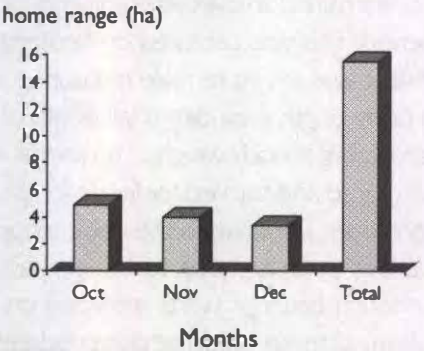


Fig. 3. The monthly and overall home range of the radio-collared Indian grey mongoose, October to December 1998.



range (2.17 km^2) obtained for the small Indian civet from this study is lower than what has been reported above for *V.malaccensis* and the large Indian civet (both of the same subfamily Viverrinae) and for two species of palm civets (subfamily Paradoxurinae). This might be partly due to the fact that the small Indian civet was tracked for only four months, compared to 7 to 12 months for other species. The large differences between monthly home ranges and overall home range for all species show very little overlap among monthly home ranges. Thus, radio-tracking over a longer period would have given a much larger overall home range for the small Indian civet. Diet and body size differences affect home range areas of civets (Rabinowitz 1991). The small Indian civets are smaller than the species studied in Thailand and thus could have smaller home ranges. Other factors which could affect home range size are spatio-temporal variation in the abundance of food sources. Even though civets of the subfamily Viverrinae include fruits in their diet, they also feed to a large extent on animals, especially invertebrates and small mammals (e.g. the large Indian civet, *op.cit.*), unlike palm civets, which are almost entirely frugivorous. The former are also more terrestrial than the latter. Since the distribution of fruits in tropical forests is highly clumped, major seasonal shifts in home ranges are expected for the frugivorous civets. This would lead to a larger overall home range in spite of monthly home ranges being small. This might be another reason for the home range of the small Indian civet to be smaller than that of two species of palm civets.

Data on home range of mongoose is available only from one study (Ray 1997). Two species, the long-nosed mongoose *Herpestes naso* and marsh mongoose *Atilax paludinosus* were included in this study carried out in northern Congo basin. The home range of three male long-nosed mongoose (95% minimum convex polygon from independent locations) were 47.5, 40.5 and 7.8 ha and that of the marsh mongoose male was 187.8 ha. The home range of the male Indian grey mongoose obtained from this study was only 15.5 ha. As in the case of the civet, one reason for the smaller home range was that the animal was radio-tracked only for three months. As in the case of the long-nosed mongoose, the Indian grey mongoose was also located most often along a stream, even though it moved away from it occasionally. There was no overlap between monthly home ranges, the overall home range being considerably larger than monthly home ranges.

ACKNOWLEDGEMENTS

We gratefully acknowledge funding from MAB, Ministry of Environment and Forests; research permit from Tamil Nadu Forest Department; facilities provided by the Salim Ali Centre for Ornithology and Natural History; assistance in radio-collaring from Dr. N.V.K. Ashraf; assistance from Mr. K. Yoganand in procuring telemetry equipments and support from Dr. R.K. Rai, Ministry of Environment and Forests, Government of India.

REFERENCES

Clevenger, A.P. (1993) Pine marten (*Martes martes* L.) home range and activity patterns in the island of Minorca, Spain. *Z. Saugetierkunde*, **58**, 137-143.

Palomares, F. & Delibes, M. (1993) Determining activity types and budgets from movement speed of radio-marked mongoose. *Journal of Wildlife Management*, **57**, 164-167.

Rabinowitz, A.R. (1991) Behaviour and movements of sympatric civet species in Huai Kha Wildlife Sanctuary, Thailand. *Journal of Zoology* (London), **223**, 281-298.

Ray, J.C. (1997) Comparative ecology of two African forest mongoose, *Herpestes naso* and *Atilax paludinosus*. *African Journal of Ecology*, **35**, 237-253.