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Roadkill of animals on the road passing from Kalaburagi to Chincholi, Karnataka, India

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Abstract: The road passing from Kalaburagi to Chincholi in Karnataka, India, is around 70km and is a state highway having different types of moderately thick vegetation on either side. The animals utilizing this vegetation face huge threats from vehicular traffic, as was observed in recent years. Although this road does not have heavy traffic, there are significant numbers of roadkills. This study was conducted from February 2015 to January 2016. During the one-year period of the study, the mean frequency of heavy vehicles was 154 per day. Among the 283 roadkills recorded, 52 individuals belonged to the class Amphibia, constituting 18.37% of the total roadkills; no amphibian was killed in the summer season whereas 35 and 17 individuals were killed in the rainy season and in the winter season, respectively. Fifty-two individuals belonged to the class Reptilia, constituting 18.37% of the total roadkills; on an average, 10±5.8 individuals were killed in the summer season, 2.5±0.71 in the rainy season, and 3.5±2.12 in the winter season. Sixty-one individuals belonged to the class Aves, constituting 21.55% of the total roadkills; on an average, 5.71±3.03 individuals were killed in the summer season, 2.66±2.08 in the rainy season, and 4.33±3.51 in the winter season. One-hundred-and-eighteen individuals belonged to the class Mammalia, which was the most affected among the roadkills, constituting 41.69% of the total roadkills; on an average, 5.33±5.08 individuals were killed in the summer season, 5±3.9 in the rainy season, and 4.6±2.7 in the winter season. Under the IUCN Red List category, the majority of the species in this study are considered Least Concern and some of them are not even mentioned. The present study helps to know the problems and threats faced by wild animals and is the first work carried out in the region.

Keywords: Mammalia, seasonality, vehicular traffic.

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INTRODUCTION

Roads negatively impact animals in a variety of ways, one of the most obvious impacts being vehicle-induced mortality (Trombulak & Frissell 2000; Spellerberg 2002; Das et al. 2007; Sheshadri et al. 2009). The effects range from habitat loss and fragmentation (Richardson et al. 1997) to affecting wild animal distribution pattern, movement, breeding, and density (Reijnen et al. 1995). The taxa affected range from amphibians (Fahrig et al. 1995; Seshadri et al. 2009) to reptiles (Rosen & Low 1994; Drews 1995; Gokula 1997; Das et al. 2007) to birds (Drews 1995; Reijnen et al. 1995) and mammals (Drews 1995; Newmark et al. 1996; Richardson et al. 1997). More attention has been given in North America, Australia, Europe, and Africa to assess such impacts, but Asia has not paid the required attention to this aspect (Baskaran & Boominathan 2010). Recent development activities such as increase in the number of highways, vehicular traffic, and widening of roads are the prime reason for the destruction of wildlife and their habitats (Gokula 1997; Gruisen 1998; Vijayakumar et al. 2001; Das et al. 2007). Therefore, non-governmental organizations and conservationists in India are protesting against the construction of new roads and also the upgrading or widening of existing roads, especially in protected areas (Baskaran & Boominathan 2010). The present paper is the first account of roadkill from Hyderabad–Karnataka region.

MATERIALS AND METHODS

Study Area

Chincholi Konchavaram Forest is situated around 8km away from our study area, which is the wildlife sanctuary of southern Indian dry forest which is at par with the Western Ghats of Karnataka. Kalaburagi is called Sun City because of its high temperature, and as we move towards Chincholi the temperature comparatively drops because of rich vegetation. The average rainfall and temperature of Kalaburagi are 200mm and 34^{0}C, respectively. The average rainfall and temperature of Chincholi are 887mm and 27.1^{0}C, respectively.

Figure 1. The road from Kalaburagi to Chincholi, Karnataka, India.

Our study area lies between Kalaburagi (17.329^{0}N & 76.834^{0}E; 454m) and Chincholi (17.461^{0}N & 77.419^{0}E; 462m), covering a distance of 70km and having a width of 45m (SH-10 from Gulbarga University to Madbul, SH-125 from Madbul to Kodla cross, SH- 32 from Kodla cross to Chincholi). About 5km of the SH-10 has crop fields on either side while the remaining stretch has scrub jungles. Further, the SH-125 road stretch has crop fields on either side and a small part of the road has scrub jungles. Most of the road stretch of SH-32 has thick vegetation on either side; some of the area is dominated by palm vegetation. The entire 70km of the road passes through 13 villages. The vegetation present on either side of the road consists of the following plant species, namely, *Eucalyptus globules, Ficus benghalensis, F. religiosa, Azardirachta indica, Phoenix sylvestris, Capparis* spp., *Albizia lebbeck, Pithecellobium dulce, Peltophorus pterocarpum, Acacia nilotica, Prorosopis julifora, Pongamia pinnata, Ailianthus excelsa, Calotropis* spp., *Euphorbia toucan, Vitex negundo*, and *Cassia auriculata*.

Methods

Sampling was carried out from February 2015 to January 2016 on the road from Kalaburagi to Chincholi via Madbul, covering a distance of 70km (Fig. 1). We surveyed the road in a Thar Jeep systematically from 07.00h to 10.00h at a speed of 15–20 km/h. The entire road was surveyed in one stretch, four times a month on holidays so as to avoid inconvenience to the traffic. The road kill encountered were recorded and the overall percentage of mortality was calculated season-wise.

Traffic flow was studied 12 times a year, i.e., on a Monday of every month during our study period (Monday was selected to record traffic flow due to high traffic intensity on that day). The traffic intensity was recorded manually as the mean number of vehicles on the road in each 1-hour interval around 24 hours. Traffic flow, type of vehicle, and their movement per day were calculated.

Images of dead animals were taken, and the dead animals were removed from the road to avoid repetition. The recorded roadkills were categorized and noted according to the type of vegetation. Identification was done using field guides (Grimmett et al. 1998; Daniel 2002; Menon 2003). No preservation was done during our survey.

RESULTS

Traffic flow in our study area was not very high around the year. Traffic flow recorded during the period of February 2015–January 2016 reveals that the mean frequency of vehicles was 154 per day (24h). The maximum contribution to the traffic flow was made by light vehicles (59%) and the minimum contribution by heavy vehicles (41%) (Table 1; Fig. 2).

During our study period, 283 individuals belonging to 26 species were recorded. Among these, Amphibia and Reptilia constituted 18.37% each, Aves 21.55%, and Mammalia 41.69% (Fig. 3).

Among the 52 recorded individuals of the class Amphibia (Table 2), one species was *Duttaphrynus melanostictus*; the other group of frogs was unidentified.

Table 1. Traffic flow (number of vehicles per day) on S-10, SH-125, and SH-32 from Kalaburagi to Chincholi in Karnataka, India, during the study period of February 2015–January 2016.

Months	Mean number of vehicles per day		Total
	Heavy vehicles	Light vehicles	
February	60	90	150
March	62	94	156
April	61	98	159
May	65	97	162
June	60	94	154
July	64	94	158
August	62	93	155
September	64	91	155
October	65	89	154
November	67	88	155
December	61	83	144
January	60	87	147
Annual total	751	1098	1849

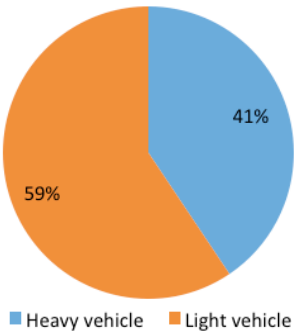

Figure 2. Composition of traffic flow from Kalaburagi to Chincholi in Karnataka, India.

Table 2. Overall roadkills recorded during February 2015–January 2016 in the study area showing various species of roadkills.

	Class	Common name of the species	Scientific name of the species	Number of individuals killed	Red List status
1	Amphibia	Black-spectacled Toad	*Duttaphrynus melanostictus*	25	Least Concern
2		Unidentified frogs		27	-
3	Reptilia	Yellow Monitor	*Varanus flavescens*	11	Least Concern
4		Dhaman	*Ptyas mucosa*	05	Not mentioned in the Red Book
5		Water Snake	*Xenochrophis pisicator*	03	Not mentioned in the Red Book
6		Unidentified snakes		06	-
7		Common Garden Lizard	*Calotes versicolor*	11	Not mentioned in the Red Book
8		Asian Chameleon	*Chamaeleo zeylanicus*	16	Least Concern
9	Aves	Greater Coucal	*Centropus sinensis*	20	Least Concern
10		Laughing Dove	*Spilopelia senegalensis*	09	Least Concern
11		Ring-necked Dove	*Streptopelia capicola*	03	Least Concern
12		Common Lora	*Aegithina tiphia*	08	Least Concern
13		House Crow	*Corvus splendens*	06	Least Concern
14		Rock Dove	*Columba livia*	05	Least Concern
15		Unidentified birds		10	-
16	Mammalia	Small Indian Civet	*Viverricula indica*	06	Least Concern
17		Jungle Cat	*Felis chaus*	04	-
18		Asian Palm Civet	*Paradoxurus hermaphrodites*	05	-
19		Grey Wolf	*Canis lupus*	02	Least Concern
20		Red Fox	*Vulpes vulpes*	02	Least Concern
21		Domestic/ Feral Dog	*Canis lupus familiaris*	20	Not mentioned in the Red Book
22		Indian Grey Mongoose	*Herpestes edwardsii*	06	Least Concern
23		Indian Crested Porcupine	*Hystrix indica*	15	Least Concern
24		Brown Rat	*Rattus norvegicus*	03	Least Concern
25		Wild Pig	*Sus scrofa*	03	Least Concern
26		Indian Hare	*Lepus nigricollis*	06	Least Concern
27		Three-striped Ground Squirrel	*Lariscus insignis*	15	Least Concern
28		Southern Plain Grey Langur	*Semnopithecus hypoleucos*	20	Least Concern

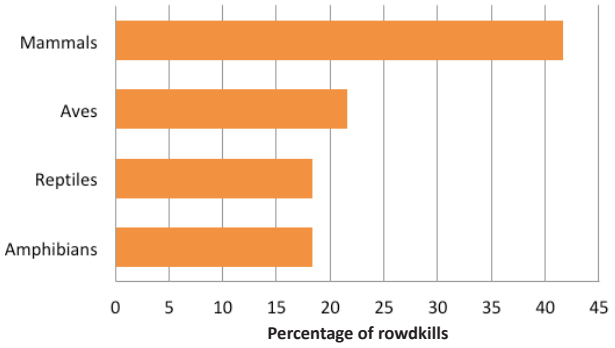

Figure 3. Class-wise composition (in %) of roadkills recorded during the study period.

Table 3. Season-wise mean roadkill recorded in the study area.

Season / Class	Summer	Rainy	Winter
Amphibia	0	35	12
Reptilia	10±5.8	2.5±0.71	3.5±2.12
Aves	5.71±3.035	2.66±2.08	4.33±3.51
Mammalia	5.33±5.08	5±3.9	4.6±2.7

In summer, no amphibians were found killed; 35 individuals were killed in the rainy season and 12 in the winter season (Table 3).

Among the 52 recorded individuals of the class Reptilia (Table 2), the highest number of kills was of

Image 1. Small Indian Civet.

Image 2. Jungle Cat.

Image 3. Asian Palm Civet.

Image 4. Grey Wolf.

Image 5. Porcupine.

Image 6. Wild Rat.

Image 7. Grey Langur.

Image 8. Jungle Cat.

Image 9. Wild Boar.

Image 10. Squirrel.

Image 11. Unidentified mammal.

Image 12. Greater Coucal.

Image 13. Dove.

Image 14. Snake.

Image 15. Yellow Monitor.

Image 16. Asian Chameleon.

Chamaeleo zeylanicus, followed by *Varanus flavescens, Calotes versicolor*, and *Ptyas mucosa*; the least number of kills was of *Xenochrophis pisicator*. Chameleons are very common in this area and are not found in any other talukas of Kalaburagi District. Seasonally, on an average, 10±5.8 reptiles were killed in the summer season—the highest number of roadkills among all seasons, followed by 3.5±2.12 in the winter season, and the lowest of 2.5±0.71 in the rainy season (Table 3; Images 1–16).

The 61 recorded individuals of the class Aves belonged to six species (Table 2). *Centropus sinensis* was frequently found killed in road collisions (20 individuals), followed by *Spilopelia senegalensis, Aegithina tiphia*, *Corvus splendens*, *Columba livia*, and *Streptopelia capicola.* Ten individuals of birds were unidentified. On average, the highest number of roadkills of birds was in the summer season with 5.71±3.03 individuals, followed by 4.33±3.51 in the winter season and the lowest of 2.66±2.08 in the rainy season (Table 3).

Among all the classes, Mammalia had the highest number of roadkills with 107 individuals belonging to 17 species (Table 2), which makes 41.69%. Out of the 107 individuals of mammals killed, the highest killed were *Semnopithecus dussumieri* and *Canis lupus familiaris* with 20 individuals each; followed by *Hystrix indica and Lariscus insignis* with 15 individuals each; *Viverricula indica, Herpestes edwardsii*, and *Lepus nigricollis* with six individuals each; *Paradoxurus hermaphrodites* with five individuals; *Felis chaus* with four individuals; and *Rattus norvegicus and Sus scrofa* with three individuals each. The least killed were *Canis lupus and Vulpes vulpes* with two individuals each. Season-wise average roadkill of mammals is 5.33±5.08 in the summer season, 5±3.9 in the rainy season, and 4.6±2.7 in the winter season (Table 3). In our observation, no Hanuman Langur was killed in the summer season, which may be due to very high temperature of nearly 40ºC which restricts the species movement on the road. According to the local Hindu tradition, burial of monkeys is carried out by the local people by performing rituals as performed for humans, for they consider the species sacred (as an avatar of Hanuman).

DISCUSSION

In our present study, greater mortality was observed in amphibians due to their slow moving behaviour. This was also true with the findings of Bhaskaran & Bhoominathan (2010). Our results are true only with amphibians. Among reptiles, however, except snakes and lizards, the rest were killed in all seasons. Since snakes and lizards have the habit of basking on the road during winter months, their roadkill incidents were more in the winter season. Our observations are similar to that of Vijayakumar et al. (2001).

Granivorous birds were killed while feeding on grains spread on either side of the road whereas insectivorous and carnivorous birds were killed while feeding on any live or dead animals found on the road.

Among mammals, comparatively higher mortality was found in the case of Hanuman Langurs due to their social habits and human-modified behaviours. They have the habit of keeping themselves close to roads and performing all their activities without bothering much about speeding vehicles. During fighting and chasing, they collide with vehicles and get injured or die as reported by Ramesh (2013).

Most of the mammalian species killed on the road as recorded in the present study are nocturnal in habit (Jungle Cat, Small Indian Civet, Asian Palm Civet, Indian Grey Mongoose, Grey Wolf, and Red Fox). Porcupine is nocturnal and insectivorous and gets killed while feeding on insects on roads. Wild Boars and Indian Hares are killed while crossing roads (Baskaran & Boominathan 2010). The composition of the roadkills varied according to vegetation. Mammalian mortality was high in areas where there was thick vegetation on either side of the road (Selvan et al. 2012)—there was a tendency for mammals to get killed in dense forests (Clevenger & Kociolek 2003).

CONCLUSIONS

Our results show that the average roadkill in the area was 23.58% every month. Human development activities are directly related to the increase in the number of roadkills (Gokula 1997). As a precautionary measure, visibility on either side of the road should be increased by clearing bushes; this helps the driver to avoid accidents. Other measures such as shining signboards, street lights, and speed-breakers can minimize the roadkill of large-bodied animals or small amphibians and reptiles (Selvan et al. 2012).

REFERENCES

Baskaran, N. & D. Boominathan (2010). Road kills of animals by highway traffic in the tropical forest of Mudumalai Tiger Reserve, southern India. *Journal of Threatened Taxa* 2(3): 753–759. https://doi.org/10.11609/JoTT.o2101.753-9

Clevenger, A.P. & A.V. Kociolek (2006). Highway median impact on wildlife movement and mortality: state of the practice survey and gap analysis. Technical Report. Department of Transportation, Sacramento, California, 118pp.

Daniel, J.C. (2002). *The Book of Indian Reptiles and Amphibians*. Oxford University Press, Bombay Natural History Society Bombay, India, viii+238pp.

Das, A., M.F. Ahmed, B.P. Lahkar & P. Sharma (2007). A preliminary report of reptilian mortality on road due to vehicular movement near Kaziranga National Park, Assam, India. *Zoos' Print Journal* 22(7): 2742–2744. http://doi.org/10.11609/JoTT.ZPJ.1541.2742-4

Drews, C. (1995). Road kill of animals by public traffic in Mikumi National Park, Tanzania, with notes on baboon mortality. *African Journal of Ecology* 33(2): 89–100.

Fahrig, L., J.H. Pedlar, S.E. Pope, P.D. Taylor & J.F. Wegner (1995). Effect of road traffic on amphibian density. *Biological Conservation* 73(3): 177–182.

Gokula, V. (1997). Impact of vehicular traffic on snakes in Mudumalai Wildlife Sanctuary. *Cobra* 27: 26–30.

Grimmett, R., C. Inskipp & T. Inskipp (1998). *Birds of Indian Subcontinent*. Oxford University Press, London, 888pp.

Gruisen, J.V. (1998). Rajasthan. *Tiger Link* 4(1): 10–11.

Menon, V. (2003). *A Field Guide to Indian Mammals*. Dorling Kindersley (India) Pvt. Ltd., Delhi, 201pp.

Newmark, W.D., J.I. Boshe, H.I. Sariko & G.K. Mahumbule (1996). Effects of highway on large mammals in Mikumi National Park, Tanzania. *African Journal of Ecology* 34: 15–31.

Reijnen, R., R. Foppen, C.T. Braak & J. Thissen (1995). The effects of car traffic on breeding bird populations in woodland III: reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* 32(1): 187–202.

Ramesh, C.S. (2013). Mitigation Impact of National Highway-58 on Indian Primate, Hanuman Langur (*Presbytis entellus*) in Uttarkhand Himalayas. In: Proceedings of the 2013 International Conference on Ecology and Transportation (ICOET 2013). Scottsdale Arizona, United States, 14pp.

Richardson, J.H., R.F. Shore & J.R. Treweek (1997). Are major roads a barrier to small mammals? *Journal of Zoology, London* 243: 840–846.

Rosen, C. & C.H. Lowe (1994). Highway mortality of snakes in the Sonoran desert of Southern Arizona. *Biological Conservation* 68: 143–8.

Selvan, K.M., Natarajan Sridharan & Sajan John (2012). Roadkill animals on national highways of Karnataka, India. *Journal of Ecology and the Natural Environment* 4(14): 363–365.

Seshadri, K.S., A. Yadev & K.V. Gururaja (2009). Road kills of amphibians in different land use areas from Sharavathi River basin, central Western Ghats India. *Journal of Threatened Taxa* 1(11): 549–552. https://doi.org/10.11609/JoTT.o2148.549-52

Spellerberg, I.F. (2002). *Ecological Effects of Roads.* Science Publishers Inc., Enfield, 260pp.

Trombulak, S.C. & C.A. Frissell (2000). Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology* 14(1): 18–30.

Vijayakumar, S.P., K. Vasudevan & N.M. Ishwar (2001). Hepetofaunal mortality on the roads in the Anamalai Hills, southern Western Ghats. *Hamadryad* 26(2): 265–272.

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