

Short Communication

Roadkill animals on national highways of Karnataka, India

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Highways passing through national reserves/wildlife sanctuaries have adverse impact upon wild animals. The present survey was conducted to estimate the roadkills on the National Highways NH212 and NH67 passing through Bandipur Tiger Reserve, Karnataka, India during summer and pre-monsoon season at various vegetational levels. The roadkills were monitored thrice a month in each habitat between January, 2007 and June, 2007 and a total of 423 roadkills belonging to 29 species were recorded. Reptiles were the most affected taxa (37.59%) followed by amphibians (29.55%), mammals (19.39%) and birds (13.48%). The variability in season indicated higher roadkills in pre-monsoon (55.6%) compared to those in summer season (44.6%). According to vegetation, the overall roadkill was 50% in mixed deciduous forest and 22.40% in the teak forest and bamboo. Conservation and management implications are essential to prevent the local extinct of faunal and floral.

Key words: Roadkill, highway, vertebrates, Bandipur National Park.

INTRODUCTION

Human encroachments and developmental activities continue to threaten the wildlife by fragmenting their habitat and isolating the residential animals (Mader, 1984) the loss of habitat and change in habitat extent beyond the road (Spellerberg, 1998) also caused major threats to wild plants and animals (Forman and Alexander, 1998). The mortality of animals' collision with vehicle is well documented (Groot and Hazebroek, 1996). Roads play major role in killing animals by collision with vehicles (Trumbulak and Frissell 2000) which is mainly dangerous to small mammals, reptiles, amphibians (Adams and Geis, 1983; Ashley and Robinson, 1996; Fahrig et al., 1995; Hodson, 1966) birds and other animals collision with vehicle and trains are common (Chhangani, 2004).

Globally, many studies have been done on road mortality mammals (Newmark, 1992; Drews, 1995; Newmark et al., 1996; Richardson et al., 1997) to birds (Reijnen et al., 1995; Drews, 1995; Loos and Kerlinger, 1993), reptiles (Drews, 1995; Gokula, 1997; Das et al., 2007), amphibian (Vos and Chardon, 1998; Vijayakumar

et al., 2001; Das et al., 2007; Seshadri et al., 2009). Highways have impact on wildlife including endangered species, recently a Leopard was killed by vehicular collision (Baskaran and Boominathan, 2010).

Study area

Data were collected in NH212 and NH67 which are passing through Bandipur Tiger Reserve (11°39'N 76°37'E) Westernghats. NH67 runs from Nagapattinam in Tamil Nadu to Gudalpet in Karnataka and NH 212 runs from Kozhikode in Kerala to Kollegal in Karnataka and both intersect in Gundalpet, Karnataka, India. The survey was done 15 KMS stretch of NH67 and 40 KMS stretch of NH212 from Gundalpet. The vegetation existing along both sides of road comprised of dry deciduous, moist deciduous, mixed deciduous, teak plantation and Bamboo forest. The vegetation is mainly composed of *Anogeissus latifolia*, *Tectona grandis*, *Bambusa arundinacea*, *Dendrocanamus strictus*, *Grevia taelefolia* and *Lantana camera* bushes. The temperature varies from 20 to 32°C and the annual rainfall ranges from 625 to 1250 mm.

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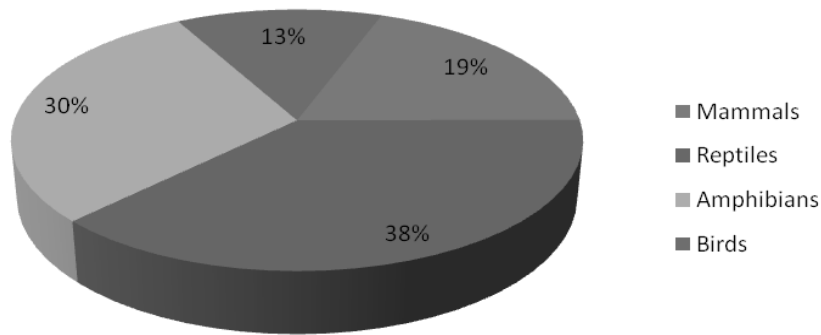


Figure 1. Composition of road kills from January to June 2007.

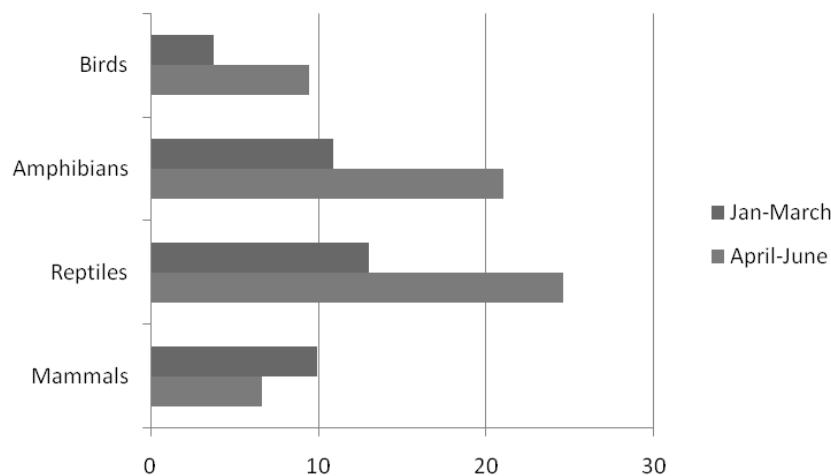


Figure 2. Road kills in different season.

METHODOLOGY

The road passing through national park was sampled from January 2007 to June 2007 Figure 1. The roads were systematically surveyed in early morning hours from 6:00 to 9:00 AM by vehicle (10 to 15 km/h). Each stretch was surveyed thrice in a month and opportunities encounter also was recorded and the over all percentage of mortality rates was calculated in vegetation and season wise also.

Counted animals were removed from the road to avoid the repetition. The roadkills were recorded according to vegetation types to see number of kills in different vegetation types. For identification we used field guides (Menon, 2003; Grimmat et al., 1998; Daniels, 2002). We have not preserved any animals during our survey.

RESULTS AND DISCUSSION

A total of 423 individual kills (0.42/km) belonging to 29 species have been recorded, in which 82 (19.39%) mammals, 57 (13.48%) Aves, 159 (37.59%) reptiles, 125 (29.55%) amphibians were recorded. The encounter rate of mammals mortality rate was 0.08/km, Aves 0.05/km, reptiles is 0.1/km and amphibian 0.1/km. Bonnet

macaque (N = 28) was the major victim among 11 species of mammals. In reptiles most killed animal was snake (N = 133) and in case of amphibian's toad (N = 72) was found to be high. For birds owls was the common kill (N = 13) Figure 2.

According to vegetation the overall roadkill occurrence had taken place in a high amount in mixed deciduous forest (N = 233) 50%. The teak forest (N = 95) 22.40% and bamboo (N = 95) 22.40% played a equal role in the opportunity of the animal is being killed.

Precisely (N = 189) 44.6% of animal kills occurred during summer (January to March) and (N = 234) 55.6% of kills occurred in pre monsoon (April to June). The data shows 25% mammal, 21% of Aves, 29% reptile and 25% amphibian during summer 2007. For pre-monsoon, 13% of mammal, 7% of Aves, 44% of reptiles and 36% amphibian roadkills were observed.

There was greater mortality in amphibians and reptiles during rainy season than summer due to the slow moving behavior of these species (Baskaran and Boominathan, 2010). Most of the amphibians were unidentified due to the vehicle ran over the animals and the data showed

higher mortality during rainy season (Vijayakumar, 2001). In case of reptiles, snakes showed the highest mortality due to their use of road substrate for their thermo regulation (Vijayakumar, 2001; Das et al., 2007), especially venomous snake like Russell Viper, Common cobra and Krait were comparatively higher in number than non venomous snakes. Venomous snakes crossing the road were more than non-venomous snakes (Andrews and Gibbons, 2005).

Among Aves, nocturnal birds had the highest mortality since they come to road to prey on amphibians and reptiles. It was observed that the owl and nightjars often come to road; also, high flying birds crossing the road unfortunately getting killed by vehicles. The fact that birds were getting killed more in rainy season than summer could be because of the herpetofaunal movement on the road during rainy season. Among mammals Macaque was found to be high in tourist zone due to the begging behavior and the mammals kill were high in summer it might be in search of food and water.

The composition of roadkills varied according to vegetations. Mammal's mortality was high in mixed deciduous forest; there was the tendency of mammals getting killed in dense forest (Clevenger et al., 2003), whereas reptiles and amphibians found to be high in mixed deciduous and teak plantation.

CONCLUSION AND MANAGEMENT IMPLICATIONS

The study showed that average roadkill was 70.5 every month. The impact of road on wild animals and plants may be attributed to human developmental activities. Apart from collisions, fire and plastics play major roles in animal mortalities. The effect of road cannot be confined to single species so single species management will not be effected. The verges of roadside bushes should be removed to increase visibility so that drivers can avoid accidents as well as increase the shyness for animals to cross the roads. Underpasses, shining sign boards, and speed breakers can minimize the road killing of large bodied animals or small amphibians and reptiles. Small drainages or v-shaped trenches can be built at edge of the road wherever the road passes through wildlife habitats.

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REFERENCES

Adams LW, Geis AD (1983). Effects of roads on small mammals. J. Appl. Ecol. 20:403-415.

- Andrews KM, Gibbons WJ (2005). How do highways influence snake movement? Behavioral responses to road and vehicles. *Copeia* 4:772-782.
- Ashley EP, Robinson JT (1996). Road mortality of amphibians, reptiles and other wildlife on the Long Point Causeway, Lake Erie, Ontario. *Can. Field- Nat.* 110:403-412.
- Baskaran N, Boominathan D (2010). Road kills of animals by highway traffic in the tropical forest of Mudumalai Tiger reserve, southern India. *J. Threatened Taxa* 2(3):753-759.
- Chhangani AK (2004). Frequency of avian road kills in Kumbhalgarh wildlife sanctuary, Rajasthan, India. *Forktail* 20:110-111.
- Clevenger APB, Chruszcz K, Kunson E (2003). Spatial patterns and factor influencing small vertebrate fauna road kill aggregations. *Biol. Conserv.* 109: 15-26.
- Daniel JC (2002). *The Book of Indian Reptiles and Amphibians*. Oxford University Press, Bombay Natural History Society Bombay, India. p. 238.
- Das A, Ahmed MF, Lahkar BP, Sharma P (2007). A preliminary report of reptilian mortality on road due to vehicular movement near Kaziranga National Park, Assam, India. *Zoos' Print J.* 22(7):2742-2744.
- Drews C (1995). Road kill of animals by public traffic in Mikumi National Park, Tanzania with notes on baboon mortality. *Afr. J. Ecol.* 33:89-100.
- Fahrig L, Pedlar JH, Pope SE, Taylor PD, Wegner JF (1995). Effect of road traffic on amphibian density. *Biol. Conserv.* 73:177-182.
- Forman RTT, Alexander LE (1998). Roads and their major ecological effects. *Annu. Rev. Ecol. Syst.* 29:207-231.
- Frissell CA, Trombulak SC (2000). Review of ecological effect of road on terrestrial and aquatic communities. *Conserv. Biol.* 14:18-30.
- Gokula V (1997). Impact of vehicular traffic on snakes in Mudumalai Wildlife Sanctuary. *Cobra* 27:26-30
- Grimmett R, Inskipp C, Inskipp T (1998). *Birds of Indian Subcontinent*. Oxford University press. . 888 pp.
- Groot Bruinderink GWTA, Hazebrock E (1996). Ungulate traffic collisions in Europe. *Conserv. Biol.* 10:1059-1067.
- Hodson NL (1966). A survey of road mortality in mammals (and including data for the grass snake and common frog). *J. Zool.* 148:576-579.
- Loos G, Kerlinger P (1993). Road mortal of sawwhet and Screech Owls on the Cape May peninsula. *J. Raptor Res.* 27:210-213.
- Mader HJ (1984). Animal habitat isolation by roads and agricultural fields. *Biol. Conserv.* 29:81-96.
- Menon V (2003). *A field guide to Indian Mammals*, Dorling Kindersley.
- Newmark WD (1992). The selection and design of nature reserves for the conservation of living resources. In: *Managing protected areas in Africa*. (Compiler W.J. Lusigi). UNESCO, Paris.
- Newmark WD, Boshe JI, Sariko HI and Mahumbule GK (1996). Effects of highway on large mammals in Mikumi National Park, Tanzania. *Afr. J. Ecol.* 34:15-31.
- Reijnen R, Foppen R, Braak CT, Thissen J (1995). The effects of car traffic on breeding bird populations in woodland III: Reduction of density in relation to the proximity of main roads. *J. Appl. Ecol.* 32:187-202.
- Richardson JH, Shore RF, Treweek JR (1997). Are major roads a barrier to small mammals? *J. Zool. London.* 243:840-846.
- Seshadri KS, Yadev A, Gururaja KV (2009). Road kills of amphibians in different land use areas from Sharavathi river basin, central Western Ghats India. *J. Threatened Taxa.* 1(11):549-552.
- Spellerberg IF (1998). Ecological effect of road and traffic : a literature review. *Glob. Ecol. Biogeogr. Lett.* 7:311-313.
- Vijayakumar SP, Vasudevan K, Ishwar NM (2001). Herpetofaunal mortality on the roads in the Anamalai Hills, southern Western Ghats. *Hamadryad* 26(2):265-272.
- Vos CC, Chardon JP (1998). Effects of habitat fragmentation and road density on the distribution pattern of the moor frog, *Rana uruulis*. *J. Appl. Ecol.* 35:44-56.