



## Road network is a death trap for wildlife, a note on the roadkill of Small Indian Civet (*Viverricula indica*) from the Banaskatha district of Gujarat, India

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### Abstract

Roads kill hundreds of millions of animals every year and pose a significant threat to many species. Vehicles cause significant mortality among the wildlife as roads bisect the home ranges, territories, migration routes, and movement corridors for wildlife. We have observed two roadkill of Indian civet (*Viverricula indica*) in the Banaskatha district of Gujarat. Both roadkills were located nearby the human habitation and agricultural areas, whereas scrub patch was scattered and small. *Prosopis juliflora*, an alien invasive species of the area, dominated along the roadside which provides suitable habitat for the small Indian civet and its prey for hiding and used as wildlife refugia as well as it offers readily available food thrown out by passengers hence it attracts wildlife and acts as an ecological trap. Despite the widespread distribution of Indian civets, little is known about their ecology, behavior, and threat. Minimizing road-induced mortality among wildlife demands an interdisciplinary approach.

**Keywords:** Ecological trap, road ecology, road mortality, Indian civet

### Introduction

Road kills hundreds of millions of animals every year and poses a significant threat to many species (Schwartz et al., 2020). Road also influences many natural phenomena and affects biodiversity in unpredictable patterns; hence it emerges as an entirely new branch of Ecology, called “Road Ecology”

(Forman and Alexander, 1998; Forman et al., 2003; Schwartz et al., 2020). Roads affect both biotic and abiotic components of the landscape by changing the dynamics of plants and animals, altering the flows of material in the landscape (Bennett, 1991). Vehicles cause significant mortality among wildlife (Bennett, 1991; Coffin, 2007), as roads bisect the home ranges, territories, migration routes, and movement corridors of wildlife. Besides this, the road also attracts the wildlife, as readily available food can be found along the road thrown out from the travelers/passengers, hence road act as an “Ecological Trap” for some species (Oxley et al., 1974; Brock and Kelt, 2004). Roads act as a barrier that hinders the movement of animals and fragments their breeding population (Bhattacharya et al., 2003), this led to the loss of habitat connectivity (Carr et al., 2002) and restrict the species dispersal with the adjoining landscape and habitat. Besides this road serve as an agent for the spread of invasive species, as it provides abundant nutrient (Parendes and Jones, 2000). Road networks foster fragmentation and deforestation and lead to more anthropogenic effects on the ecosystem, as roads increase the access to those areas (Peres and Lake, 2003; Morelli et al., 2014; Van et al., 2015). Small Indian civet (*Viverricula indica*) known as Oriental Civet, adopted to a wide variety of habitats throughout their vast geographical range of south Asia and south-east Asian countries i.e., Sri Lanka, Pakistan, most of India, Nepal, Southern and Central China, Taiwan, Bangladesh, and Indonesia (Mudappa, 2002). Due to *the* generalist preference *for* habitat, in India, Small Indian Civets are distributed from the foothill of the *Himalayas* to the southern tip of Kanyakumari (Charoo et al., 2010; Menon, 2014). Small Indian civet *is* found in almost all kinds of *habitats* i.e., Bushland, deciduous forest, grassland, marshes, riverine habitat, mangroves, semi-evergreen and evergreen forest, and scrubland (Feeroz et al., 2012). Small Indian civet is listed in the ‘Least Concern’ category by the IUCN, whereas it falls under the ‘Schedule-II’ category of the Wildlife (Protection) Act, 1972. Small Indian civet has brown, yellow, and orange pelage with white and black rings on their necks, whereas small spot-on body which merge into seven stripes towards the tail. They have also remarkable white and black banded rings on the tail (Fig. 1 & Fig. 2). Besides this Indian civet has dark brown and black paws, whereas the breast is a lighter brown or grayish with less marking (Fig 1).



**Figure 1.** Roadkill of Small Civet on Jetda - Deodar State highways



**Figure 2.** Roadkill of Indian civet on Changa- Thara State highways

While traveling through the various roads within the Banaskatha district of Gujarat two instances of roadkill of Small Indian Civet (*Viverricula indica*) were encountered (Table 1). Banaskatha district is located in the northern part of Gujarat state falling partially under the arid and semi-arid

biogeographical zones of India. In recent times, due to the enhanced irrigation facility through the Narmada canal, the entire district has had significant changes observed in the land use and land cover.

**Table 1.** Location of roadkill of the Small Indian Civet

Sr. No	Date	Location	Locality	Road Name	Road Category
1	28 <sup>th</sup> June 2021	N 24°19.572' E 71°45.763'	Jetda	Jetda – Deodar	Important district roads
2	15 <sup>th</sup> September 2021	N 23°58.063' E 71°46.581'	Khodiyal Nagar	Changa – Thara	Rural road

The roadkill of Small Indian Civets in both instances was observed during the early morning hours. While observing the dead body, we suspect that the Indian civet might have regularly crossed the road to catch prey in nearby human habitation, as the nearest village is located within 300 m from the location of roadkill. Near the site, the majority of the area is used for cultivation. *Prosopis juliflora*, an alien invasive species of the area, dominated along the roadside which provides suitable habitat for the small Indian civet for hiding and used as wildlife refugia (Fig. 3). The areas along the roadside have increased levels of nitrogen in soil by the accumulation of nutrients and in the air due to the release of nitrogen by the vehicle and therefore lead to the fast growth of vegetation patches along the roads which provide habitat for animals mainly the nocturnal animal (Lee et al., 2015).

The population of small Indian civets is diminishing day by day in their native ranges due to natural as well as anthropogenic activities. Small Indian civets move slowly due to the small leg size which put the animal more vulnerable during crossing roads led to road mortality through collisions with vehicles (Jochimsen et al., 2014). Small Indian civet is primarily carnivore and they eat mainly small

vertebrates, especially rodents (Nowak et al., 2005), this may be due to the that, they live in proximity to agricultural areas, which supports the rodent population is abundant.



**Figure 3.** Patch of *Prosopis Juliflora* along the road verge

The road is one of the major communication infrastructures and demands people for reaching various destinations in a faster way. The road is also one of the major modern development indicators of an area. With the increasing pace of road network development in every part of the Gujarat state, specifically in forest areas, rich biodiversity areas, and native range wildlife, putting more wildlife vulnerable, day by day. With the increasing road network, the relative number of vehicles is also growing nowadays and as a result every day, thousands of animals are killed through road accidents in various parts of the state. Many of the road kills are cleared by stray dog and flesh-eating birds like crows and raptor species, and therefore the actual number of road kills are not reported. Further, the lack of awareness about the importance of wildlife and their population status among the common people is one of the major challenges for minimizing the road kills of wildlife and saving our valuable wildlife.

The strategy for mitigating roadkill requires an interdisciplinary approach, involving road ecology, geography, engineering, and appropriate planning (Coffin, 2007). Further, there is a need to identify the wildlife corridors along with the road network and collision hotspot to put signing board and instructions for slow driving in such areas to minimize the road kills. Despite the widespread distribution of Small Indian civets in the Indian subcontinent and India, little is known about their ecology, behavior, and movement pattern.

## References

- Bennett, A.F. (1991). Roads, roadsides and wildlife conservation: a review. In: Saunders, D.A., Hobbs, R.J. (Eds.), *Nature Conservation 2: The Role of Corridors*. Chipping Norton, Australia, Surrey Beatty, pp. 99–117.
- Bhattacharya, M., Primack, R.B., Gerwein, J. (2003). Are roads and railroads barriers to bumblebee movement in a temperate suburban conservation area. *Biological Conservation* 109, 37–45.
- Brock, R.E., Kelt, D.A. (2004). Influence of roads on the endangered Stephens' kangaroo rat (*Dipodomys stephensi*): are dirt and gravel roads different. *Biological Conservation* 118, 633–640.
- Carr, L.W., Fahrig, L., Pope, S.E. (2002). Impacts of landscape transformation by roads. In: Gutzwiller, K.J. (Ed.), *Applying Landscape Ecology in Biological Conservation*. Springer-Verlag, New York, pp. 225–243.
- Charoo AS, Sharma KL, Sathyakumar, S. & Naqash, Y.R. (2010). First record of small Indian civet *Viverricula indica* in Kashmir Himalaya, India. *Small carnivore conservation* 43: 42-43.
- Coffin, A.W. (2007). From roadkill to road ecology: a review of the ecological effects of roads. *J TranspGeogr* 15:396–406. <https://doi.org/10.1016/j.jtrangeo.2006.11.006>.
- Feeroz, M., Hasan, M., Hossain, M. (2012). *Biodiversity of Protected Areas of Bangladesh, Vol. II, Dudpukuria-Dhopachari Wildlife Sanctuary*. BioTrack, Arannayk Foundation, Dhaka, 224pp.
- Forman RTT, Alexander, L.E. (1998). Roads and their major ecological effects. *Annu Rev Ecol Syst* 29:207–231.
- Forman RTT, Sperling, D., Bissonette, J.A., Clevenger, A.P., Cutshall, C.D., Dale V.H., et al. (2003). *Road ecology: science and solutions*. Washington, DC: Island Press.
- Jochimsen, D.M.; Peterson, C.R.; Harmon, L.J. (2014). Influence of ecology and landscape on snake road mortality in a sagebrush-steppe ecosystem. *Anim. Conserv.* 17, 583–592.
- Lee, E., Croft, D.B., Achiron-Frumkin, T. (2015). Roads in the arid lands: Issues, challenges and potential solutions. In *Handbook of Road Ecology*; van der Ree, R., Smith, D.J., Grilo, C., Eds.; Wiley-Blackwell: Chichester, UK, pp382–390.
- Morelli, F., Beim, M., Jerzak, L., Jones, D., Tryjanowski, P. (2014). Can roads, railways and related structures have positive effects on birds? —A review. *Trans. Res. Part D*, 30, 21–31.
- Mudappa, D. (2002). Observations of small carnivores in the Kalakad Mundathurai Tiger Reserve, Western Ghats, India. *Small Carnivore Conservation* 27: 4–5.
- Nowak, R., E. Walker, Macdonald, D., & Kays, R. (2005). *Walkers' carnivore of the world*. New York: JHU Press.
- Oxley, D.J., Fenton, M.B., Carmody, G.R. (1974). Effects of roads on populations of small mammals. *Journal of Applied Ecology* 11, 51–59.
- Parendes, L.A., Jones, J.A. (2000). Role of light availability and dispersal in exotic plant invasion along roads and streams in the H.J. Andrews Experimental Forest, Oregon. *Conservation Biology* 14, 64–75.

- Peres, C.A., Lake, I.R. (2003). The extent of nontimber resource extraction in tropical forests: accessibility to game vertebrates by hunters in the Amazon Basin. *Conservation Biology* 17, 521–535
- Schwartz, A.L.W., Shilling, F.M., & Perkins S.E. (2020). The value of monitoring wildlife roadkill. *European journal of wildlife research*. 66:18. <https://doi.org/10.1007/s10344-019-1357-4>
- Van der Ree, R., Smith, D.J., Grilo, C. (2015). (Eds.) *Handbook of Road Ecology*; Wiley-Blackwell: Chichester, UK.