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Human pursuits cause of road killing of wild and domestic animals by accident on National Highway of Punjab, Pakistan

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ABSTRACT

Introduction: Anthropogenic impacts i.e. deforestation for roads and alteration of the natural ecosystem negatively impacts on the wildlife. So they have to move or migrate seasonally in search of food and shelter. During this activity, these animals passed away due to the striking of heavy and speed over traffic. This is an alarming issue all over the world; every year large of animal's death is reported in every country. So focus on this problem and designed the study to explore the issues about wildlife accidents.

Materials and methods: The road is visited by the vehicle that having a route from Rahwali (Gujranwala, district) to Faizabad (Rawalpindi, district) and vice versa. The total length of this road is 208km, we used questionnaire and photographs (4 x 6 inch) wild and domestic fauna. The data were collected on the monthly basis. For identification field guides were used.

Results: Results showed that Canis family (N = 271) was the major victim as compared to others families; while among rodents *Rattus rattus* (N=29) is more accidental. In reptiles, the most killed animal was *Aspideretes gangeticus* (N = 19) and in case of amphibian's *Bufo Stomaticus* (N = 16) was found to be high.

Conclusions: The impact of the road on wild animals and plants may be attributed to human developmental activities. Wildlife underpasses and corridors should be built to reduce the accidents.

Key words: Mammal, Bird, Rodents, Reptile, Punjab

INTRODUCTION

Anthropogenic impact in the form use of vehicles is the serious threats to the declining wild animals in human dominant areas. Such crucial situation, wild animals have to establish the new home range and a mass movement in the search of food derives them to come on the road, on this activity wild animals death happened during a road accident. Mortality directly or indirectly of wild animals is not a healthy sign for a balanced ecosystem, not a healthy environment (Pandy, 2016). Small and large roads are the major threats of killing for wild animals (Baskaran and Boominathan, 2010). Roads or highways in and around the wild habitat are the major cause of alteration of habitat and cause of extinction of wild animals (Burnett, 1992; Carr and Fahrig, 2001) and fragmentation to the distribution of wild animals and their attitude (Newmark *et al.*, 1996), impact on breeding capability (Reijnen *et al.*, 1995). Genetic polymorphism, heterozygosity and on spot death of wild fauna by the collision of vehicles (Das *et al.*, 2007; Baskaran and Boominathan, 2010). This death ration increases with the increasing number of vehicles and population explosion of humans; it is considered that over speed vehicles having more serious threats of killing (Baskaran and Boominathan, 2010). Many studies have been completed over the globe about the mortality of mammals, birds, reptiles, amphibians and killing of endangered species (Selvan *et al.*, 2012). It is reported that previous 30 years record showed that most of the mortalities on roadside killing is due to striking of vehicles that are directly killing of wild animals by humans (Forman and Alexander, 1998). Each year mortality rate in Spain is 10^7due to a road (Caletrio *et al.*, 1996). Many reptiles' species are reported in death in Canada. Thousands of road accidents are reported in Australia every year, while, in Australia kangaroo and wallabies were commonly reported a roadside accident (Rowden *et al.*, 2008).

Globally, there is increased scientific interest in road kill and road ecology (Seiler *et al.*, 2004). America, Australia, Europe and Africa are the continents where the population is aware of the loss of wildlife during a road accident. But in Asia, there is no action plan to save the wildlife. Especially road that divides the habitat of wild animals is more vulnerable to the mortality of wild animals and ecosystem disturbance (Lalo, 1987; Vijayakumar *et al.*, 2001; Das *et al.*, 2007). Roads are the necessity, however, these proven serious threats to the wild animals directly and indirectly (Seiler *et al.*, 2004).

However, in Pakistan, there is a lot of animals causality takes place every day but there is no serious attention to this hot and explosive issue. The main objective of the study is to explore the issues about wildlife accidents.

MATERIALS AND METHODS

Study area: Data were collected in NH5 from Rahwali Cannt (Gujranwala) to Faizabad (Rawalpindi) 208 km long road, which passes through several natural habitats and villages that are rich in animal fauna like mammals, rodents, reptiles, amphibians and birds. The vegetation existing along both sides of road comprised of dry deciduous and agro-pastoral areas. This area is highly fertile due to four distinct seasons (summer, winter, autumn and spring). That's why animal's movement in search of food and shelter is really challenging.

Climate: The climate of the district is hot and dry during summer and moderately cold in winter. The summer season starts in April and continues till September. June is the hottest month with maximum and minimum temperatures of 46ºC and 27ºC, respectively. Relief is only provided by occasional dust storms. The winter season begins in November and lasts till March. January is the coldest month and fogy; while the maximum and minimum temperatures during this month are 19ºC and 5ºC, respectively. The sky is frequently overcast during winter with meager

rainfall. The monsoons set in July and continue till September. The eastern part (Jhelum, to Rawalpindi) of the study area receives more rain. The average annual rainfall in this zone varies from 625 to 1250 mm millimeters. The soil is alluvial and fertile. It is a flat strip of land running roughly east to west (Khattak and Ali, 2015).

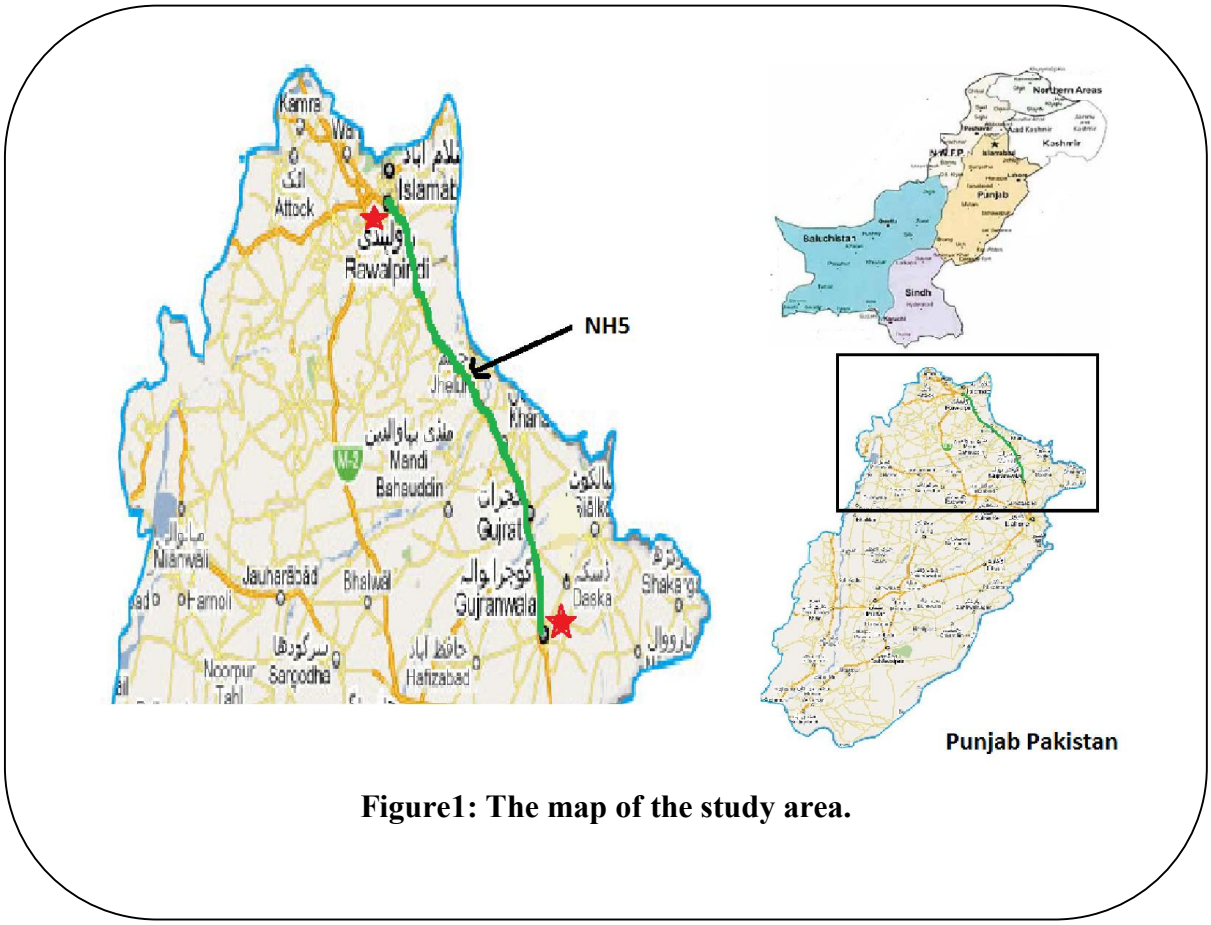

Figure1: The map of the study area.

Methodology: The road is visited by the vehicle that having a route from Rahwali (Gujranwala) to Faizabad (Rawalpindi) daily and vice versa. The total length of this road is 208km, we used questionnaire and photographs (4 x 6 inch) wild and domestic fauna. The data were collected on the monthly basis. For identification field guides and books were used (Roberts, 1991, 1992; Grimmett, 1998; Menon and Daniel, 2003; Roberts, 2005a, b; Khan, 2006)

Results and discussion

A total 636 individuals killed (3.0/km) belonging to 31 species are recorded. In which (326) are large mammals while small mammals (rodents, porcupine, hare, and Indian mongoose) are (142), aves are (67), reptiles are (65) and amphibians are (36) in number (Figure 2 and Table 1).

Canis family (N = 271) was the major victim as compared to others families; and among rodents *Rattus rattus* (N=29) is more accidental. In reptiles, the most killed animal was *Aspideretes gangeticus* (N = 19) and in case of amphibian's *Bufo Stomaticus* (N = 16) was found to be high. For birds, *Athene brama* was the common kill (N = 18).

Above interpreted data indicates that amphibians and reptiles are less affected by attack due to their hibernator in nature. And mammals are more frequently killed during winter due to fogy season and a shortage of food, in searching food items they mammals wonder around the human settlements where they were frequently attacked by vehicles. There was greater mortality in amphibians and reptiles during the rainy season than summer due to the slow moving behavior of these species (Baskaran and Boominathan, 2010). Most of the amphibians and rodents were unidentified due to the vehicle ran over the animals.

Conclusion: The impact of the road on wild animals and plants may be attributed to human developmental activities. The effect of the road cannot confine to single species so single species management will not be affected. 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 signboards, 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 the edge of the road wherever the road passes through wildlife habitats

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Availability of data: We have included all relevant data in the manuscript that were collected during the field survey.

Authors' contributions: Chattha designed this study and also performed the research; Malik and Altaf helped in data write up; Mahmood, Khan, Ali and Javid analysis article and approved as final manuscript.

Table 1: The animals kill in the road accidents.

Sr.	Common name	Scientific names	Mortality
Amphibians			
1	Indus Valley toad	*Bufo Stomaticus*	16
2	Indian Bullfrog	*Hoplobatrachus tigerinus*	11
	Unidentified		9
	Total		36
Reptiles			
3	Russell's viper	*Daboia russelii*	4
4	Common snake	*Lycodon aulicus*	6
5	Krait	*Bungarus caeruleus*	3
6	Indian Monitor	*Varanus bengalensis*	13
7	Indian soft shell	*Aspideretes gangeticus*	19
8	Indian Flap-shelled Turtle	*Lissemys punctate*	15
	Unidentified		**5**
	Total		65
Birds			
9	Sparrow	*Passer domesticus*	6
10	Common swallow	*Hrundor ustica*	7
12	Hoopoe	*Upupa epops*	13
13	Tawny pipit	*Anthus campestris*	5
14	Spotted little owlet	*Athene brama*	18
15	Common Myna	*Acridotheres tristis*	8
	Unidentified		9
	Total		67
Small mammals			
16	House mouse	*Mus musculus*	24
17	House rat	*Rattus rattus*	29
18	Shrew	*Suncus murinus*	35

19	Indian gerbil	*Tatera indica*	16
20	Mongoose	*Herpestes javanicus*	9
22	Hare	*Lepus migricollis dayanus*	5
23	Porcupine	*Hystrix indica*	14
	Unidentified		10
	Total		142
Large mammals			
24	Asiatic jackal	*Canus aureus*	9
25	Fox	*Vulpes bengalensis*	2
26	Goat	*Capra aegagrus hircus*	8
27	Cow	*Bos taurus*	2
28	Buffalo	*Bubalus bubalis*	1
29	Donkey	*Equus africanus*	5
30	Domestic cat	*Felis domesticus*	15
31	Domestic dog	*Canis lupus familiaris*	271
	Unidentified		13
	Total		326
Overall total			**636**

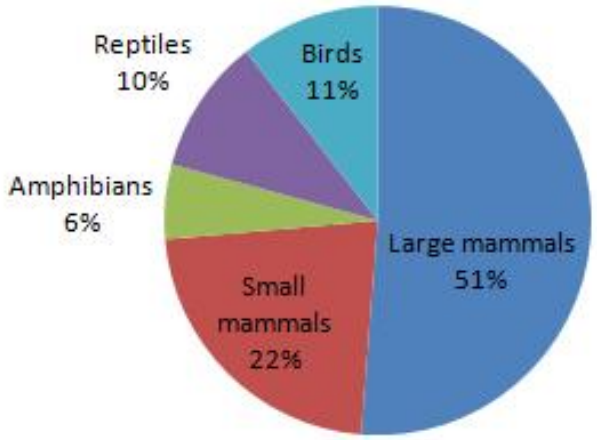

Figure 2: The different animals groups killed during road accident.

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