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Surveillance of avian mortality on the road passing through Pohra – Malkhed reserve forest district Amravati, Maharashtra

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Abstract
Anthropogenic activities severely affect the avian population and becoming serious threat to avian population and its biodiversity. Roads traffic is becoming one of the greater threats to animal and plant population. In India the highways are going through many protected forest areas and causes severe impact to wildlife and their habitat. In India, few studies were carried out regarding mortality of avian fauna. Hence the attempt has been made to study the mortality in birds on state highway passing through Pohara-Malkhed reserve forest and its percentage to total avian fauna by quantitative analysis of avian carcases. For Surveillance, regular visits for 1 year at a weekly interval along with some occasional visits was undertaken during January 2015- Dec 2015 to identify the carcasses. The identification of birds was done by morphologically and through photographic evidences. The data was recorded including the name of species, family, place and date of occurrence etc. Frequency of mortality of birds was calculated by assessing the number of carcasses. From the observations it is found that the Greater Coucal (*Centropus sinensis)* is the most dominant species found dead in road vehicle collision, followed by Red - vented Bulbul (*Pycnonotus cafer*), Spotted Owlet (*Athene brama*), Common Myna (*Acridotheres tristis*), Indian Nightjar (*Caprimulgus asiaticus*). Family wise maximum mortality was recorded in the family Centropodidae followed by Pycnonotidae, Strigidae, Caprimulgidae. Seasonal variation shows that maximum mortality was found during the months of January- February-March and minimum mortality during the months of Apr – June. This preliminary study provides a baseline data on the magnitude of avian mortality on roads passing through reserve forest. The impact of such loss on avian population remains unknown. Long term study will be needed to evaluate such impact on Biodiversity.

Keywords: avian mortality, road vehicle collision, Pohra – Malkhed reserve forest, Maharashtra

Introduction
There are approximately 80 million birds are killed due to collision with road vehicles every years in the United Sates alone [1] and approximately 13 million birds estimated to be killed annually in Canada [2]. Highways through wild life reservoir affects the fauna seriously and the effects ranges from habitat loss and fragmentation, direct mortality through collision with vehicle [3, 4, 5, 6, 7]. Roads are becoming one of the greater threats to animal and plant population. In India the highways are going through many protected areas and causes severe impact to wildlife and their habitat [5, 8].

Besides road killing, the mortality in birds due to injury, poisoning, climatic factors, parasites, infectious diseases, and deaths due to some unknown causes has been studied [9, 10]. The avian mortality due to collision with power line and electrocution is described from a long time [11, 12]. Predator and scavenger bird species are poisoned from poison-baits particularly in the areas where game management and livestock farming were done. Anthropogenic use of lead is also found to be associated with the bird mortality [13].

In India, few studies were carried out regarding mortality of birds and its percentage to total avian fauna [5, 8]. Amravati District is rich in Biodiversity of avian fauna with recorded 265 birds species. This study is selected because there is lack of data regarding the mortality of birds in Amravati District. Hence attempt has been made to study the mortality in birds by quantitative analysis of avian carcases. The Indian subcontinent hosts about 1295 bird species [14] of which more than 600 species have been reported from Maharashtra State. In Vidarbha, a total of 417 bird species has been reported till date [15] and also in Amravati district 392 bird species has been recorded [16, 17].

In Vidarbha, protected forests, grassland pockets, number of water bodies and agriculture crop patterns has maintained the great diversity of avifauna. Forests in Vidarbha occupy about 31.60% of the total area of Maharashtra state forest. The forest types found in the area are classified as the sub-tropical hill forest, Tropical Moist Deciduous Forest and Lush Green Deciduous Forest [18]. Vidarbha has three main seasons: the wet monsoon and post monsoon from June to October, the cool dry winter, from October to March and the hot dry season from March till the onset of rains. Temperature of Vidarbha ranges from minimum of 12ºC- 25º C to a maximum of 30ºC-48ºC with the relative humidity varying from 10-15% to 60-95%. Annual precipitation is 1000 – 1700 mm and about 90% of the precipitation is in four months, i.e. from June to September.

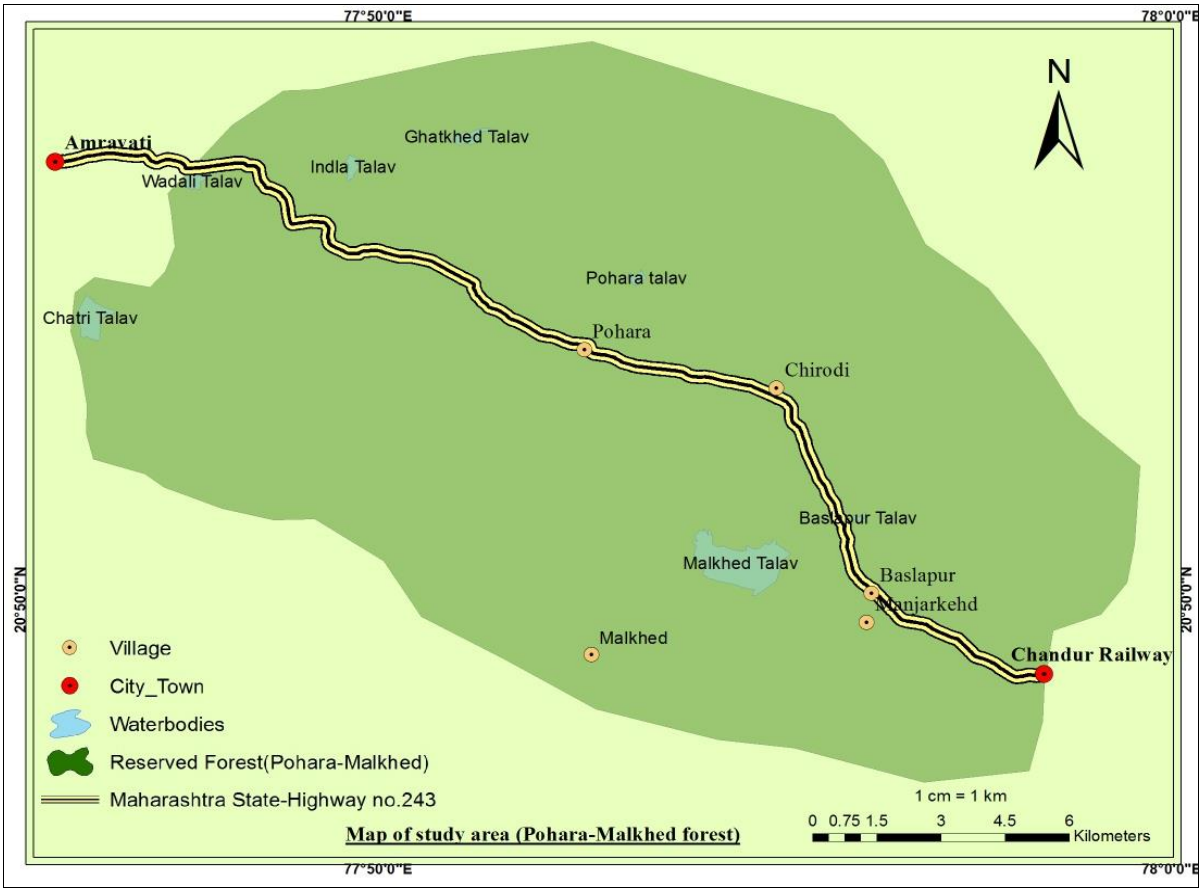

Fig 1: Map of study area (Pohra – Malkhed Reserve forest)

Study Area

Pohra – Malkhed Reserve forest

Pohra – Malkhed forest is the most Avian diversity rich reserve forest of Amravati District. It is located between N 20^0 54' 229'' and E 77^0 51' 104'' with an elevation on 455 meter. Annual average rain fall is in between 1500 – 1600 mm. Total area under forest is 80 sq km. It is dry deciduous type and mixed type of forest with some grassland forest. More than 275 species of birds are reported form this forest. The other faunal species includes Mammals 17, Reptiles 26, Amphibians 11, Fishes 17, Butterflies 72, and numerous species of insects. This reserve forest has more than 150 plants species [19,20]. For surveillance of avian mortality we surveyed the state highway no.243 passing through Pohra –Malkhed Reserve forest.

Materials and Methods

For Surveillance Regular visit for one year at a weekly interval along with some occasional visits was undertaken during January 2015- Dec 2015 to identify the carcasses on the State highway passing through Pohra-Malkhed Reserve Forest. Carcasses informed by colleagues, travellers, farmers etc. was also evaluated. Surveillance was done in the morning hours between times 7- 9 am by two wheeler motorbike with the speed of 30- 40 km/ hour on State highway for 40 km to and fro. The identification of birds was done by morphologically through photographic evidences. The data was recorded including the name of species, family, place and date of occurrence etc. Frequency of mortality of birds was calculated by assessing the number of carcasses with the threat. Species mortality frequency is calculated by assessing the number of times particular species is found dead, during sample surveillance period of study.

Result and Discussion

The one year survey (January 2015- Dec 2015) has been undertaken on the State highway passing through Pohra - Malkhed reserve forest of Amravati district. The data of the survey has been presented in the table no.1.

Table 1: Month wise mortality of avian fauna on Amravati – Chandur railway State highway passing through Pohra - Malkhed reserve forest

Scientific Name	Common Name	Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Total
Centropus sinensis	Greater Coucal	3	2	2	1	1	2	2	2	2	3	2	4	26
Pycnonotus cafer	Red - vented Bulbul	3	1	-	2	-	2	-	1	3	1	1	2	16
Athene brama	Spotted Owlet	2	1	1	1	1	1	1	1	2	1	1	2	15
Acridotheres tristis	Common Myna	1	-	2	2	2	1	-	2	1	-	1	1	13
Caprimulgus asiaticus	Indian Nightjar	1	2	-	1	-	2	-	2	2		1		11
Spelaeornis chocolatinus	Long Tailed Babbler	2	1	2	-	-	-	2	1	1	1	-	1	11
Turdoides striata	Jungle Babbler	1	-	1	2	1	-	2	1	-	1	1	-	10
Prinia sylvatica	Jungle Prinia	1	1	2	1	-	1	-	-	1	2	1	-	10
Prinia socialis	Ashy Prinia	-	1	3	-	-	1	1	-	1	-	1	-	8
Coracias benghalensis	India Roller	-	-	1	-	-	-	-	-	1	2	2	-	6
Tyto alba	Barn Owl	-	-	1	-	-	-	-	-		1	2	2	6
Chrysomma sinense	Yellow- eye Babbler	1	1	-	-	2	-	-	-	1	-	-	-	5
Eudynamys scolopaceus	Asian Koel	-	1	-	2	-	-	1	-	-	-	1	-	5
Corvus splendens	House Crow	-	-	1	-	-	-	-	1	2	1	-	-	5
Spilopelia senegalensis	Laughing Dove	1	2	-	-	-	-	1	1	-	-	-	-	5
Orthotomus	Tailor Bird	-	2	-	1	-	-	-	-	-	-	-	1	4
Otus bakkamoena	Indian Scoops Owl	-	1	1	-	-	-	-	-	-	1	-	-	3
Clamator jacobinus	Pied Cuckoo	-	-	-	-	-	-	-	1	-	1	-	-	2
Turnix suscitator	Barred button Quail	-	-	-	-	-	-	1	1	-	-	-	-	2
Upupa epops	Common Hoopoe	-	1	-	-	-	-	1	-	-	-	-	-	2
Saxicoloides fulicatus	Indian Robin	-	-	-	-	1	-	-	-	-	-	1	-	2
Dendrocitta vagabunda	Rufous Treepie	-	1	-	-	-	-	-	-	-	-	-	-	1
	Total	16	18	17	13	08	10	12	14	17	15	15	13	168

Family wise Frequency of Road Killed Avian Fauna

Table 2: Family wise Frequency of Road Killed Avian Fauna on State Highway passing through Pohra - Malkhed during Jan– Dec 2015

Name of Family	Centropodidae	Pycnonotidae	Strigidae	Caprimulgidae	Sturnidae	Columbidae	Sylviidae	Cisticolidae	Corvidae	Cuculidae	Tytonidae	coraciidae	Muscicapidae	Phasiannidae	Upupidae
Species Involved	Greater Coucal	Red – vented Bulbul	Owl, Owlets	Nightjars	Common Myna	Doves	Tailor bird, Yellow eye Babbler, Jungle Babbler	Prinias	Treepie, House Crow	Pied cuckoo, Asian Koel	Barn Owl	Roller	Indian Robin,	Bard Button Quail	Common Hoopoe
Frequency	26	16	18	11	13	05	30	18	06	07	06	06	02	02	02

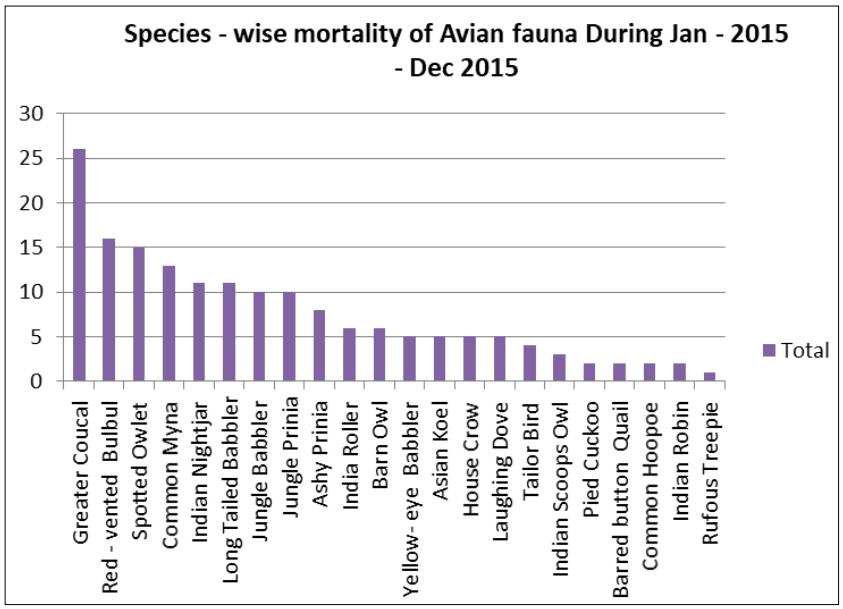

Fig 1: Species - wise mortality of Avian fauna During Jan - 2015 - Dec 2015

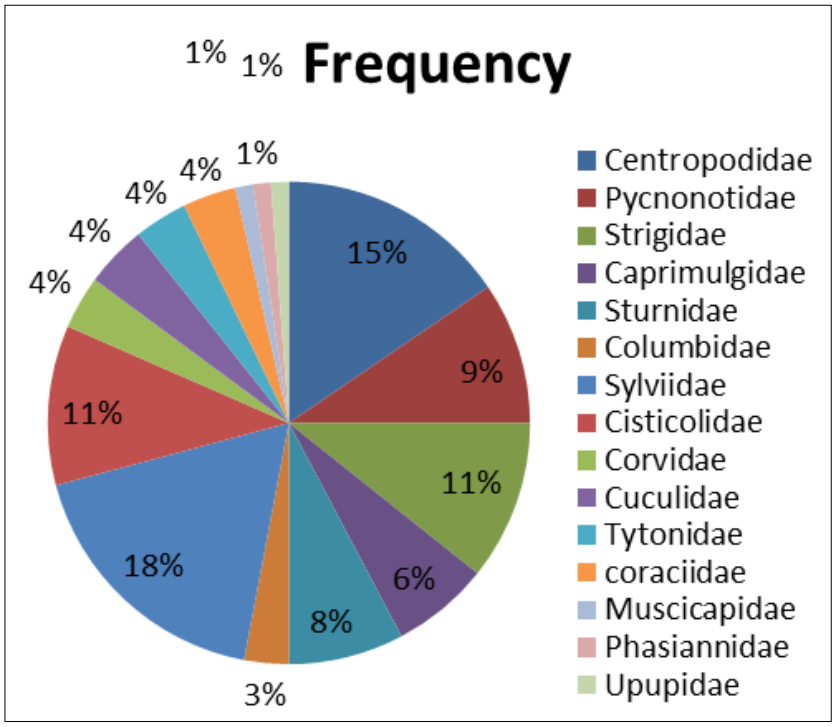

Fig 2: Family wise frequency of road killed avian fauna on state highway passing through Pohra - Malkhed during Jan– Dec 2015.

From the above observation it is found that the Greater Coucal (*Centropus sinensis)* is the most dominant species found dead in road vehicle collision, followed by Red - vented Bulbul (*Pycnonotus cafer)*, Spotted Owlet (*Athene brama*), Common Myna (*Acridotheres tristis*), Indian Nightjar (*Caprimulgus asiaticus*), and so on. Greater Coucal carcasses are found more frequently than the other reported bird carcasses on road passing through Pohra - Malkhed reserve forest. This is happened so because of the large size of this bird and ground dwelling habit. This birds cannot make pace with the speed of the vehicle and got collide and get killed. Owls, Owlets and Nightjars are the nocturnal animals. They are active during night, but due to high intensity flash light of vehicle they cannot make pace with the speed of vehicle and get killed.

Laughing Dove is granivorous bird. They come on the roads to feed on the grains dispersed on the road or road side while Red- vented Bulbul, Common Myna, Prinia and Tailor birds feeds on nectar, insects and insect larvae on plants along the road sides. Spotted Owlet the most frequently killed species of birds among the Owls and Owlets. The other bird species whose carcasses are found are represented in

Table 1.

The above observation are found correlating with earlier studies on avian road kills in Kumbhalgarh Wildlife

Sanctuary, Rajasthan, India [21] and with forests of Mudumalai Tiger Reserve, southern India [7]. Seasonal variation shows that maximum mortality was found during the months of January- February-March and minimum mortality during the months of Apr – June. Greater Coucal and Red- vented Bulbul found more affected species by vehicle collision and hence road kills became major threat to these species at present. Family wise maximum mortality was recorded in the family Centropodidae followed by Pycnonotidae, Strigidae, Caprimulgidae, Sturnidae, Columbidae Sylviidae. This preliminary study provides a baseline data on the magnitude of avian mortality on roads passing through Pohra- Malkhed reserve forest. The impact of such loss on avian population remains unknown. Long term study will be needed to evaluate such impact. The number may be quite large, because the avian carcasses gets cleared immediately by scavengers after death and cannot be noticed; sometimes the collided birds are expelled far away from road and cannot be noticed. Further this is a small attempt to estimate the mortality. Hereby we recommend limiting the speed of vehicle on the highway passing through forest to 30 km / hour, further speed breakers and signposts at the roadsides of the reserve forest.

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