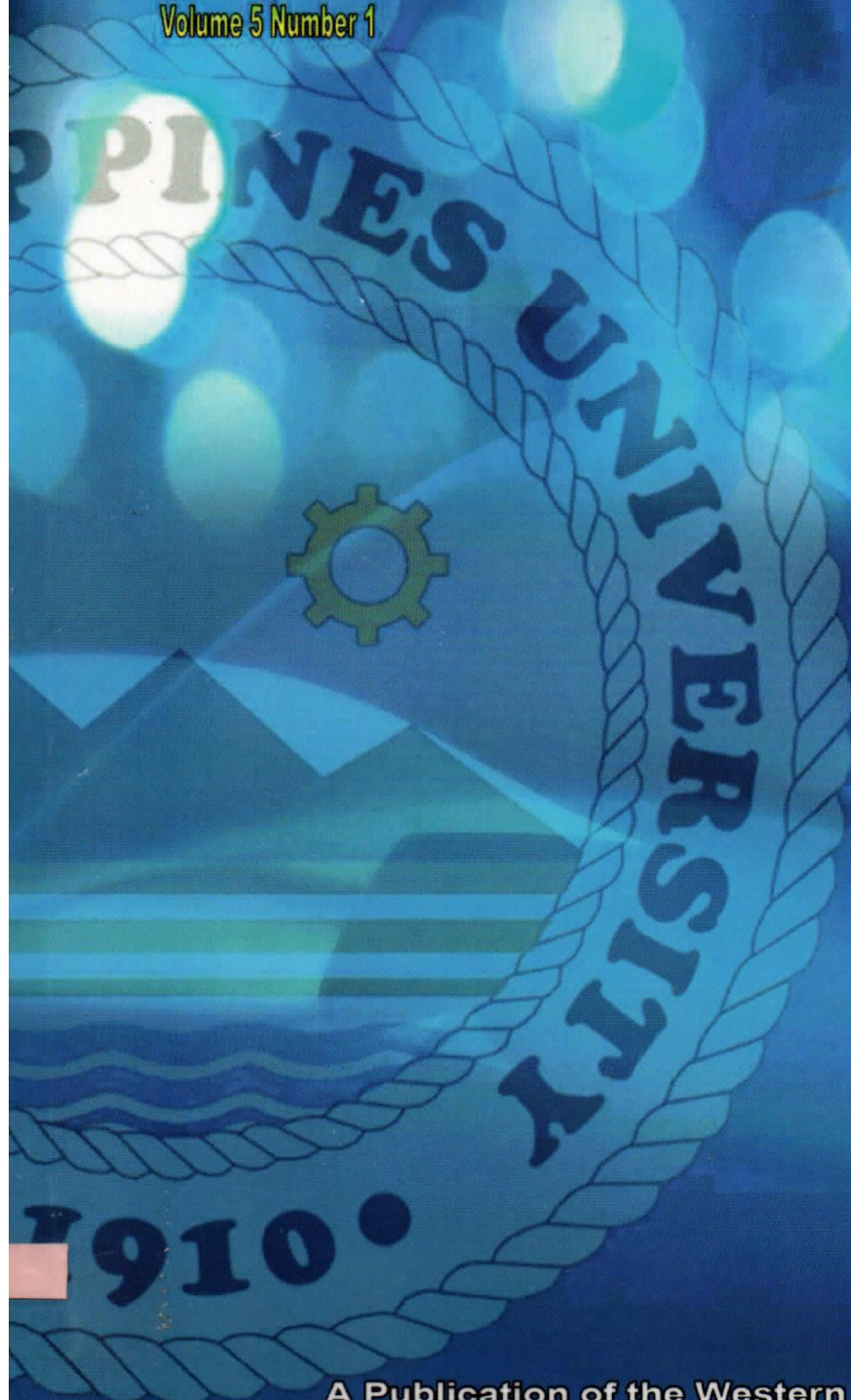


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## Vehicle-Induced Mortalities of Birds and Mammals Between Aborlan and Puerto Princesa City National Highway

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### ABSTRACT

Building of paved road networks as part of the development in the province causes further habitat fragmentation and the alarming increase in the number of road users intensifies the possibility of vehicle-induced wildlife mortalities.

Despite the risks, the wildlife mortalities resulting from vehicle collision in the province are not yet documented. Hence, this study was conducted to provide a baseline information on the species composition of road killed birds and mammals along the highway section connecting the municipality of Aborlan and Puerto Princesa City. Collection of data was conducted four times a month from January to December 2010 by travelling along the road section on board a motorcycle with an average travelling speed of 40km/hr. Carcasses of birds and mammals found along the road were counted and identified.

A total of 47 mammal and 80 bird carcasses were recorded. Seven species of mammals belonging to 6 families and 33 species of birds representing 22 families were identified. Out of the 40 identified species of animals, 3 mammals and 4 birds were considered as Palawan endemics. Common Palm Civet (*Paradoxurus hermaphroditus*) and Large-Tailed Nightjar (*Caprimulgus macrurus johnsoni*) are the most frequently recorded mammalian and avian species, respectively.

Although most of the identified animals were classified in the IUCN Red List of Globally Threatened Animals (2010) as "least concern", two mammalian and one bird species were listed as "vulnerable" and "near threatened", respectively.

*Keywords: birds, mammals, road-kill*

## INTRODUCTION

The ecosystems of the Greater Palawan Island and its clusters of smaller islands are filled with diverse and unique forms of organisms. This distinct biogeographic region is believed to be influenced by the Sunda shelf ecoregion, the Philippine ecoregion and the existing bio-physical features of the island. According to Critical Ecosystem Partnership Fund (2001), Palawan is politically part of the Philippines, but it is geologically part of the Sunda shelf together with the islands of Sumatra, Borneo, Malay Peninsula and Java.

Palawan is considered as one of the conservation priority areas because of the global significance of its biological diversity. The United Nations Educational, Scientific and Cultural Organization (UNESCO) declare the entire province as a Biosphere reserve. It was also classified as one of the seven endemic bird areas of the Philippines with 11 identified important bird areas.

However, like the other islands of the Philippine archipelago, Palawan's ecological stability is also experiencing tremendous pressures resulting from anthropogenic activities like illegal logging, extensive slash and burn farming, land use conversion for mainstream agriculture, human encroachment, and mining (CIDENR and Haribon 2008, Sopsop and Buot 2011). Activities that directly affect the wildlife population like hunting for bush meat is still in practiced but is subsistence in nature (Lacerna and Widmann 2008), however poaching for pet trade is rampant and occurring in a much organized manner (Cruz *et al.* 2008).

Another problem that worsens the impact of anthropogenic activities to Palawan's biodiversity is its growing population which expands at a rate of 3.6% (NSO 2002). The high birth rate combined with the influx of migrants from other parts of the Philippines significantly increases the population of the province. This scenario challenges the sustainability of the Palawan's wildlife diversity. Extensive conversion of terrestrial ecosystem to agricultural lands and settlement areas bring further habitat destruction and fragmentation. Aside from these factors wildlife species are also affected by the increasing hunting and poaching activities (Cruz *et al.* 2008).

Another factor that poses hazard to the wildlife population is the existing road network that bisects the already fragmented ecosystems. Building of wider and smoother paved roads and the increasing number of



road users travelling at faster speeds pose risks to the wildlife species crossing the roads. Barthelmess and Brooks (2010) reported that 50% of all the mammal species in their study area were affected by road kill and the rate varied between seasons and species.

In some places where heavy traffic and diverse wildlife meet, mitigating measures designed to reduce the incidence of vehicle-induced wildlife mortality like speed bumps, rumble strips, barriers, culverts and wildlife fence must be established. Schutt (2008) reported that speed bumps constructed in a highway that bisects the Ankarafantsika National Park in Madagascar significantly reduced the road kill incidences across all faunal classes.

Building of wide and paved highway that spans longitudinally in the Eastern part of the Greater Palawan Island and the increasing number of road users travelling at faster speeds endanger wildlife population. However, despite these risks the wildlife species affected by vehicle collision in the province was not yet documented. Hence, this study was conducted to provide baseline information on the species composition, level of endemism and conservation status of road killed birds and mammals along the highway section connecting the municipality of Aborlan and Puerto Princesa City.

## **METHODS**

### **Time and Place of the Study**

The survey of vehicle- induced mortalities of birds and mammals was conducted in a road section of the National Highway connecting the municipality of Aborlan and Puerto Princesa City (Fig. 1) from January to December 2010. The 67 kilometer road section served as an intangible strip transect that traverses different habitat types including grassland, secondary growth forest, mangrove, riparian, swamps, rice fields, coconut and fruit tree plantations, human settlements, shrub lands and coastal area.

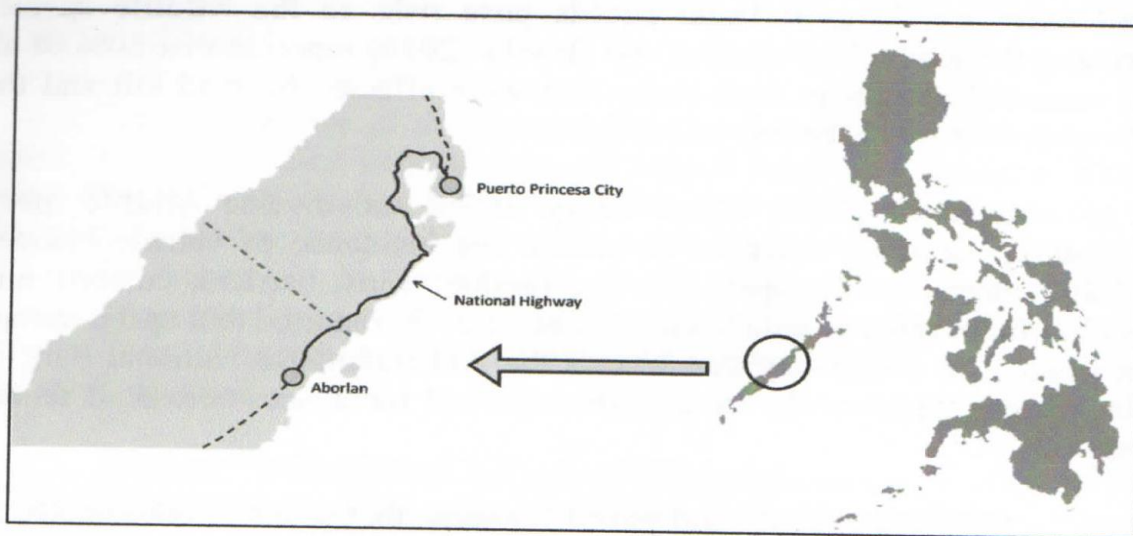


Figure 1. Map showing the portion of National Highway where road killed birds and mammals were surveyed.

## Data Collection

Data gathering was conducted four times a month at weekly intervals from January to December 2010. The researcher collected the data by travelling twice along the road section on board a motorcycle with an average travelling speed of 40km/hr. Initial counting was conducted early in the morning to document the road killed nocturnal birds and mammals while another counting was conducted in the late afternoon to document the road killed diurnal birds and mammals. Carcasses found along the road were identified, counted and photographed. Specimens recorded during the initial counting were removed from the road to avoid being recounted in the afternoon.

## RESULTS AND DISCUSSION

### Species Composition

There were at least 127 carcasses of road killed animals recorded in the study area 47 (37%) of which were mammals while 80 (63%) were birds (Table 1). From the recorded carcasses 33 species of birds representing



22 families and 7 species of mammals belonging to 6 families were identified. Mammals under family Muridae were not classified down to species level because the specimens were totally crushed and identifying it by means of morphologic and morphometric characteristics will give unreliable result.

Most of the bird families recorded were only represented by a single species (Podargidae, Dicruridae, Nectariniidae, Ardeidae, Chloropseidae, Hirundinidae, Turdidae, Pittidae, Sturnidae, Ploceidae, Sylviidae, Turnicidae and Caprimulgidae). The most commonly recorded road killed bird was the Large-Tailed Nightjar (*Caprimulgus macrurus johnsoni*) of the family Caprimulgidae. This Palawan endemic race is a nocturnal bird that commonly feeds by catching insects in midair. The increased density of insects attracted to the lights of the passing vehicles might lured these birds to hunt along the road. It was also noted that road killed Large-Tailed Nightjar is abundant in road sections where swarms of termites in nuptial flight were sighted. Although currently classified as "least concern" in the IUCN Red List 2010, future prospects of this species is still uncertain considering the bulk of the individuals affected by vehicle-induced mortality. The continuously growing number of road users and building of new road networks in the province is a serious threat that might somehow affect the health of the population of this bird. Monitoring the population of this species to serve as basis for elevating its conservation priority status is a must.

On the other hand, most of the mammalian species killed were non-volant. Only two species of volant mammals were recorded during the survey period, the Diadem Roundleaf Bat (*Hipposideros diadema*) and the Short-Nosed Fruit Bat (*Cynopterus brachyotis*).

Of the 7 recorded road-killed families of mammals 5 families were represented by only a single species (Pteropodidae, Hystricidae, Rhinolopidae, Sciuridae and Viverridae), and only one family was represented by two species (Mustelidae).

The most commonly recorded road killed mammal was Common Palm Civet (*Paradoxurus hermaphroditus*) followed by the Palawan Stink Badger (*Mydaus marchei*) with a frequency of 10 and 9, respectively. This report corroborates with the findings of Esselstyn *et al.* (2004) that Common Palm Civet is probably the most common carnivore on the island, hence frequently recorded



road killed samples of these animals were commonly found across different habitat types.

Table 1. Species composition, conservation status, level of endemism and frequency of road killed animals recorded in a road section connecting municipality of Aborlan and Puerto Princesa City, Palawan.

Family	Scientific Name	Common Name	Level of Endemism	Conservation Status	Freq
<b>Birds</b>					
Alcedinidae	<i>Alcedo meninting amadoni</i>	Blue-Eared Kingfisher	Palawan endemic race	Least concern	1
Alcedinidae	<i>Ceryx erithacus rufidorsa</i>	Oriental Dwarf Kingfisher	Resident	Least concern	2
Ardeidae	<i>Egretta intermedia</i>	Intermediate Egret	Migrant	Least concern	1
Caprimulgidae	<i>Caprimulgus macrurus johnsoni</i>	Large-Tailed Nightjar	Palawan endemic race	Least concern	17
Chloropseidae	<i>Aegithina tiphia</i>	Common Iora	Resident	Least concern	1
Columbidae	<i>Geopelia striata</i>	Zebra Dove	Resident	Least concern	1
Columbidae	<i>Treron vernans vernans</i>	Pink-Necked Green-Pigeon	Philippine endemic race	Least concern	1
Columbidae	<i>Treron curvirostra</i>	Thick-Billed Green-Pigeon	Resident	Least concern	2
Cuculidae	<i>Centropus sinensis</i>	Greater Coucal	Resident	Least concern	1
Cuculidae	<i>Phaenicophaeus curvirostris harringtoni</i>	Chestnut-Breasted Malkoha	Palawan endemic race	Least concern	2
Cuculidae	<i>Centropus bengalensis</i>	Lesser Coucal	Resident	Least concern	3
Dicaeidae	<i>Dicaeum pygmaeum palawanorum</i>	Pygmy Flowerpecker	Palawan endemic race	Least concern	1
Dicaeidae	<i>Prionochilus plateni</i>	Palawan Flowerpecker	Palawan endemic	Least concern	3
Dicruridae	<i>Dicrurus hottentottus palawanensis</i>	Spangled Drongo	Palawan endemic race	Least concern	1
Estrildidae	<i>Lonchura leucogastra</i>	White-Bellied Munia	Resident	Least concern	2
Estrildidae	<i>Lonchura malacca jagori</i>	Chestnut Munia	Resident	Least concern	3
Hirundinidae	<i>Hirundo rustica gutturalis</i>	Barn Swallow	Migrant	Least concern	2
Muscicapidae	<i>Hypothymis azurea</i>	Black-Naped Monarch	Resident	Least concern	1
Muscicapidae	<i>Terpsiphone cyanescens</i>	Blue Paradise-Flycatcher	Palawan endemic	Near Threatened	1
Nectariniidae	<i>Nectarina jugularis</i>	Olive-Backed Sunbird	Resident	Least concern	1
Pittidae	<i>Pitta sordida palawanensis</i>	Hooded Pitta	Palawan endemic race	Least concern	2
Ploceidae	<i>Passer montanus</i>	Eurasian Tree Sparrow	Resident	Least concern	4
Podargidae	<i>Batrachostomus javensis chaseni</i>	Javan Frogmouth	Palawan endemic race	Least concern	1
Pycnonotidae	<i>Pycnonotus plumosus cinereifrons</i>	Olive-Winged Bulbul	Palawan endemic race	Least concern	2

Table 1. Cont'n..

Family	Scientific Name	Common Name	Level of Endemism	Conservation Status	Freq
Pycnonotidae	<i>Pycnonotus plumosus cinereifrons</i>	Olive-Winged Bulbul	Palawan endemic race	Least concern	2
Pycnonotidae	<i>Pycnonotus atriceps</i>	Black-Headed Bulbul	Resident	Least concern	3
Rallidae	<i>Gallinula chloropus lozanoi</i>	Common Moorhen	Philippine endemic race	Least concern	1
Rallidae	<i>Amauromis phoenicurus javanica</i>	White-Breasted Waterhen	Resident	Least concern	3
Sturnidae	<i>Aplonis panayensis</i>	Asian Glossy Starling	Resident	Least concern	2
Sylviidae	<i>Orthotomus sericeus</i>	Rufous-Tailed Tailorbird	Resident	Least concern	5
Timaliidae	<i>Trichastoma cinereiceps</i>	Ashy Headed Babbler	Palawan endemic	Least concern	1
Timaliidae	<i>Macronous gularis woodi</i>	Striped Tit-Babbler	Palawan endemic race	Least concern	2
Turdidae	<i>Copsychus niger</i>	White-Vented Shama	Palawan endemic	Least concern	2
Tumidae	<i>Tumix suscitator haynaldi</i>	Barred Buttonquail	Palawan endemic race	Least concern	5
<b>Mammals</b>					
Hystriidae	<i>Hystrix pumila</i>	Palawan Porcupine	Palawan endemic	Vulnerable	1
Muridae	Unidentified Specimens				20
Mustelidae	<i>Amblonyx cinereus</i>	Oriental Small-Clawed Otter	Resident	Vulnerable	2
Mustelidae	<i>Mydaus marchei</i>	Palawan Stink Badger	Palawan endemic	Least concern	9
Pteropodidae	<i>Cynopterus brachyotis</i>	Short-Nosed Fruit Bat	Resident	Least concern	1
Rhinolophidae	<i>Hipposideros diadema</i>	Diadem Roundleaf Bat	Resident	Least concern	2
Sciuridae	<i>Sundasciurus juvenis</i>	Tree Squirrel	Palawan endemic	Least concern	2
Viverridae	<i>Paradoxurus hermaphroditus</i>	Common Palm Civet	Resident	Least concern	10

### Level of Endemism and Conservation Status

Out of the 40 identified species of road killed birds and mammals, 4 birds and 3 mammals were Palawan endemics. Most of the affected birds were resident species and 37% of it were Palawan endemic race.

Although only 12% of the avian species killed by vehicles were classified as Palawan endemics, 30% more have Palawan endemic race (Figure 2). The Palawan endemic birds were the White-Vented Shama (*Copsychus niger*), Ashy Headed Babbler (*Trichastoma cinereiceps*), Blue Paradise-Flycatcher (*Terpsiphone cyanescens*) and Palawan Flowerpecker (*Prionochilus plateni*) (Table 1).



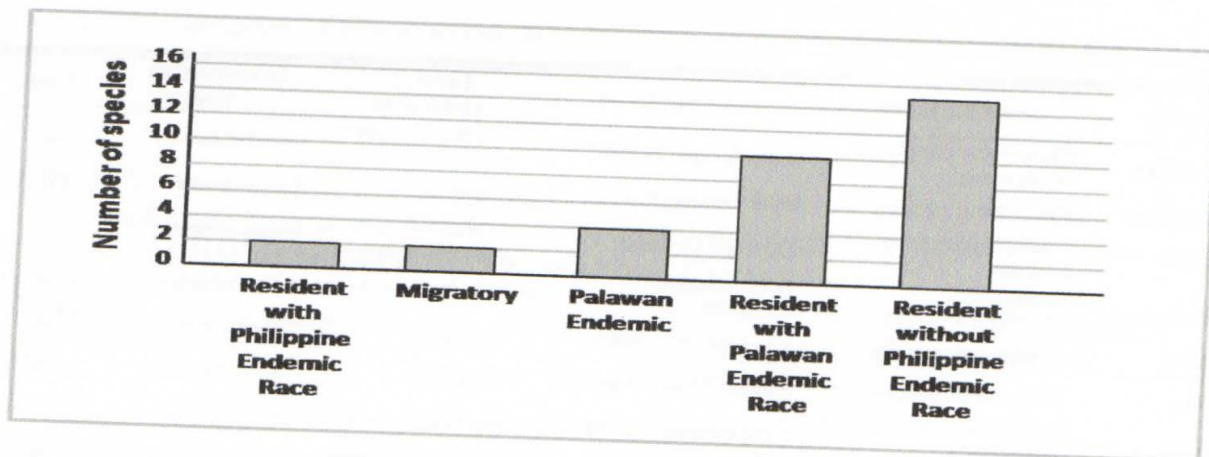


Figure 2. Level of endemism of road killed bird species recorded in a road section connecting the municipality of Aborlan and Puerto Princesa City Palawan

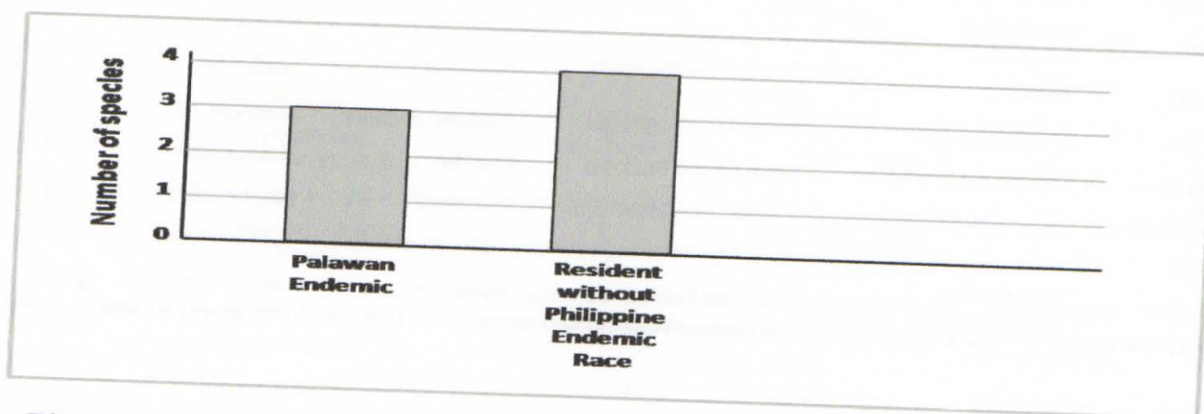


Figure 3. Level of endemism of road killed mammal species recorded in a road section connecting the municipality of Aborlan and Puerto Princesa City Palawan

On the other hand, the Palawan endemic mammals recorded during the census were the Tree Squirrel (*Sundasciurus juvencus*), Palawan Porcupine (*Hystrix pumila*) and Palawan Stink Badger (*Mydaus marchei*). Even though large number of individuals of the family Muridae were not classified to species level, the degree of endemism of mammals was considerably high (43%). This finding supports the level of endemism of non-volant mammals in Palawan which was reported to be 44% (WWF and McGinley 2008). Meanwhile, the two volant mammals recorded

were both non Palawan endemics, these bats were also found all over the Philippines and other Sunda islands as well.

Based on the International Union for the Conservation of Nature (IUCN 2010) Red List of Globally Threatened Wildlife Species, most of the mammalian and avian species killed by vehicles were categorized as "least concern". However, one bird species the Blue Paradise-Flycatcher (*Terpsiphone cyanescens*) is already near threatened, and two mammals the Palawan Porcupine (*Hystrix pumila*) and Oriental Small-Clawed Otter (*Amblonyx cinereus*) were both red listed as "vulnerable". It was also noted that the Blue Paradise-Flycatcher and the Palawan Porcupine were both Palawan endemic species.

## CONCLUSION

The study revealed that a rich assemblage of birds and mammals are affected by vehicle induced mortalities. In terms of the number of individuals, species and families, more birds are affected than mammals. Majority of the road killed animals have wider geographic distribution and only few are endemic to Palawan, the level of endemism of mammals is comparably higher than birds.

Based from the Red List of Globally Threatened Animals (IUCN 2010) most of the road killed birds and mammals are classified as "least concern" except for the two mammal species which are classified as "vulnerable" and one bird species which is listed as "near threatened". Because of the stable population and wider geographic distribution of the affected species, most of the road killed birds and mammals were currently given less conservation priority.

## RECOMMENDATION

1. A wildlife survey must be conducted to update the conservation status of the wildlife species affected by vehicle-induced mortalities.
2. Information campaign must be conducted to educate the people about the impact of vehicle-induced mortalities to the natural population of wild animals.

## REFERENCES

- Barthelmess, E. L. and Brooks, M. S. 2010. The Influence of Body-Size and Diet on Road-Kill Trends in Mammals. *Biodiversity and Conservation Journal*. Springer Netherlands. 9(6):1611-1629



- Conservation International, Department of Environment and Natural Resources and Haribon Foundation 2008. Priority Sites for Conservation in the Philippines: Key Biodiversity Areas.
- Critical Ecosystem Partnership Fund (CEPF) 2001. Ecosystem Profile: The Philippines. Retrieved February 10, 2009 from <<http://www.cepf.net>>
- Cruz, R.M., D.V. Van Den Beukel, I.L. Widmann, S. Schoppe and P. Widmann. 2008. Wildlife Trade in Southern Palawan, Philippines. Conservation Studies on Palawan Biodiversity: A Compilation of Researches Conducted in Cooperation with or Initiated by Katala Foundation Inc.. Katala Foundation Inc. Palawan, Philippines. pp 171-178.
- Esselstyn, J.A., P. Widmann and L.R. Heaney. 2004. The Mammals of Palawan Island, Philippines. Proceedings of the Biological Society of Washington. 117(3):271-302. 2004.
- Lacerna, L.D. and P. Widmann. 2008. Biodiversity Utilization in a Tagbanua Community, Southern Palawan Philippines. Conservation Studies on Palawan Biodiversity: A Compilation of Researches Conducted in Cooperation with or Initiated by Katala Foundation Inc.. Katala Foundation Inc. Palawan, Philippines. pp 158-170.
- National Statistics Office (NSO). 2002. 2000 Census of Population Press Release Report No. 2002-90. Retrieved January 8, 2009 from <http://www.census.gov.ph>
- Schutt, P. 2008. Analysis of Road Kill Data from Ankarafantsika National Park, Madagascar. Masters Project in Master of Environmental Management. Nicholas School of the Environment and Earth Sciences of Duke University.
- Sopsop, L.B. and I.E. Buot Jr. 2011. Human Forest Interaction in Aborlan Guba System, Palawan Island, Philippines: Implications for Conservation and Management. Asia Life Sciences: The Asian International Journal of Life Sciences 20(1):155-173
- World Wildlife Fund (Content Partner); Mark McGinley (Topic Editor). 2008. "Palawan rain forests." In: Encyclopedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C.: Environmental Information Coalition, National Council for Science and the Environment). [First published in the Encyclopedia of Earth August 31, 2007; Last revised September 11, 2008; Retrieved January 19, 2009]. <[http://www.eoearth.org/article/Palawan\\_rain\\_forests](http://www.eoearth.org/article/Palawan_rain_forests)>