Journal of Tropical Resources and Sustainable Science

journal homepage: jtrss.org

A preliminary study on wildlife roadkill incidents in Jeli, Kelantan

Noor Jemali[1,*], Syafiq Sulaiman[1,2], Syafinie Majid[1] and Marinah Muhammad[1]

[1]Faculty of Earth Science, Universiti Malaysia Kelantan, 17600 Jeli Kelantan, Malaysia
[2]Malaysan Rainforest Station, 27200 Kuala Lipis, Pahang, Malaysia

Received 15 April 2021
Accepted 25 May 2021
Online 30 June 2021

Keywords:
Roadkill, Spotteron, Jeli, Wildlife, Collision.

☒*Corresponding author:
Noor Janatun Naim Jemali
Department of Natural Resource and Sustainability, Faculty of Earth Science, Universiti Malaysia Kelantan.
janatunnaim@umk.edu.my

Abstract

Roadkill leads to biodiversity destruction, which cause threats to human well-being as harmful as climate change. Nowadays, people observe roadkill accidents as a natural occurrence, hence no proper record or study has been taken especially in a remote area. Therefore, this study was carried out to properly record the roadkill incidents at different road types and time. Data were collected in two different time ranges for three months. The morning session runs from 8-11 a.m. and the afternoon session runs from 4-7 p.m. Two types of roads were selected which are Jeli-Gerik highway and the local road in the Jeli area with a total distance of 30 km. Parameters recorded during the survey were types of dead animals found on the road, type of road, location and time. A total of 21 road-kill incident cases were registered, with mammals accounting for 33%, reptiles for 33% followed by birds (23%) and the remainder was from amphibian species. By systematically compiling and recording the numbers of road-kill incidents, a huge amount of data could be generated. Thus, it will take a whole new level of road-kill observation, especially in the Jeli area for the purposes of wildlife tracking and monitoring.

© 2021 UMK Publisher. All rights reserved.

1. INTRODUCTION

Animal-vehicle accidents or roadkill are a significant and growing cause of concern for the publics, conservation groups, and government agencies. Roadkill may not disseminate at a random area or along roads. It is rather concentrated in some hotspots where environmental and road conditions increase the occurrence of wildlife, or where nearby source habitat presents a steady supply of probable roadkill victims. Animals are drawn to grass, trees, and water in margin ditches, which can sometimes remain well in any weather or season when there is no food or water available elsewhere (Mooney & Spencer, 2000). Food thrown from vehicles (Drews, 1995) and the presence of animal's dead bodies resulted from roadkill incidents (Forman & Alexander, 1998) among factors that attracted wildlife to be on the road.

In a world where road infrastructure is rapidly expanding, understanding the negative impact of roads on wildlife is becoming increasingly relevant. However, due to the lack of awareness, many roadkill accidents witnessed by member of the public have been neglected. Anticipating and emphasizing these roadkill places to reduce the impact on drivers and animals may be a critical step in reducing this issue. Therefore, it is crucial to collect accurate and continuous data on roadkill to help in forecasting and subsequent mitigation on a large-scale data. In response to this, this study was conducted to properly record the observation of roadkill incidents specifically on different road types, location and time in the Jeli area.

2. MATERIALS AND METHODS

2.1 The study area

This study was carried out on the selected highway and local roads in Jeli, Kelantan. The selected area covers a total length of 30 kilometers as shown in Figure 1. The Jeli-Gerik highway is 124 kilometers long, with 61 kilometers in Perak and the remainder in Kelantan. The highway makes mobility from west to east easier and faster, boosting the economy of not only Perak and Kelantan states, but also the entire region. The highway runs through the Bintang and Titiwangsa mountain ranges. Both sides of the highway consist of lowland intact forest, with a high diversity of flora and fauna. Since no wildlife corridor has been set up, caution signs were placed to warn highway users of wild animals (e.g elephants, tapirs, and other large mammals) crossing the road.

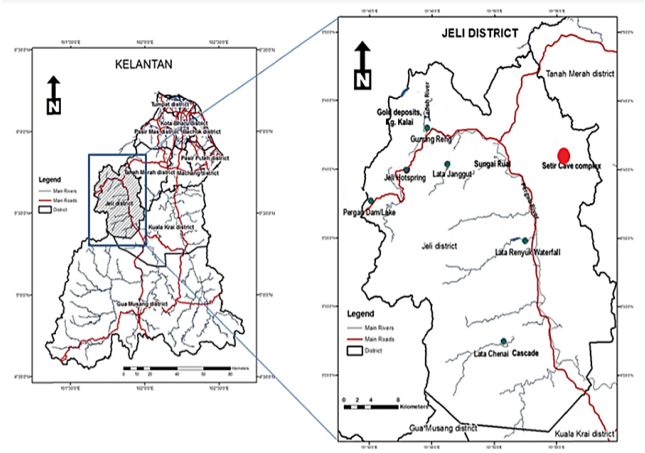

Figure 1: The location of highway and local roads in the district of Jeli

2.2. Data Collection

The observations took place between August to October 2019. The survey was conducted from 8 a.m. to 11 a.m. and again from 4 p.m. to 7 p.m within 3 three months. Both highway and local roads were observed during the time allotted per day by riding a bike at a speed of 20 to 30 km/h. Once a roadkill object detected on the road, we recorded the location coordinates using a handheld GPS device. The probable cause of death and the location on the road for all non-domesticated reptiles, amphibians, birds, and mammals were recorded. To avoid double-counting, we took photographs to aid identification and removed the roadkill victim from the road surface. All data, including images of the victims were captured using Roadkill Applications by Spotteron. Spotteron is an android application that allows users to add outdoor roadkill sightings to the database. Spatial data include location, time and images can be updated in the database in real time. This application was developed to promote citizen science activity on smartphones. Collected data were recorded and tabulated in Excel and basic statistical analysis on roadkill and possible factors influencing the incidents were examined and analysed.

3. RESULTS AND DISCUSSION

Within the three months of observation, we discovered and recorded a total of 21 roadkill incidents. The distribution of roadkill cases based on species or animal carcasses found on the road is presented in Table 1. According to the findings, Jeli has an average of seven cases of roadkill per day. From all cases recorded, mammals and reptiles made up 66.7% of the roadkill casualties (e.g. monkey, cat, snake) followed by birds (23.8%) and amphibian species was detected as the least common found as the roadkill victims. Along the observed highway, there is a forest area that puts the vehicle at risk of encountering forest animals. Mammals had the highest rate of roadkill in this study. Rapid urbanisation in the Jeli, particularly near the highway, had increased the chances of roadkill among wildlife dwelling nearby the forest highway. Meanwhile, the distribution map of detected roadkill is presented in Figure 2.

Table 1: Number of individuals road-kill recorded based on animal type.

Group of animal	No. detected	Percentage (%)
Mammals	7	33.3
Reptiles	7	33.3
Birds	5	23.8
Amphibians	2	9.6
Total	**21**	**100**

Figure 2: The distribution map of detected roadkill incident plotted by Spotteron.

Monitoring roadkill could provide us information on a wide variety of related issues such as the road ecology, local abundance of live animals (Gehrt, 2002) and track of long-term changes in population dynamics (Capula et al., 2014). In this study, the abundance of road-kill incidents differed depending on the type of roads. The highway, which serves as a connector between Kelantan and Perak, was found to have more significant roadkill accidents than local roads, as shown in Table 2. The highway serves as a connector between Kelantan and Perak, resulting in a high volume of traffic. Based on the evidence, it can be inferred that animals on highway roads, whether wildlife or domestic, are more exposed to roadkill than animals on small country roads. Since highways have a higher level of traffic than local roads, the chances of an animal-vehicle collision are higher. The discrepancy between these two groups is the vehicles' maximum speed limits. Highways with speed limits of 80-90 km/h, set by the Minister of Works (MOW) are unquestionably more dangerous for animals crossing the road than local roads with speed limits of 50-60 km/h. Fences and highways, as well as towns and other development, hinder wildlife ability to find mates, food, and new habitats. Wildlife moves using ecological connectivity through corridors. Corridors are an important part of successfully combating fragmentation and improving biodiversity. Therefore to ensure that species can migrate between protected areas while preserving genetic strength is to create physical links across the highway.

Table 2: Number of individual road-kill by road category.

Category of road	No. detected	Percentage (%)
Highway	13	61.9
Local road	8	38.1
Total	**21**	**100**

eISSN Number: 2462-2389 © 2021
UMK Publisher. All rights reserved.

Differences in behaviour and ecology, such as looking for mates or increased foraging activity at specific times of year, can also explain the variations in temporal reporting rates of roadkill (Clevenger et al., 2003). According to the results of this survey, 71 percent of roadkill accidents occurred in the evening. This is due to the high traffic density created by human movement to return home after the office hour, which was normally at 5 to 6 p.m. The animals began to return to their nest at this hour as the day became darker.

The low number of amphibians found in this study is to be expected due to the great distance between the aquatic environment and the study location. Amphibians live in a wide range of environments, with the majority of species inhabiting aquatic, fossorial, arboreal, or freshwater ecosystems. Despite this, the majority of amphibians continue to live in freshwater habitats (Diego et al., 2005). Figure 3 a and b showed the example of roadkill cases cat and snakes hit by vehicle on the local and highway road respectively.

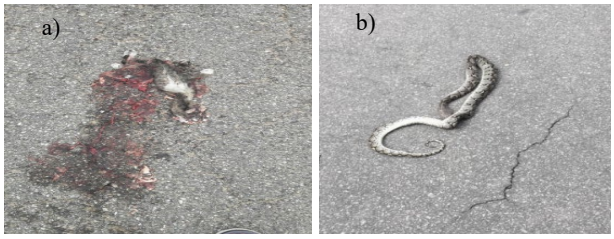

Figure 3: a) Carcase of a cat on local road and b) Snake (highway road) found in the roadkill incident.

Roadkill observation is a useful method not only to detect a hotspot or recognising areas with a higher collision risk but also used to evaluate the ecology of wildlife at a certain place. Detecting a hotspot area is critical for implementing equal management techniques with limited resources in the overall road safety improvement process. To do this, a bigger data set is needed to accurately represent the respective area for hotspot recognition and to predict the wildlife ecology, especially in the Jeli area. The result would also support the decision making of relevant agency to plan and build green corridor or safer highway for wildlife crossing.

4. CONCLUSION

The observation of road-kill incidents in Jeli majorly detected on highway roads compared to the local roads. The temporal factor also affects the number of roadkill incidents with various species found as victims. Systematic monitoring of road-kills could help in improving the accuracy of estimating road-kill cases and detecting roadkill hotspots area in Kelantan. However, a comprehensive data collection is needed for the future study. Systematic observance by the use of recent technologies integrated with geographical information system (GIS) applications is the right choice and it could also include the public in data gathering assisted by tools like smartphones to record massive amounts of roadkill data. With proper and systematic records, it will bring roadkill observation and monitoring to a whole new level that can aid the decision making of associated stakeholders.

Acknowledgement

We would like to thanks the Spotteron technical committee on their advice and assistance in completing this study.

REFERENCES

Bang, C., Faeth, S.H. (2011) Variation in arthropod communities in response to urbanization: seven years of arthropod monitoring in a desert city *Landscape and Urban Planning* 103: 383–399.

Bissonette, J.A., Kassar, C.A., Cook, L.J. (2008) Assessment of costs associated with deer-vehicle collisions: human death and injury, vehicle damage, and deer loss. *Human Wildlife Conflicts* 2: 17–27.

Capula, M., Rugiero, L., Capizzi, D., Danial, F. Guliano, M., Luca, L. (2016) Long-term, climate-change-related shifts in feeding frequencies of a Mediterranean snake population *Ecology Research* 31: 49–55 (2016).

Case, R.M. (1978) Interstate highway road killed animals: a data source for biologists. *Wildlife Society Bulletin* 6(1):8-13.

Clements, G.R., W. Yap, and P. Henry (2012) Towards safer passages: the Kenyir wildlife corridor project *Malaysian Naturalist* 65: 56-59.

Cooper, C.B., Shirk, J., Zuckerberg, B. (2014) The invisible prevalence of citizen science in global research: migratory birds and climate change. *Plos One* 9(9).

Corona, P., Chirici, G., McRoberts, R.E., Winter, S., Barbarti, A. (2011) Contribution of large-scale forest inventories to biodiversity assessment and monitoring. *Forest Ecology and Management* 262: 2061–2069.

Covaciu-Marcov, S.D., Ferenţi, S., Cicort-Lucaciu, A.S., Sas, I. (2012) Eryx jaculus (Reptilia, Boidae) north of Danube: a road-killed specimen from Romania *Acta Herpetologica* 7: 41–47.

Devictor, V., Whittaker, R.J., Beltrame, C. (2010) Beyond scarcity: citizen science programmes as useful tools for conservation biogeography *Diversity and Distribution* 16: 354–362.

Diego, S.M., Miguel, V., Marina, A., Rafael, Z. (2005) Initial Diversification of Living Amphibians Predated the Breakup of Pangea *The American Naturalist* 165(5):590-9.

Drews, C. (1995) Roadkills of animals by public traffic in Mikumi National Park, Tanzania, with notes on baboon mortality *African Journal of Ecology* 33:89-100.

Forman, R.T.T., Alexander, L.E. (1998). Roads and their major ecological effects *Annual Review of Ecological Systems* 29:207-231.

Gehrt S. (2002) Evaluation of Spotlight and Road-Kill Surveys as Indicators of Local Raccoon Abundance *Wildlife Society Bulletin* 30(2):449-456.

Mooney, N., Spencer, C. (2000) Why did the platypus cross the road? *Australian Mammalogy* 21(2):264-267.Abah, R. C. (2014). Rural perception to the effects of climate change in Otukpo, Nigeria. Journal of Agriculture and Environment for International Development, 108 (2), 153-166.

eISSN Number: 2462-2389 © 2021
UMK Publisher. All rights reserved.