CENTER for LARGE LANDSCAPE CONSERVATION

A.P.E. Project

(Assess. Protect. Evaluate.)

Mitigating Road Impacts on Wildlife from the Expansion of National Highway 37 in Assam, India

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Paula George

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Contact Information

Megan Parker

Center for Large Landscape Conservation

megan@largelandscapes.org

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Introduction

National Highway 37 (NH-37) connects northeastern Assam to the rest of India, where an average of 5,500 vehicles pass daily.[1] For 60 km, NH-37 stretches along the southern border of Kaziranga National Park (KNP), home to Bengal tigers, elephants, and most of the world's one-horned rhinos.[2] The north part of the park experiences seasonal flooding from the Brahmaputra River, which causes animals to migrate to higher elevations in the south. This requires animals to cross the NH-37, where wildlife-vehicle collisions (WVC) pose a grave threat. Reports suggest that at least 200 animals are killed annually on the highway. As a result, low-cost mitigation efforts, including signage, striping, and rumble strips, have been deployed in an effort to slow traffic and reduce WVCs.

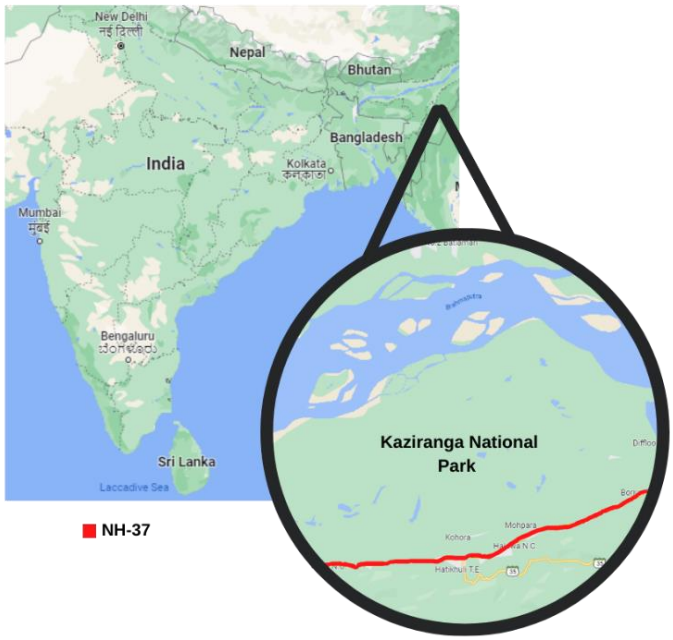

Figure 1. Location of NH-37 through Kaziranga National Park

Impacts of NH-37

NH-37 is part of the international Asian Highway Network, a nationally coordinated effort to develop 140,000 km of highways across India. The section of NH-37 that borders KNP is slated for a planned expansion from two to four lanes. The planned expansion will add additional pressures on wildlife in three primary ways:[3]

- Wider roads allow for higher speeds and traffic volume, increasing the chance of wildlife collisions.
- Higher traffic volume may trap some species on one side of the road because they are reluctant to or can't cross the expanded road, leading to genetic isolation and possible population extinctions if they are trapped in inhospitable habitats or where seasonal flooding may displace them.
- Current mitigation measures may be ineffective with more traffic and wider lanes.

Data Collection

Road expansions require good data for pre-construction baseline information to inform mitigation measures. Fortunately, data were collected on wildlife road-kills and wildlife crossings along the KNP section of NH-37 from 2018 to 2020 by Aaranyak, a wildlife NGO based in Guwahati, Assam. In collaboration with the Western Montana Transportation Institute – Montana State University (Bozeman, Montana) and funded by US Fish and Wildlife Service, a study was undertaken to study animal crossings and road-kills. These data were collected while driving the KNP section of highway Between November 2018 and March 2020, approximately every two to four days, using a Smart phone application called ROaDS (Roadkill Observation and Data Systems).[4] This app records the species, number of animals, status (dead, alive crossing road, alive near road), relative confidence

in the species identified, a geo-synched photograph, and other information, all attached to a precise GPS location, date, and time.

Aaranyak staff collected data along this stretch of road approximately 10 days/month during this same time and 1,423 animals were observed, representing 75 species. Three dead primates, 57 live primates near the road and 40 primates crossing the roads totaled 100 primates observed during this study to inform mitigation locations. Data collected on the NH-37 was analyzed to provide spatial reporting on live animal crossing and road-kills. Observations were classified by season, taxonomic type and status (dead, live, crossing road) and these were used to conduct optimized hotspot analyses to identify significant spatial clusters of observations.

Spatial patterns of wildlife crossings and dead animal sightings were found in different locations, and these hotspot locations changed seasonally, seen in Figure 1. Taxonomic status also resulted in different spatial and temporal patterns.

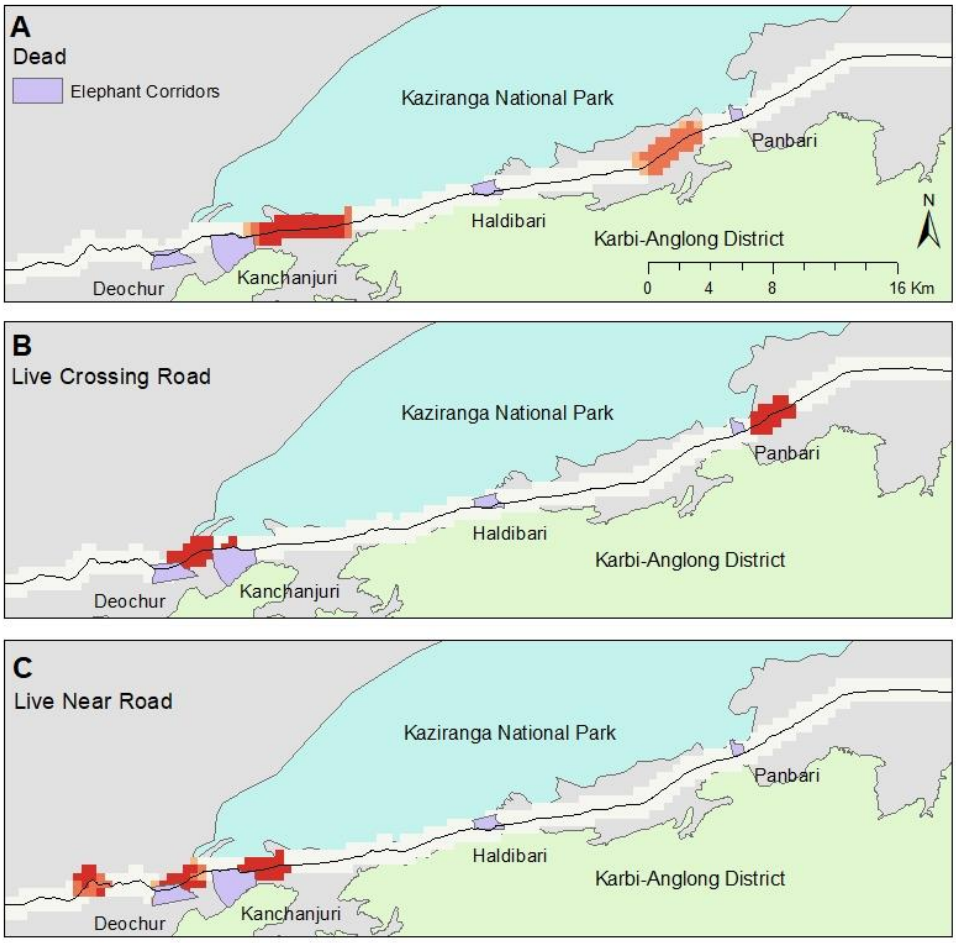

Figure 2. The results of four optimized hotspot analyses where darker red indicates a greater density of observations and white indicates areas that were not statistically significant hotspots. A) Hotspots of dead animals. B) Hotspots of live animals crossing the road. C) Hotspots of live animals near the road. Purple polygons are elephant corridors identified by Menon et al. (2017)

Conclusion

Since the proposal to widen this road, mitigation measures including three flyovers, or elevated sections of highway, are reported to be planned for construction.[5] These flyovers will stretch 18, 11, and 6 km respectively, returning to grade level at village entrances. Tunnels and elevated highways are some of the most wildlife friendly and safest wildlife crossing designs, allowing animals to move below or through areas previously endangering wildlife.[6]

This study highlights the critical importance of monitoring wildlife and roads to determine where mitigation is necessary and, optimally, how highways can be designed to reduce threats to humans and wildlife due to collisions. This section of road was a danger to wildlife and expansion of the road would have likely increased wildlife deaths. This area contains elephant corridors and these data contributed to a better understanding of how elephants and other ungulates use these corridors. The data also highlighted the effectiveness of the mitigation tools, such as rumble strips to slow traffic. Also of importance is the analyses of seasonality and attention to temporal as well as spatial road effects for crossings and wildlife collisions. Over 95% of dead animals observed in this study were small and medium-sized vertebrates and these were likely under-reported due to their size. Considering small crossing structures like culverts and arboreal crossings are also needed along with the fly-overs.

"Even with the planned flyovers, it remains important to revisit these areas to ensure that the most appropriate mitigation measures are designed and implemented at these critical habitat linkages, especially for focal species such as Asian elephants and one-horned rhinoceroses. The high use of these corridors also shows the importance of protecting these areas from the pressures of additional human development over the long term. Further research on the land use surrounding NH-37 could also be helpful for identifying additional potential crossing areas by relating landcover to wildlife observation hotspots."[3]

References

1. Menon, V., Tiwari, S. K., Ramkumar, K., Kyarong, S., Ganguly, U., & Sukumar, R. (2017). *Right of Passage: Elephant Corridors of India [2nd Edition]* (Conservation Reference Series No. 3). Wildlife Trust of India.

2. UNEP-WCMC and IUCN. (2022). *Protected Planet: The World Database on Protected Areas (WDPA) and World Database on Other Effective Area-based Conservation Measures (WD-OECM)*. UNEP-WCMC and IUCN. https://www.protectedplanet.net

3. USAID. (2021). *Annex 1: Spatial analyses of linear infrastructure threats to biodiversity in Asia. . Authors: Creech T, Stonecipher G, Bell M, Clevenger AP, Ament R. Prepared by Perez, APC for Contract no. AID-OAA-I-15-00051/AIDOAA-TO-16-00028, ESS WA#13* (Building a Foundation for Linear Infrastructure Safeguards in Asia). U.S. Agency for International Development (USAID).

4. Ament, R., Bell, M., & Wittie, M. (2021). *Federal lands wildlife-vehicle collision data coordination project, Phase 3.* [Final Report]. National Center for Rural Road Safety. http://ruralsafetycenter.org/

5. Parashar, U. (2019, September 8). Longest flyover to protect wildlife at Kaziranga planned. *Hindustan Times*. https://www.hindustantimes.com/india-news/longest-flyover-to-protect-wildlife-at-kaziranga-planned/story-QgE7k99jT1zP7LAfjR1exM.html

6. Clevenger, A. P., & Huijser, M. P. (2011). *Wildlife Crossing Structure Handbook: Design and Evaluation in North America* (Final Report FHWA-CFL/TD-11-003). Federal Highway Administration: Planning, Environment, and Realty.