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COMMUNICATION

A highway to hell: a proposed, inessential, 6-lane highway (NH173) that threatens the forest and wildlife corridors of the Western Ghats, India

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Abstract: A globally, extensive road network combined with increasing vehicular traffic poses a significant threat to local wildlife, environment, economy, and socio-politics. India, with nearly 5.9 million kilometers of road, has the second-highest road network in the world; and has plans to exponentially increase its national highways. In this study, we use a combination of collation of official documents, literature review, and GIS mapping to outline the possible environmental and socio-economic impacts caused by a proposed 6-lane national highway (NH 173). This highway is set to cut through the low elevation evergreen forests of the central Western Ghats between Mudigere and Nelliyadi towns of Chikkamagaluru and Dakshina Kannada districts, of Karnataka State, respectively. We further outline the insignificance of the project and recommend workable alternatives that could be considered in the wider public's interest.

Keywords: Conservation, forest, India, linear intrusion, road, roadkill, wildlife.

Kannada abstract: ಜಾಗತಿಕ ಮಟ್ಟದಲ್ಲಿ, ವ್ಯಾಪಕವಾಗಿರುವ ರಸ್ತೆಗಳ ಸಂಪರ್ಕ ಮತ್ತು ಹೆಚ್ಚಾಗುತ್ತಿರುವ ವಾಹನಗಳ ಸಂಚಾರವು ಸ್ಥಳೀಯ ವನ್ಯಜೀವಿ, ಪರಿಸರ, ಆರ್ಥಿಕ ಮತ್ತು ಸಾಮಾಜಿಕ ವ್ಯವಸ್ಥೆಯ ಮೇಲೆ ವ್ಯತಿರಿಕ್ತವಾದ ಪರಿಣಾಮವನ್ನು ಬೀರುತ್ತದೆ. ಭಾರತದಲ್ಲಿನ ರಸ್ತೆಗಳು, ಸುಮಾರು 5.9 ದಶಲಕ್ಷ ಕಿಲೋಮೀಟರ್ ಗಳಷ್ಟು ವಿಸ್ತೀರಣವನ್ನು ಹೊಂದಿದ್ದು, ವಿಶ್ವದಲ್ಲಿ ಎರಡನೇ ಅತಿದೊಡ್ಡ ರಸ್ತೆ ಸಂಪರ್ಕ ಹೊಂದಿರುವ ದೇಶವಾಗಿದೆ. ಅಷ್ಟೇ ಅಲ್ಲದೆ, ಇನ್ನೂ ಹೆಚ್ಚಿನ ಸಂಖ್ಯೆಯಲ್ಲಿ ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿಗಳ ನಿರ್ಮಾಣ ಯೋಜನೆಯನ್ನು ಹಾಕಿಕೊಂಡಿದೆ. ಕೆಳಕಂಡ ಅಧ್ಯಯನದಲ್ಲಿ, ಪ್ರಸ್ತಾಪಿತ ಷಟ್ಪದಿ ರಾಷ್ಟ್ರೀಯ ಹೆದ್ದಾರಿ ಯೋಜನೆಯಿಂದ (NH 173), ಪರಿಸರ, ಸಾಮಾಜಿಕ ಮತ್ತು ಆರ್ಥಿಕ ವ್ಯವಸ್ಥೆಯ ಮೇಲೆ ಬೀಳಬಹುದಾದ ಪರಿಣಾಮಗಳ ರೂಪರೇಖವನ್ನು, ಸರ್ಕಾರಿ ಸಂಯೋಜಿತ ದಾಖಲೆಗಳು, ಲೇಖನ ವಿಮರ್ಶೆ ಹಾಗೂ ಜಿ ಐ ಎಸ್ ರೇಖಾಚಿತ್ರಗಳನ್ನು ಅಧ್ಯಯನ ಮಾಡುವುದರ ಮೂಲಕ ತಿಳಿಸಿರುತ್ತೇವೆ. ಭಾರತ ದೇಶದ ಕರ್ನಾಟಕ ರಾಜ್ಯದ ಚಿಕ್ಕಮಗಳೂರು ಜಿಲ್ಲೆಯ ಭಾಗವಾದ ಮೂಡಿಗೆರೆ ಹಾಗೂ ದಕ್ಷಿಣ ಕನ್ನಡ ಜಿಲ್ಲೆಯ ಭಾಗವಾದ ನೆಲ್ಯಾಡಿ ಮಧ್ಯೆ ಇರುವ, ಪಶ್ಚಿಮ ಘಟ್ಟಗಳ ಕಡಿಮೆ ಎತ್ತರದ ನಿತ್ಯ ಹರಿದ್ವರ್ಣ ಕಾಡುಗಳ ಮೂಲಕ ಈ ಹೆದ್ದಾರಿಯು ಹಾದು ಹೋಗುವುದನ್ನು ಪ್ರಸ್ತಾಪಿಸಲಾಗಿದೆ. ಅದಲ್ಲದೆ, ಇದು ಮಹತ್ವಹೀನ ಯೋಜನೆ ಎಂಬುದನ್ನು ತಿಳಿಸುತ್ತಾ, ಸಾರ್ವಜನಿಕ ಹಿತಾಸಕ್ತಿಯನ್ನು ಕಾಪಿಡುವ ದೃಷ್ಟಿಯಿಂದ, ಇದಕ್ಕೆ ಪರ್ಯಾಯ ವ್ಯವಸ್ಥೆಯನ್ನೂ ಸೂಚಿಸಲಾಗಿರುತ್ತದೆ.

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Author contribution: Both the authors conceived the idea, HSSCS primarily wrote the paper and both the authors contributed to the final manuscript.

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INTRODUCTION

India has the second-highest road network in the world with nearly 5.9 million kilometers of road (MRTH 2019). Between the years 2018 and 2019, with 10,855km added to the existing highway network, India had a 10% increase in national highways compared to the previous year (MRTH 2019). Even with increased fuel economy standards, technological advancements, and continued roadway constructions, India's vehicular traffic is expected to grow significantly beyond the year 2050 (Dulac 2013). Globally, such extensive road network combined with increasing vehicular traffic has been identified as a significant threat to local wildlife, environment, economy, socio-politics, and indigenous culture & traditions (Goosem et al. 2010; Alamgir et al. 2017).

One such road is the proposed 6-lane national highway (NH-173) between Mudigere and Nelliyadi towns of Chikkamagaluru and Dakshina Kannada districts, of Karnataka State, respectively (hereafter Shishila Byrapura (SB) highway) to connect the coastal town of Bantwal with Chitradurga in southern India, through an entirely new alignment (NHAI 2018) (Fig. 1). The entire project of 233km has been split into four workable packages, each under 100km (NHAI 2018). Among them is the 68.9km stretch between Mudigere and Nelliyadi, with no existing highway in the alignment. With a budget of 25 billion INR (330 million USD at 1 USD = 75.698 INR), the project is set to connect this stretch, currently without any motorable road between Byrapura Village near Mudigere and Shishila Village near Nelliyadi; where the mean elevation changes nearly 800m, within just 21.9km (Image 1). SB highway is set to cut across contiguous forest patches of central Western Ghats – a biodiversity hotspot and a UNESCO world heritage site (Myers et al. 2000; WHC 2012) (Appendix 1). Here we outline the inevitable socio-economic and environmental disaster expected to be caused by the project, its insignificance, and the recommendation of workable alternatives.

Environmental and socio-economic impacts

The highway is set to fragment a contiguous stretch of forest, protected under seven reserve forests (RFs), which connects Bhadra Tiger Reserve, Kudremukha National Park, and Pushpagiri Wildlife Sanctuary (Appendix 1). Building a 30m wide highway with crash barriers and other road safety features as proposed under the project could act as blockades for the movement and seasonal migration of wildlife (Raman 2011; Alamgir et al. 2017). These areas hold one of the highest populations of Asiatic Elephants and also has been identified as an important Tiger corridor (Appendix 2; Elephant Task Force 2012; Qureshi et al. 2014; Project Elephant Division 2017). Along with these charismatic and threatened mega-fauna, these RFs are home to five species of birds, nine species of reptiles, and 23 species of mammals (Appendix 4), listed under schedule I and II of the Indian Wildlife (Protection) Act 1972, giving them the highest protection under Indian law (WII-ENVIS 2014; IUCN 2019). In addition, this landscape hosts an array of globally threatened and endemic species of flora and fauna (Myers et al. 2000; UNESCO WHC 2012). The proposed highway, with high speeding vehicles, would disrupt wildlife movement, especially of Asiatic Elephants, potentially worsening the existing acute human-elephant interactions in the region (Fig. 2, Appendix 5); this threatens the safety of both the local community and wildlife (Puyravaud et al. 2019). Opening up this relatively undisturbed patch of forest with no current access would inevitably lead to an increase in wildlife mortality through collision with speeding vehicles (Baskaran & Boominathan 2010; Raman 2011) and could provide access to poachers and smugglers to indulge in the illegal trade of wildlife and deforestation (Wilkie et al. 2000; Hughes 2018). The construction of a highway has also been linked to the spreading of invasive species such as *Lantana camara* and Eupatorium *Chromolaena odorata* and cause forest fires due to an increase in fuel loads from invasive alien species (Goosem et al. 2010; Raman 2011). At the same time, roads and highways lead to a change in animal behaviour where a few species will be attracted to the roads for scrap food from travelers while others would avoid regular movement, affecting their genetic diversity (Trombulak & Frissell 2000; Holderegger & Di Giulio 2010).

The area between Mudigere and Nelliyadi that is proposed for the construction of the SB highway lies on the high and moderate landslide susceptibility areas (Gupta & Basu 2017) (Appendix 3). The highway is also planned to pass along the Kapila River, one of the main feeders for the Nethravathi River system – a major river that provides water to millions of people and agrarian systems. Road construction, particularly in steep landscapes are associated with increased frequency of landslides and soil erosion (Goosem et al. 2010), resulting in heavy pulses of sediment into streams (Beevers et al. 2012). Thus, construction of the SB highway would worsen the landslide susceptibility, also damaging the water catchment of the Nethravathi

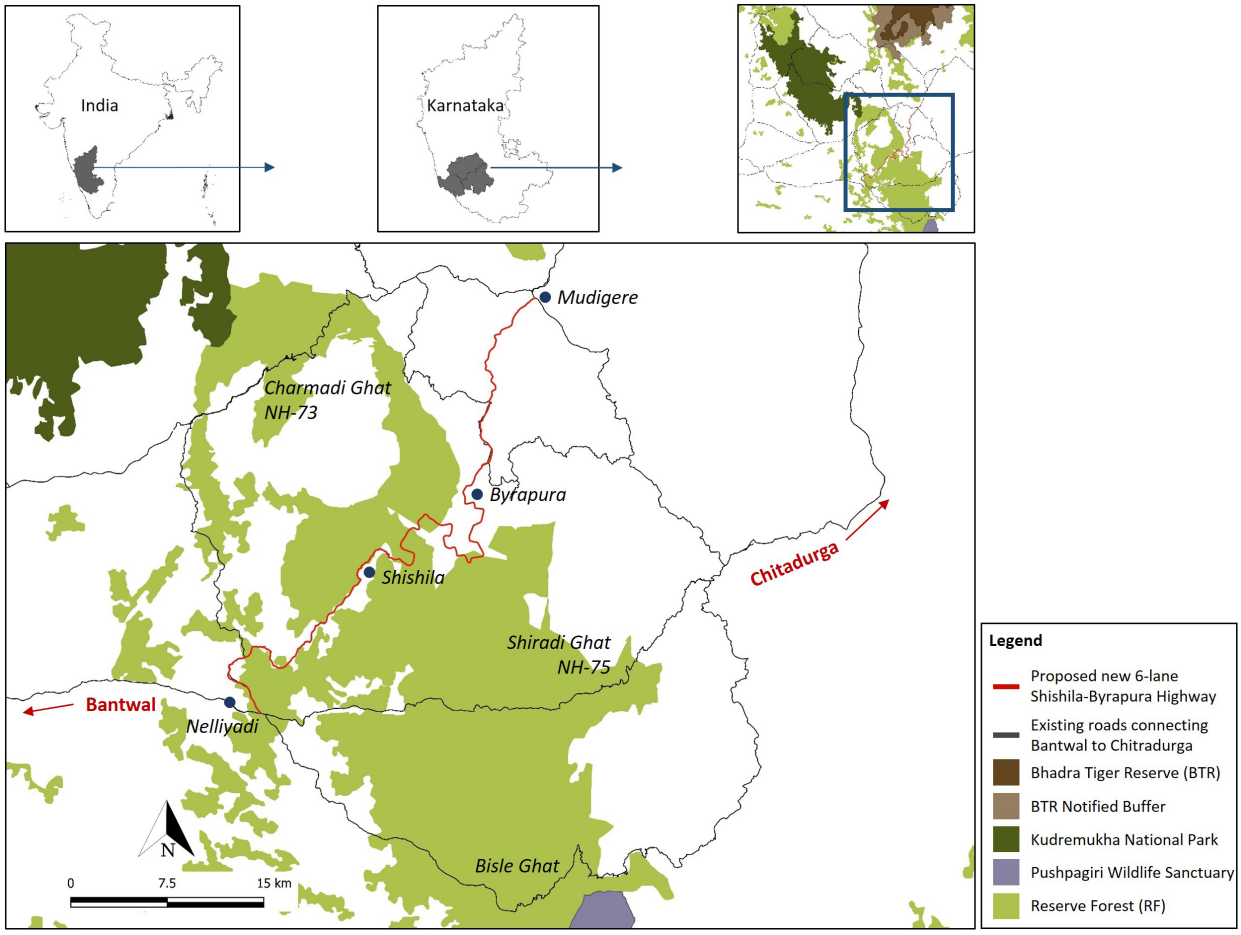


Figure 1. The proposed 6-lane Shishila Byrapura (SB) highway (coloured in red) between Mudigere in Chikkamagaluru District and Nelliyadi in Dakshina Kannada District, of Karnataka State. Three existing highways passing through the region that connects Chitradurga to Bantwal. The SB highway is set to further cut through a contiguous forest that connects Bhadra Tiger Reserve, Kudremukha National Park and Pushpagiri Wildlife Sanctuary. Details regarding SB highway were collected mainly from the open-access forest clearance web portal, submitted by the National Highway Authority of India (NHAI). All mapping was done using the QGIS software version 3.4.11-Madeira (QGIS Development Team 2019).

River system (Gupta & Basu 2017). The problem would escalate during the monsoon period, causing irreversible damage to wildlife, the local community, and economy as seen during the monsoon of 2018 and 2019 at various parts of the Western Ghats (Ghosh 2018; Mrunmayee & Girish 2019). Moreover, a 4-year long process of constructing a 70km highway through the forested landscape using earthmovers and blasting machinery, by itself, may permanently damage the area and disrupt wildlife movement. No amount of economic benefits, compensatory afforestation, or financial allowance can outweigh or equal the exceptional value of these old-growth natural forests (Watson et al. 2018).

Insignificance of the project and recommended alternatives

SB highway has been proposed for construction without due consideration of environmental and socio-economic factors, stating that habitat fragmentation is unavoidable; however, the proposed alignment of the highway is parallel to two existing highways (Fig. 1); and most other roads between Bantwal and Chitradurga, are being widened and upgraded to national highways. Furthermore, the alternative highway alignments that we propose are existing roads that are already being upgraded and almost trace the proposed highway. By tracing our proposed alignment, Nelliyadi – Sakaleshpura – Belur – Chikkamagaluru – Chitradurga (Fig. 3, Appendix 6), we could: a) halt the environmental and socio-economic impacts from the newly proposed SB highway; and b) save the needless expenditure of 25 billion INR of

Image 1. A picture of the old-growth lowland evergreen rainforest landscape through which the proposed 6-lane Shishila Byrapura (SB) highway is set to pass through.

taxpayer's money on an unnecessary project.

CONCLUSION

Under the current global biodiversity crisis and climate emergency, protection of natural forests and landscape is crucial now, more than ever before (Watson et al. 2018; Lewis et al. 2019). Increasing evidence also shows that inviolate spaces help in wildlife conservation and reduce human-wildlife conflict (Goswami et al. 2014; Srivathsa et al. 2014). It is evident that the construction of the proposed SB highway would lead to (a) habitat destruction and fragmentation (Appendix 1), (b) threaten the survival of 37 species of schedule I and II animals potentially found in the region (Appendix 4), (c) worsen the existing acute human-elephant interactions in the region (Fig. 2), and (d) cause an array of environmental and socio-economic disasters. We see no requirement for a parallel and a completely new 6-lane highway between Mudigere and Nelliyadi through the old-growth and sensitive forests, under a proposed new alignment. This is because, there are suitable alternatives with significantly lower impacts (Fig. 3, Appendix 6), which we strongly urge the Government of India to re-examine. Considering all the potential environmental and socio-economic impacts from the proposed SB highway, we request the concerned authorities to take necessary actions to consider alternative options.

REFERENCES

Alamgir, M., M.J. Campbell, S. Sloan, M. Goosem, G.R. Clements, M.I. Mahmoud & W.F. Laurance (2017). Economic, socio-political and environmental risks of road development in the tropics. *Current Biology* 27(20): PR1130–R1140. https://doi.org/10.1016/j.cub.2017.08.067

Baskaran, N. & D. Boominathan (2010). Roadkill of animals by highway traffic in the tropical forests of Mudumalai Tiger Reserve, southern India. *Journal of Threatened Taxa* 2(3): 753–759. https://doi.org/10.11609/JoTT.o2101.753-9

Beevers, L., W. Douven, H. Lazuardi & H. Verheij (2012). Cumulative

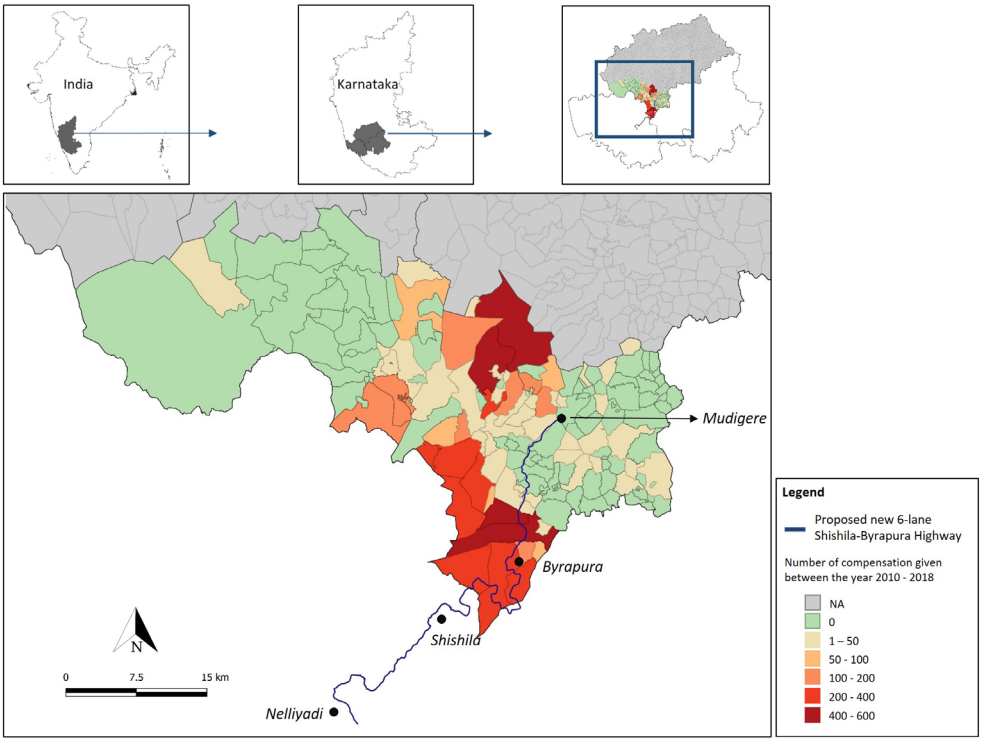


Figure 2. The number of compensations given at village level, by the Karnataka Forest Department (KFD), Government of India, for the elephant caused crop loss between the year 2010 and 2018. Here the compensation data is shown only for the taluk of Mudigere in Chikkamagaluru (light green to dark red), through which the proposed 6-lane Shishila Byrapura (SB) highway (dark blue line) is set to pass; all other villages are coloured in light grey. It is evident from the map that, the proposed highway cuts through the villages with high human-elephant conflict. If completed, the SB highway would potentially lead to an increase in the human-elephant negative interactions in the region. Details regarding the compensation were collated through written requests to KFD.

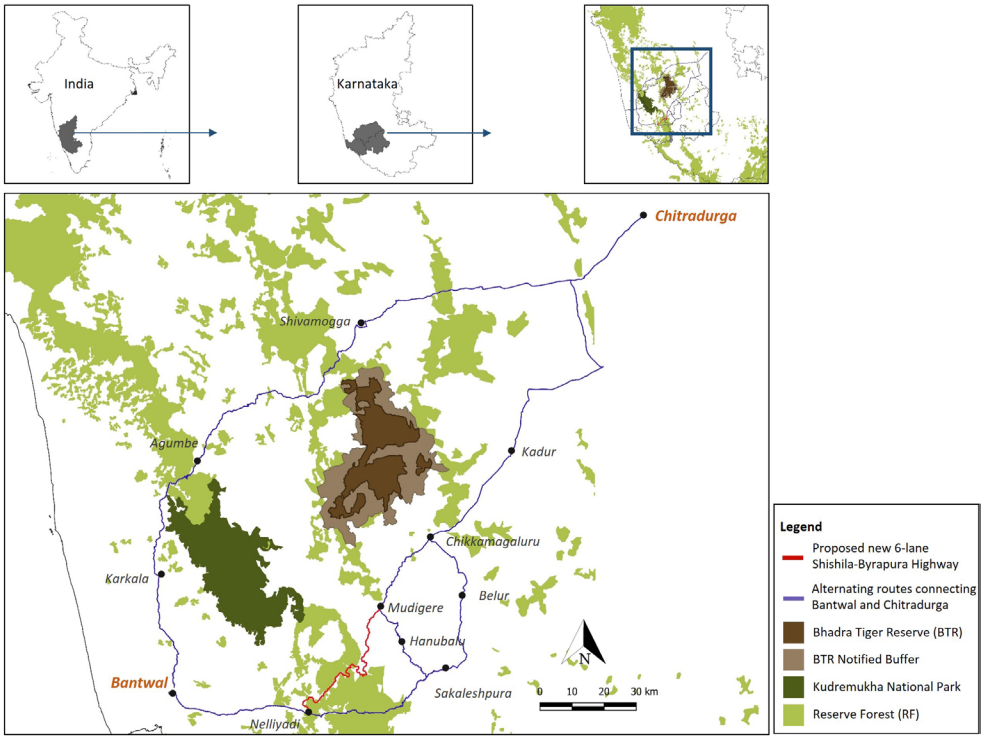


Figure 3. The existing highway routes that are being upgraded that can be used as an alternative (blue lines) to the proposed new 6-lane SB-highway (red line).

impacts of road developments in floodplains. *Transportation research part D: Transport and Environment* 17(5): 398–404. https://doi.org/10.1016/j.trd.2012.02.005

Dulac, J. (2013). Global Land and Transport Infrastructure Requirements - Estimating Road and Railway Infrastructure Capacity and Costs to 2050. Available at: https://webstore.iea.org/. Last accessed on 17 December 2019.

Elephant Task Force (2012). Report of the Karnataka Elephant Task Force - Submitted to the High Court of Karnataka. Available at: http://www.indiaenvironmentportal.org.in/. Last accessed on 17 December 2019.

Ghosh, S. (2018). Kerala landslides: GSI advocates land use and zoning regulations. Available at: https://india.mongabay.com/. Last accessed on 17 December 2019.

Goosem, M., E.K. Harding, G. Chester, N. Tucker & C. Harriss (2010). Roads in Rainforest: science behind the guidelines. Reef and Rainforest Research Centre. Available at: https://www.rrrc.org.au/research_reports-html/. Last accessed on 17 December 2019.

Goswami, V.R., D. Vasudev & M.K. Oli (2014). The importance of conflict-induced mortality for conservation planning in areas of human-elephant co-occurrence. *Biological Conservation* 176: 191–198. https://doi.org/10.1016/j.biocon.2014.05.026

Gupta, T. & S. Basu (2017). Macro-Scale (1:50,000) Landslide Susceptibility Mapping in parts of Toposheet Nos. 48P/05 and 48P/09, Dakshina Kannada and Hassan Districts, Karnataka. Bengaluru. Available at: https://www.gsi.gov.in/webcenter/portal/OCBIS. Last accessed on 17 December 2019.

Holderegger, R. & M. Di Giulio (2010). The genetic effects of roads: a review of empirical evidence. *Basic Applied Ecology* 11(6): 522–531. https://doi.org/10.1016/j.baae.2010.06.006

Hughes, A.C. (2018). Have Indo-Malaysian forests reached the end of the road? *Biological Conservation* 223: 129–137. https://doi.org/10.1016/j.biocon.2018.04.029

IUCN (2020). The IUCN Red List of Threatened Species. Version 2020-1. Available at: http://www.iucnredlist.org. Last accessed on 03 May 2020.

Lewis, S.L., C.E. Wheeler, E.T.A. Mitchard & A. Koch (2019). Restoring natural forests is the best way to remove atmospheric carbon. *Nature* 568: 25–28. https://doi.org/10.1038/d41586-019-01026-8

MRTH (2019). Annual Report 2018-19. New Delhi. Available at: https://morth.nic.in/. Last accessed on 17 December 2019.

Mrunmayee & D.V. Girish (2019). Is climate change the only reason for flooding in the Western Ghats? Available at: https://india.mongabay.com/. Last accessed on 17 December 2019.

Myers, N., R.A. Mittermeier, C.G. Mittermeier, G.A.B. Da Fonseca & J. Kent (2000). Biodiversity hotspots for conservation priorities. *Nature* 403: 853–858. https://doi.org/10.1038/35002501

NHAI (2018). Development of Economic Corridors, Feeder Routes and Coastal Roads to improve the efficiency of freight movement in India (Lot-3/KN/Package-2) Phase III of Chitradurga – Mangalore Intercorridor of NH 173 – From Mudigere Hand Post at Junction of NH 73 to Nellyadi Junction at Km 270.600 of NH 75. Available at: https://parivesh.nic.in/. Last accessed on 17 December 2019.

Project Elephant Division (2017). Synchronized Elephant Population Estimation - India 2017. Available at: http://www.indiaenvironmentportal.org.in/. Last accessed on 17 December 2019.

Puyravaud, J.-P., S. Gubbi, H. C. Poornesha & P. Davidar. (2019). Deforestation increases frequency of incidents with elephants (*Elephas maximus*). *Tropical Conservation Science* 12: 1–11. https://doi.org/10.1177/1940082919865959

QGIS Development Team (2019). QGIS Geographic Information System. Open Source Geospatial Foundation Project. Available at: http://qgis.osgeo.org.

Qureshi, Q., S. Saini, P. Basu, R. Gopal, R. Raza & Y.V. Jhala (2014). Connecting Tiger Populations for Long-term Conservation. Dehradun. Available at: https://wii.gov.in/. Last accessed on 17 December 2019.

Raman, T.R.S. (2011). Framing ecologically sound policy on linear intrusions affecting wildlife habitats - Background paper for the National Board for Wildlife. Available at: https://www.conservationindia.org/wp-content/files_mf/Linear-intrusions_Shankar-Raman.pdf. Last accessed on 18 December 2019.

Srivathsa, A., K.K. Karanth, D. Jathanna, N.S. Kumar & K.U. Karanth (2014). On a dhole trail: Examining ecological and anthropogenic correlates of dhole habitat occupancy in the Western Ghats of India. *PLoS One* 9(8): e106213. https://doi.org/10.1371/journal.pone.0098803

Trombulak, S.C. & C.A. Frissell (2000). Review of ecological effects of roads on terrestrial and aquatic communities. *Conservation Biology* 14(1): 18–30. https://doi.org/10.1046/j.1523-1739.2000.99084.x

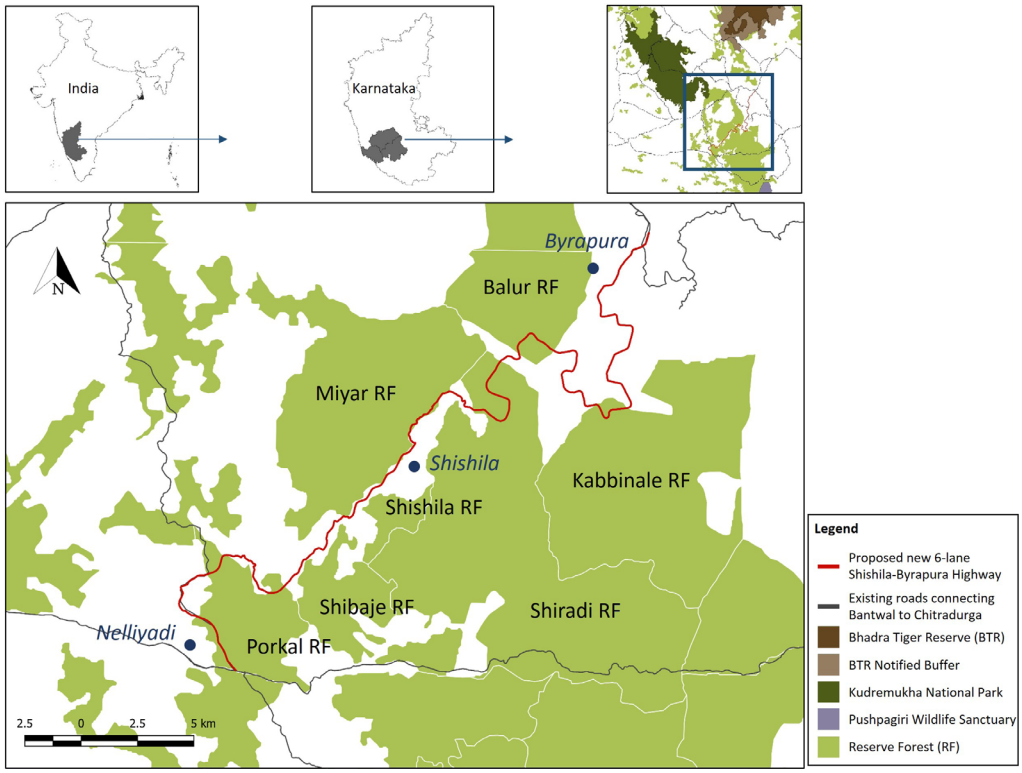
UNESCO WHC (2012). Western Ghats. Available at: https://whc.unesco.org/en/list/1342/. Last accessed on 03 May 2020.

Watson, J.E.M., T. Evans, O. Venter, B. Williams, A. Tulloch, C. Stewart, I. Thompson, J.C. Ray, K. Murray, A. Salazar, C. McAlpine, P. Potapov, J. Walston, J.G. Robinson, M. Painter, D. Wilkie, C. Filardi, W.F. Laurance, R.A. Houghton, S. Maxwell, H. Grantham, C. Samper, S. Wang, L. Laestadius, R.K. Runting, G.A. Silva-Chávez, J. Ervin & D. Lindenmayer (2018). The exceptional value of intact forest ecosystems. *Nature Ecology and Evolution* 2: 599–610. https://doi.org/10.1038/s41559-018-0490-x

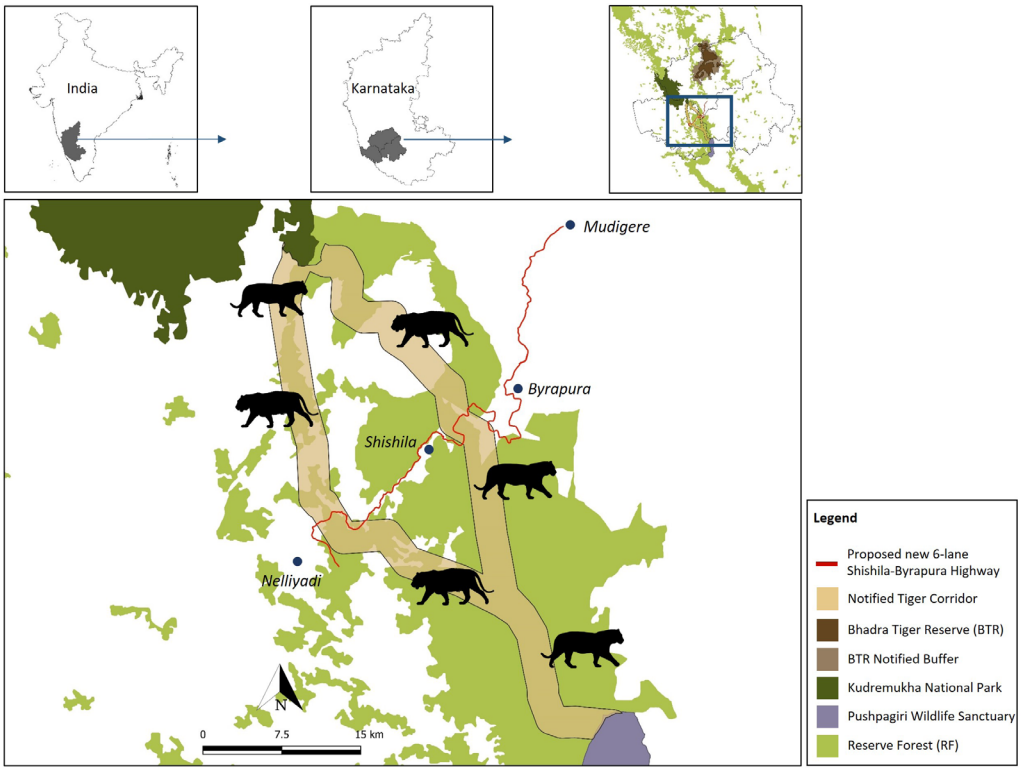
WHC (2012). Adoption of Statements of Outstanding Universal Value for the following World Heritage properties inscribed at the 36th session of the World Heritage Committee. Available at: https://whc.unesco.org/. Last accessed on 17 December 2019.

WII-ENVIS (2014). Schedule Species Database. Ministry of Environment for Climate Change, Government of India. Available at: http://www.wiienvis.nic.in/Database/ScheduleSpeciesDatabase_7969.aspx. Last accessed on 03 May 2020.

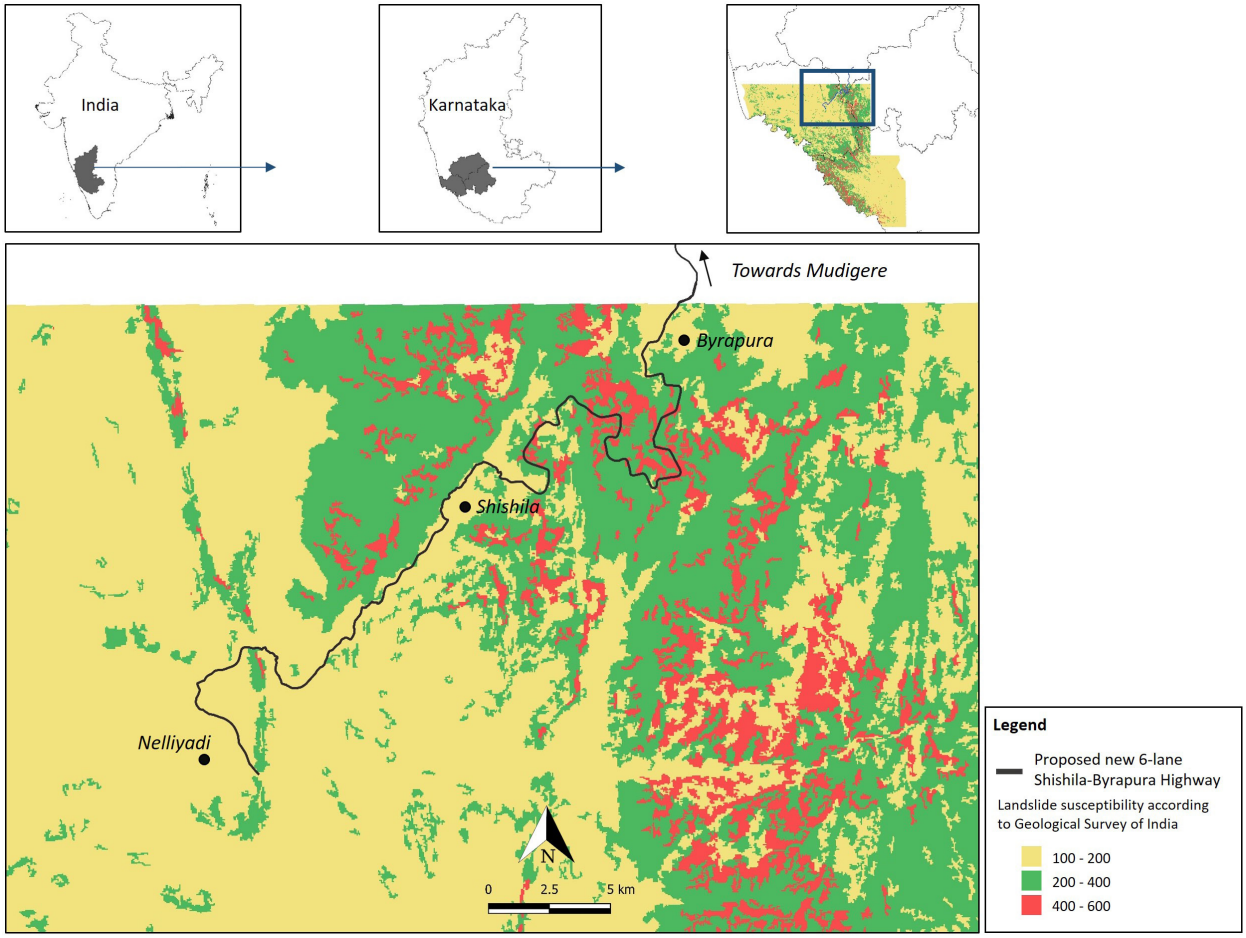
Wilkie, D., E. Shaw, F. Rotberg, G. Morelli & P. Auzel (2000). Roads, development, and conservation in the Congo Basin. *Conservation Biology* 14: 1614–1622. https://doi.org/10.1046/j.1523-1739.2000.99102.x



Appendix 1. The proposed Shishila Byrapura (SB) highway, which is set to cut through seven contiguous Reserve Forests (RF) in the Central Western Ghats namely: Balur RF, Kabbinale RF, Miyar RF, Porkal RF, Shiradi RF, Shishila RF, Shibaje RF. These RFs are contiguous and their various names are given by the Forest Department, Government of India, according to their administrative circles.



Appendix 2. The extent of the Tiger corridor notified by the National Tiger Conservation Authority (NTCA) of India as per the report submitted by Qureshi et al (2014).



Appendix 3. The landslide susceptibility of the proposed area through which the proposed Shishila Byrapura (SB) highway section of the NH173, is set to be newly constructed, as measured by the Geological Survey of India, Government of India. It is evident that the stretch passing through the Byrapura region passes almost entirely through Medium and High landslide susceptibility areas.

Appendix 4. Species listed under Schedule I and II of the Indian Wildlife (Protection) Act, 1972, that are found in the landscape where the proposed Shishila Byrapura (SB) highway section of the NH173, is set to be newly constructed.

Taxa	Common name	Scientific name	Schedule
Birds	Great Pied Hornbill	*Buceros bicornis*	I
Birds	Indian Pied Hornbill	*Anthracoceros malabaricus*	I
Birds	Peregrine Falcon	*Falco peregrinus*	I
Birds	Osprey	*Pandion haliaetus*	I
Birds	Southern Hill Myna	*Gracula indica*	I
Mammals	Gaur	*Bos gaurus*	I
Mammals	Malabar Civet	*Viverra civettina*	I
Mammals	Elephant	*Elephas maximus*	I
Mammals	Leopard	*Panthera pardus*	I
Mammals	Leopard Cat	*Prionailurus bengalensis*	I
Mammals	Gray Slender Loris	*Loris lydekkerianus*	I
Mammals	Indian Mouse Deer	*Moschiola indica*	I
Mammals	Indian Pangolin	*Manis crassicaudata*	I
Mammals	Asian Small-clawed Otter	*Aonyx cinereus*	I

Taxa	Common name	Scientific name	Schedule
Mammals	Sloth Bear	*Melursus ursinus*	I
Mammals	Tiger	*Panthera tigris*	I
Mammals	Bonnet Macaque	*Macaca radiata*	II
Mammals	Dark-legged Malabar Langur	*Semnopithecus hypoleucos*	II
Mammals	Dhole / Asiatic Wild Dog	*Cuon alpinus*	II
Mammals	Brown Palm Civet	*Paradoxurus jerdoni*	II
Mammals	Common Palm Civet	*Paradoxurus hermaphroditus*	II
Mammals	Small Indian Civet	*Viverricula indica*	II
Mammals	Indian Giant Squirrel	*Ratufa indica*	II
Mammals	Jackal	*Canis aureus*	II
Mammals	Jungle Cat	*Felis chaus*	II
Mammals	Brown Mongoose	*Herpestes brachyurus*	II
Mammals	Common Mongoose	*Herpestes edwardsii*	II
Mammals	Stripe-necked Mongoose	*Herpestes vitticollis*	II
Reptiles	Indian Flapshell Turtle	*Lissemys punctata*	I
Reptiles	Large Bengal Monitor Lizard	*Varanus bengalensis*	I
Reptiles	Indian Python	*Python molurus*	I
Reptiles	Indian Chameleon	*Chamaeleo zeylanicus*	II
Reptiles	Checkered Keelback	*Xenochrophis piscator*	II
Reptiles	King Cobra	*Ophiophagus hannah*	II
Reptiles	Indian Rat Snake	*Ptyas mucosa*	II
Reptiles	Spectacled Cobra	*Naja naja*	II

Appendix 5. The total number of compensation at the village level, for the elephant-caused crop loss within Mudigere Taluk of Chikkamagaluru District, given by the Karnataka Forest Department (KFD), Government of India. These villages are part of the region through with the proposed 6-lane highway Shishila Byrapura (SB) highway of NH173 is set to pass through. We collated the information on the compensation number through written requests to KFD. The economic value of each compensation might vary based on the intensity of the crop loss faced by individual farmers. At the village level, however, we have summed the number of cases to get the total number across eight years (2010–2018), irrespective of the economic value received.

Village names	Total number of compensation (2010–18)
Vurubage	580
B.Hosahalli	540
Kundhuru	492
Gutthi	386
Bankenahalli	290
Byrapura	285
Kogile	242
Bidarahalli	179
Hosakere	175
Saragodu	173
Kenjige	168
Binnadi	165
Mudhugundi	156
Palguni	135
Heggudlu	121

Village names	Total number of compensation (2010–18)
Meguru	101
Beranagodu	99
Maddrahalli	86
Mekanagadde	85
Tathkola	81
Tharuve	80
Koove	69
Byduvalli	49
Hesagodu	48
Darshana	46
Lokavalli	36
Hoysalalu	26
Bettagere	24
Baggasagodu	22
Jogannanakere	21

Village names	Total number of compensation (2010–18)
Kotragere	20
Kasaba Banaka	19
Hemmadhi	18
Halike	16
Indravalli	14
Hanumanahalli	11
Tripura	10
Hadhi Oni	10
Javali	9
Kannagere	9
Kollibylu	7
Angadi	7

Village names	Total number of compensation (2010–18)
Anajuru	7
Gowdahalli	6
Kelagodu	4
Kelaguru	4
Kademadakallu (naduvinamadakallu)	4
Kasaba Baluru	3
Halekote	3
Koluru	3
U. Hosahalli	3
Gonibeedu Agrahara	2
Kelluru	2
G Hosalli Agrahara	2

Appendix 6. A description of the alternative routes to the proposed Shishila Byrapura (SB) highway of NH173, using existing roads and highways that could be upgraded/are in due for an upgrade. National highways show the existing highways through which the proposed alternative route passes. The distance in kilometres is the distance between Bantwal in Dakshina Kannada District to Chitradurga in Chitradurga District, which spans the entire stretch of the project.

	Passing through Locations	National Highways	Distance (km)
1	Nelliyadi - Sakaleshpura - Belur- Chikkamagaluru -Chitradurga	75; 173	318
2	Nelliyadi - Sakaleshpura - Hanbal - Mudigere - Chikkamagaluru - Chitradurga	75; 173	329
3	Nelliyadi - Karkala - Agumbe - Shimoga - Chitradurga	169; 369	291

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