Road Risks & Environmental Impact Assessments in Malaysian Road Infrastructure Projects


Dr Mohammed Alamgir


Dr Mason J. Campbell


Dr Sean Sloan


Dr Wong Ee Phin


Prof. William F. Laurance

Roads can promote economic growth and social integration but they can also initiate environmental, economic and socio-political harms. In many cases, these harms can be considerably minimised and the road benefits maximised through proactive planning by road engineers and effective Environmental Impact Assessments (EIAs).

We are living in an era of unprecedented road infrastructure expansion across the globe. The length of official roads has increased by 12 million kms worldwide since 2000, with a further 25 million kms expected to be built by 2050 (Dulac, 2013).

In the last decade (2002-2013), Malaysia has built 133,000 kms of official roads (ASEAN 2010, 2015), and there are ambitious plans for further road infrastructure expansion under the 11th Malaysia Plan (2016-2020) with a focus on rural connectivity.

Considering the contribution good roads can make to economic growth and rural connectivity, it is completely justifiable to expand the country's network of roads. However, problems arise when road proponents are arguably unaware of the full extent of the risks that bad roads may pose to the economy, society and environment.

Moreover, in many cases, the inadequacies of EIAs – the only safeguard against potential environmental risks and to propose adequate mitigation and offset measures – means it has failed to expose the risks and thus do not allow road proponents such as engineers and approving bodies to adequately respond to or act to minimise potential risks.

THE CHALLENGES

In Malaysia, building roads is often a challenge due to factors such as the tropical climate, sporadically distributed human communities and exceptionally biodiverse and sensitive tropical forest landscapes.

The peninsula and Borneo are home to world renowned tropical rainforests. In particular, Borneo is one of only two places on the planet where rhinoceros, elephant and orangutan co-exist. The challenge to protect these landscapes is made even greater by the need for roads to support economic development which includes oil palm plantations, logging and mining. All these require roads to be laid in often remote, difficult terrain and, in many cases, through virgin rainforests.

Unfortunately, as we can see happening globally, the overestimation of road benefits often overshadows the estimation of road risks. Therefore, it is absolutely necessary to be able to adequately identify all the potential risks through effective EIAs and road infrastructure planning.

THE RISKS

A badly-planned road can open a Pandora's Box of environmental, economic and socio-political dangers (see Table 1 for selected examples, and *Alamgir et al., 2017*, for a detailed version). These risks vary across the full spatial and political spectrum, affecting local, state and national level governments. In some cases, these may even cross national boundaries.

The Pan Borneo Highway, for example, poses significant environmental risks, as it will dissect one of the two last remaining habitats of rhinoceros, elephant and orangutan.

Furthermore, road penetration into the rainforest will lead to human access and consequently increase risks of poaching, deforestation and degradation which will be likely to push many threatened flora and fauna species to the edge of extinction.

The number of road kills will most likely increase, especially for large mammals, slow-moving wildlife and arboreal species which are being forced to traverse on ground (see Figure 1).

Social risks are already apparent under the current plan of the Pan Borneo Highway as evidenced by

Table 1: Selected examples of road development risks (details available in Alamgir et al., 2017; Laurance and Burgués-Arrea 2017; Laurance et al., 2009; Clements et al., 2014).

ENVIRONMENTAL RISKS	ECONOMIC RISKS	SOCIO-POLITICAL RISKS
Threat to biodiversity - wildlife vehicle collision, habitat fragmentation, increased poaching, increased noise level effects on reproductive capacity of wildlife, barrier effects on animal migration.	High construction cost due to tropical environments. In steep terrain, more cut and fill, tunnels and landslide mitigation measures will be required. Flatter/swampy ground - these sections will require high road base and more culverts, bridges and drainage.	Social disparity: Relatively few prosper from road development such as road proponents and social elite (e.g. resulting in higher land price) while many such as those who are forced to migrate, do not.
Increased surface erosion and localised flooding	The real expenditure in road construction is often far less than that in the original budget due to corruption	Influx of migrant workers often resulting in an increase in immoral activities such as prostitution and black market product usage
Landslides in steep terrain and impeded drainage in flatter terrain	Lack of investment for road maintenance – pothole and slumping (an example in figure 2 and 3) increase	Increases in pathogens and diseases such as malaria and dengue fever
Deforestation, illegal roads, illegal logging, and fires can increase	Roads may become stranded assets due to rapid degradation by tropical climates (e.g. intense rainfall and resulting landslides) and lack of maintenance	Threat to politicians – lack of community consultation and perceived unfairness can lead to social instability, lawsuits and litigation and protests
Increased effects on aquatic biodiversity and downstream community livelihood activities, e.g. pollution of fishing zones	If all risks are not discussed adequately during the planning process, the project may be delayed and costs increased	Roads can increase threats to indigenous culture through influx of non-indigenous land settlers, illegal colonisation and land appropriation, disruption of hunting by poachers and potential incursion of previously unknown diseases.

Figure 1: This Malayan tapir is a road killed victim in northern Peninsular Malaysia (photo © WWF-Malaysia)

criticisms levelled by many civil society and community groups in both Borneo and Peninsular Malaysia.

Furthermore, with the uncertainty over the high levels of ongoing investment required for the future maintenance of the highway, it may fail to deliver the economic and social expectations, considering the difficult terrain it will need to traverse in both Sabah and Sarawak, and the intense seasonal tropical rainfall. If maintenance of the proposed Pan Borneo Highway is inadequate, it will rapidly become an economic liability.

INADEQUACIES IN EIAs

EIAs are intended to identify many of the risks and potential liabilities of road infrastructure projects, and to minimise such risks with suitable mitigation and offset measures. In Malaysia, an EIA had been a mandatory regulatory requirement for prescribed infrastructure projects since 1988

Figure 2: Potholes in tropical roads (photo © Mohammed Alamgir)

(*DoE, 2007*). This has seen environment impacts in Malaysia significantly reduced when compared to other comparable tropical countries.

However, many relevant road risks have not been adequately identified during the EIA process for road infrastructure projects, resulting in inadequate mitigation measures. This ineffectual assessment has been occurring due to a number of apparent inadequacies in the current process and requirement of EIAs (*Yusoff and Hashim, 1996; Briffett et al., 2004*) including spatial and temporal ignorance, conflict of interests and the relaxation and flexibility of legislative requirements.

EIAs in road infrastructure projects in Malaysia often assess a narrow spatial and temporal scale that is inadequate to identify the impact on wildlife such as tigers and elephants, whose large home ranges and movement corridors may overlap with planned road locations. Assessments also often focus on potential local impacts within a limited spatial scale and therefore fail to adequately assess the impact of development on the whole landscape.

For example, the current requirements for EIAs mean they rarely effectively identify the impacts on landscape level hydrological process and water flow, downstream wetland biodiversity and related livelihood activities (such as fishing) in downstream human communities. The consequences become apparent when there are environmental pollution, clean water shortages, landslides occurrence or reduction in income.

EIAs surveys rarely, if ever, assess temporal variation in environmental communities. For instance, repeated surveys across a landscape and diurnal and seasonal period are necessary to identify rare and threatened species (*Raiter et al., 2014*). As mentioned, this practice is rarely evident in EIAs for road infrastructure projects in Malaysia or elsewhere in the tropics.

Few EIAs in Malaysia effectively assess indirect or induced and cumulative effects of a project, such as when a road opens a forested region to subsequent degradation. Access to these once intact areas can lead to significant degradation through encroachment, hunting, poaching and habitat fragmentation.

For example, in Terengganu, 90% of snares and poaching camps in the forest were found within 5 km of the state route T156 (*Clements et al., 2014*). Such indirect impacts of road infrastructure expansion in forested areas are rarely identified during the EIA process. Furthermore, the EIAs requirement for small projects is often relaxed (i.e. not requiring community consultation and comments) or even deemed unnecessary for mini projects (*DoE, 2007*). However, the cumulative impacts of several small and mini projects may prove highly detrimental to the landscape with regards to both natural ecosystems and human communities. In that sense, relatively few EIAs are sufficiently robust or adequate in scope.

As with most countries, the most striking feature of road development EIAs in Malaysia is the presence of "conflicts of interest". This means that as most EIAs are funded by the project proponent, the consultancy firm may hesitate to conduct a stringent EIA if it believes this will result in it being blacklisted in future by other project proponents.

Project proponents usually have considerable resources and they push hard to get projects approved, regardless of EIAs. As such, consulting companies which deliver EIAs with very few mitigation measures despite the increased risks and lack of appropriate safeguards (*Alamgir et al., 2017*), will be the ones in high demand.

Moreover, the EIA process places the burden of proof on road opponents who rarely have detailed information about rare species, biological resources and ecosystem services needed to determine the actual environmental costs of roads (*Alamgir et al., 2017*).

In addition, the time allocation for public comments is often very limited and the requirement for a National Registration Identification Card (NRIC) number for online comments not only discourages local community input but also prevents international experts from providing useful and informed comments.

Often, road proponents also submit EIAs at a very late stage in the development process, sometimes even after a project has already started, although they are required to do so at the planning stage. This late submission can prevent the inclusion of effective comments or project modifications by exterior experts. For example, while the Department of Environment and Economic Planning Unit are usually quite stringent in incorporating public comments into development process and approvals, the late submission of

EIAs may prevent their inclusion and thus limit adequate modification and mitigation measures.

Many EIAs carried out for infrastructure projects in tropical developing countries are extremely superficial. A classic example can be seen in an EIA survey for a housing project in Panama's suburban forests which reported only 12 common bird species. Subsequently, a bird expert identified 121 bird species in the same survey area within only two hours including several rare and threatened species (*Laurance, 2007*).

As in many other developing nations, some EIA surveys in Malaysia are conducted by inexperienced scientists who may not have the skills required for identifying rare and threatened species.

This trend of employing inexperienced scientists is also due to a shortage of skilled experts and the cost minimisation practices of EIA firms in order to remain competitive. Such inadequacies are compounded by the fact that EIA supervising and approving bodies, such as the Economic Planning Unit and the Department of Environment, often suffer from inadequate financial resources and their own lack of highly skilled personnel to effectively scrutinise the often complex EIAs for road infrastructure projects.

CONCLUSION

The deficiencies of EIAs for road projects increase the risk of environmental damage, social conflicts and litigation which can lead to project delays, cost overruns or even project cancellation. However, many risks can be potentially minimised if road engineers are aware of them during the planning and road design phases. Further, the inadequacies in EIAs for road projects can be minimised through the incorporation of proactive planning and greater community engagement (details in *Laurance et al., 2015*) throughout the life of the project.

The inadequate consideration of risks in road infrastructure planning and the serious flaws in EIAs in road projects are not confined only to developing nations but also in many developed countries.

Figure 3: Slumping in tropical roads (photo © Mohammed Alamgir)

However, in Malaysia, with the current rapid expansion of the road network, the pressure on policy makers by road proponents, extractive industries and multilateral lenders is many times higher than that by scientists and conservationists. The pressure would be greatly lessened through further financial resource provision and an increase in the use of highly skilled field personnel by the EPU and DOE. This would enable them to deliver the EIAs process more effectively through all stages, including the revision of current EIA requirements and processes, the effective monitoring practices of road developments and the strict enforcement of legislation. With such improvements, the producers of EIAs will be required to reach minimum satisfactory standards and this will very likely have positive impacts on the long-term environmental, economic and social outcomes of road developments in Malaysia. ■

REFERENCES

[1] Dulac, J. (2013) Global land transport infrastructure requirements: Estimating road and railway infrastructure capacity and costs to 2050. International Energy Agency, Paris, France. p 50.

[2] ASEAN (2010) ASEAN Statistical Yearbook 2010. The ASEAN Secretariat, Jakarta, Indonesia. p 244.

[3] ASEAN (2015) ASEAN Statistical Yearbook 2014. The ASEAN Secretariat, Jakarta, Indonesia. p 236.

[4] Alamgir, M. Campbell, M. J. Sloan, S. Goosem, M. Clements, G. R. Mahmoud M. I. and Laurance, W. F. (2017) Economic, socio-political and environmental risks of road development in the tropics. Current Biology, 27: R1130-R1140.

[5] Laurance, W. F. and Burgués-Arrea, I. (2017) Roads to riches or ruin? Science, 358: 442-444.

[6] Laurance, W. F. Goosem, M. and Laurance, S. G. W. (2009) Impacts of roads and linear clearings on tropical forests. Trends in Ecology & Evolution 24: 659-669.

[7] Clements, G. R. Lynam, A. J. Gaveau, D. Yap, W. L. Lhota, S. Goosem, M. Laurance, S. and Laurance, W. F. (2014) Where and how are roads endangering mammals in Southeast Asia's Forests? Plos One, 9: e115376.

[8] DoE (2007) Environmental impact assessment (EIA): procedure and requirements in Malaysia. Department of Environment (DoE), Ministry of Natural Resources & Environment, Malaysia. p 59.

[9] Yusoff S. and Hashim R. (1996) A case study on an environmental impact assessment in Malaysia. Transactions on Ecology and the Environment, 11: 161-169.

[10] Briffett, C. Obbard, J. and Mackee, J. (2004). Environmental assessment in Malaysia: a means to an end or a new beginning? Impact Assessment and Project Appraisal, 22 (3): 221-233

[11] Raiter, K. G. Possingham, H. P. Prober, S. M. and Hobbs, R. J. (2014). Under the radar: mitigating enigmatic ecological impacts. Trends in Ecology & Evolution, 29: 635-644.

[12] Laurance, F. (2007). Road to ruin. New Scientist.https://www.newscientist.com/article/mg19426075.600-forest-destruction-the-road-to-ruin/

[13] Laurance, W. F. Peletier-Jellema, A. Geenen, B. Koster, H. Verweij, P. Van Dijck, P. Lovejoy, T. E. Schleicher, J. and Van Kuijk, M. (2015). Reducing the global environmental impacts of rapid infrastructure expansion. Current Biology (25): R259-R262.