

Quest for disaster-resilient roads in the Himalaya

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Mountain roads are important lifelines and the most critical means for connectivity in the Himalayan villages of India. However, the inherent geological, geomorphological, ecological and climate fragility of the terrain warrants critical scientific investigations for the roads to sustain the vagaries of nature. Further, the increased frequency of extreme events with the ongoing climate change increases the potential impact of disasters. This note highlights the major challenges and issues faced with the ongoing road-widening projects in the country. It cautions against the uniform standard of road widening and the need to increase sensitivity towards appreciating the terrain fragility.

In recent times, slope instability associated with the Himalayan roads in India has increased, resulting in serious damage to life and property. For example, Himanchal Pradesh, India, experienced multiple slope failures such as the tragic Kinnaur (Chaura village), Nahan-Kumarhatti and Pandoh (near Mandi town) in 2021. Similar incidences were observed in the adjoining Uttarakhand Himalaya. Such tragic incidences, certainly raised concern about the stability of the Himalayan roads and thus, the safety of the local inhabitants. It is pertinent to understand whether these road-proximal disasters are the geomorphic ex-

roads. It was observed that too much funding is being earmarked for the initial construction of ambitious new road networks and too little for their ongoing maintenance⁴. Further, there is no denial that a few roads are adequately engineered for the challenging local conditions, but there are large number of roads which suffer from ill-planned construction. According to a World Bank study, typically 15–30% (and in some cases ~60%) of road funding in developing nations is lost to cartels and corruption¹.

Besides road stability, an equally important factor is the rapid penetration of roads

Impact Assessment (EIA) is not mandatory. Nevertheless, the 100 km rule is ineffective, considering the fact that the Himalayan roads traverse through abrupt rise in the altitude gradient, thus trespassing the diverse geological and ecological niches within short distances (Figure 1). With the focus of the current road-widening project on increasing the road width, the critical aspect of disaster resilience and environment has been ignored, rendering it highly prone to slope instability. Studies demonstrate that there is a positive correlation between road width and slope instability causing associated environmental damage (Figure 2). With the chronic land

are environment-friendly and disaster-resilient. Assessment of the terrain by detailed EIA should be mandatory prior to execution of road projects by independent experts with established scientific credentials and experience of working in the Himalaya. This would significantly help in providing environment friendly and disaster resilient roads in an ecologically fragile Himalayan terrain.

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COMMENTARY

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