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Applicability of connectivity concept for disaster management and hazard mitigation

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The concept of geomorphic connectivity is being widely used since last two decades to understand and explain the various earth surface processes and dynamics. Its applicability to understand inter- and cross-scale process-response systems is now well established. In the present work, we have evaluated the applicability of the geomorphic connectivity framework (Singh et al., 2020, ESPL) for managing and mitigating various geological hazards. For an effective hazard mitigation and management planning, we need to know (a) source of hazard, (b) hazard propagation pathways, (c) probable affected areas, and (d) identification of escape routes/pathways. The connectivity concept can be effectively utilised to satisfy aforementioned requirements. For example, sediment and hydrological connectivity can be used to evaluate the potential pathways, identify sources and affected areas, and to assess return periods of fluvial-related hazards such as debris flow and riverine flash floods. Similarly, the potential sites of landslide, stream congestions (and hence, flash flood)- can be identified by evaluating the channel-slope sediment connectivity and longitudinal hydrological connectivity. The concept of landscape connectivity can play a pivotal role in understanding the forest fire probabilities by evaluating the connectivity between various fire-prone patches of forests, fuel, and the spatial positions of fire-breaking landscape patches. Based on connectivity concepts, the potential paths of forest fire propagation can be demarcated in advance and can play a crucial role in forest fire mitigation. Other than identifying the risk-prone zones with respect to various hazards, connectivity concept can also be used to plan evacuation routes as well. Therefore, we propose that the geomorphic connectivity framework can be a robust tool to manage and mitigate various geological hazards.