



## **LANDSLide multi-hazard risk assessment, Preparedness and early warning in South Asia: integrating meteorology, landscape and society (LANDSLIP)**

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About 13% of Indian land mass is prone to landslides, with the Himalaya and Western Ghats regions particularly prone due to climate, geomorphology and geology. Rainfall and earthquakes are the main triggers of these landslides, coupled with poor land management practices and increased development. The impact of landslides on people, business, culture and heritage can be considerable and wide-ranging, including fatalities, loss of agricultural land and infrastructure, and damage to ecosystems. LANDSLIP (LANDSLide multi-hazard risk assessment, Preparedness & early warning in South Asia: integrating meteorology, landscape and society) is a four-year research grant that aims to reduce impacts of hydrologically related landslide multi-hazards (in terms of fatalities, livelihoods, assets) and build resilience to landslides in vulnerable (often remote) and hazard prone areas of South Asia. LANDSLIP brings together 36 physical and social scientists from three academic (KCL, Newcastle, Amrita), four government (BGS, CNR-IRPI, GSI, Met Office) and two non-governmental organisations (Practical Action UK/India) in India, the UK and Italy.

LANDSLIP's overall objectives are the following:

- (i) To enhance risk assessment and monitoring at regional scales (e.g.,  $>5 \text{ km}^2$ ) for hydrologically controlled landslides and related hazards in two main Indian study regions (Nilgiris & Darjeeling/East Sikkim), with a focus on identifying landslide-relevant weather patterns [1], landslide domains and rainfall thresholds [2], societal factors and the interaction of 'cascading' hazards [3].
- (ii) To develop methodologies on a regional to catchment spatial scale and a seasonal to daily temporal scale.
- (iii) To strengthen understanding of the underlying drivers of risk toward more integrated, multi-hazard landslide risk monitoring and warning systems.
- (iv) To build capacity and ensure LANDSLIP's lasting legacy at Indian national government levels.

LANDSLIP will explore replicability of methodologies developed in LANDSLIP for other landslide prone regions such as Uttarakhand, India and disseminate LANDSLIP project knowledge to the wider region of Southeast Asia (in particular, Afghanistan).

Through advances in interdisciplinary science and application in practice, the collective ambition of this consortium is to contribute to better landslide risk assessment and early warning in a multi-hazard framework, and, by working with communities, better preparedness for hydrologically controlled landslides and related hazards.

### References

1. Neal, R., Fereday, D., Crocker, R. and Comer, R.E. 2016. A flexible approach to defining weather patterns & their application in weather forecasting over Europe. *Meteorological Applications*, v. 23, issue 3, pp. 389-400.
2. Guzzetti, F., Peruccacci, S., Rossi, M., Stark, C.P. 2008. The rainfall intensity-duration control of shallow landslides and debris flows: an update. *Landslides*, v. 5, pp. 3-17.
3. Gill, J.C. and Malamud, B.D. 2016. Hazard interactions and interaction networks (cascades) within multi-hazard methodologies. *Earth System Dynamics*. v. 7, pp. 659-679.