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Case Histories of Landslide Impact: A Database-driven Approach

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Fundamental understanding of landslide risk requires in-depth knowledge of how landslides have impacted society in the past (e.g., Corominas et al., 2014). A key to obtain insights into the evolution of landslide risk at single facilities of critical infrastructures are case histories of landslide impact. The purpose of such historical analyses is to inform about the site-specific interactions between landslides and land-use activity. Case histories support correlating landslide events and associated damages with multiple control variables of landslide risk, including (i) previous construction works, (ii) hazard awareness, (iii) the type of structure or its material properties, and (iv) measures of post-disaster mitigation. It is a key advantage of case histories to provide an overview of the changes in the exposure and vulnerability of infrastructures over time. Their application helps to learn more about changing patterns in risk culture and the effectiveness of repair or prevention measures (e.g., Klose et al., 2014).

Case histories of landslide impact are developed on the basis of information extracted from landslide databases. The use of path diagrams and illustrated flowcharts as data modeling techniques is aimed at structuring, condensing, and visualizing complex historical data sets on landslide activity and land-use. Much of the scientific potential of case histories simply depends on the quality of available database information. Landslide databases relying on a bottom-up approach characterized by targeted local data specification are optimally suited for historical impact analyses. Combined with systematic retrieval, extraction, and integration of data from multiple sources, landslide databases constitute a valuable tool for developing case histories that enable to open a whole new window on the study of landslide impacts (e.g., Damm and Klose, 2014).

The present contribution introduces such a case history for a well-known landslide site at a heavily frequented highway in NW Germany. Landslide problems at this site started with road construction in the early 1880s and were related to multiple event clusters, especially those in the years 1936-1937 (n = 4), 1961 (n = 2), 1970-1974 (n = 5), and 1999-2001 (n = 7). The most frequently applied mitigation measures were rudimentary and less expensive, including (i) removal of loose rock and vegetation (1924, 1936, 1961-1962, 1994), (ii) rock blasting (1936), (iii) catch barriers (1937, 1994), and (iv) temporary or perpetual closure of traffic lanes (1982, 1994). A series of destructive landslides forced decision-makers to launch an expensive slope stabilization project in 2001 that resulted in costs of USD 7.1 million. After finalization of the project no further landslide problems have been reported for this site.

References

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