Landslides (2016) 13:1323
DOI 10.1007/s10346-016-0745-z
Received: 21 May 2016
Accepted: 25 July 2016
Published online: 6 August 2016

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Preface for the thematic issue "glacial lake outburst floods"

The theme of glacial lake outburst floods (GLOFs) is not a very common topic in the *Landslides* journal, nevertheless several papers have already been published in the past (e.g. Vilímek et al. 2005; Breien et al. 2008; Bhakta et al. 2013; Tapas et al. 2015). Looking into the scientific literature worldwide, it is obvious that attention to GLOFs has recently risen strongly—see Fig. 2 in Emmer et al. (in this issue). This is one of the reasons why we now present a monothematic issue on glacial lake outburst floods for *Landslides*.

GLOFs are rather complex phenomena—all of the causes and mechanisms of moraine-dammed failures have been analysed by Emmer and Cochachin (2013) for the regions of the Cordillera Blanca, the North American Cordillera and the Himalayas through a review of the scientific literature as well as some unpublished reports. There are several differences from region to region; however, certain types of landslides are the most common or the most important triggers. Due to this fact, we have prepared this monothematic issue where we can highlight the role of landslides in the origin and propagation of glacial lake outburst floods.

There has recently been a large interest in the numerical simulation of cascading processes involving mass movements and lakes. Glacial lakes are often situated under unstable slopes and are therefore prone to impacts from rockfalls, ice-falls and landslides. This topic is addressed in Schaub et al. (this issue).

Another study (Klimeš et al. This issue) focuses on landslides occurring directly in moraine deposits in the closest surroundings of a glacial lake, which can trigger impact waves responsible for the generation of glacial lake outburst floods. Evidence gathered in this study suggests that GLOFs triggered by landslides from moraines could probably be smaller than floods resulting from other types of slope processes (e.g. ice/rock avalanches). But this assumption has to be critically evaluated against the site-specific conditions of a given lake.

Implications for glacier lake outburst hazard assessment in a changing climate are also discussed (Allen et al. This issue). They analyse hydrometeorological factors for slope saturation and run-off, pointing out the importance of hydrometeorological triggers for lake outbursts and debris flows in the Himalayas.

A risk analysis and risk management strategy for debris flows and glacier lake outbursts are prepared by Frey et al. (this issue). This could be also considered as an example of an integrated risk management strategy in a data-scarce, remote mountain catchment.

Glacial lake outburst floods have been studied in many regions across the world, including the Alps, the Andes, North America, Central Asia and the Himalayas, and an initial global summary of events has been compiled (Würmli 2012). This inventory shows that in many cases, important information on the preconditions of lake outbursts is unavailable. As a complete understanding of the process is crucial for hazard assessment, special emphasis should be placed on the description of all of the essential parameters involved in the process leading to outbursts (Vilímek et al. 2014). A global database could help us to close this gap. A unified database of glacial lake outburst floods has been created for analysis and future natural hazard evaluations (Emmer et al. This issue).

The research activities carried out in the field of glacial lake outburst floods are also intended to meet the Sendai Partnership proposed by the International Consortium on *Landslides* (Sassa 2015) in the following two topics at least (including the GLOFs database):

1) "The combined effects of triggering factors, including rainfall, earthquakes, and volcanic eruptions, can lead to greater impacts through disastrous landslides such as **debris flows**, lahars, rock falls, and megaslides."
2) "Open communication with society through integrated research, **capacity building, knowledge transfer**, awareness, training, and educational activities to enable societies to develop effective policies and strategies for reducing landslide disaster risk, to strengthen their capacities for preventing hazards to develop into major disasters, and to enhance the effectiveness and efficiency of relief programs."

Acknowledgments

This activity has been performed in the framework of the INGO II, No. LG15007 from the Ministry of Education, Youth and Sports of the Czech Republic.

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