Development of an empirical tool to predict rockslide dam heights of future rock slope failures

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This work is part of a method development project at the Geological Survey of Norway to evaluate the consequences of potential rockslides in Norway. In particular we develop here a tool to assess dam height and therefore the consequences related to valley impoundment, with related upriver and potential outburst flooding. Seventy-two landslide dams were identified in southwestern Norway by searching for landslides bodies impounding water bodies using aerial photographs. Each identified dam was characterized by depositional process, showing that 46% were formed by rock falls, 53% by rock avalanches and 1% by debris flows. The majority of dams are stable, constituting 39%, 18% of all dams have failed partially or nearly entirely, the remaining dams are either eroded or filled in. The identified dams were classified according to Hermanns et al., 2011. The two-dimensional classification show that 65% of all dams were formed by singular landslide events that cross the valley entirely, 11% by singular events that only partially dammed the valley, while 6% of the dams are composed of several landslide events. The remaining dams are composed of larger landslide events that form multiple lakes in a valley, or several valleys. Furthermore the Dimensionless Blockage Index describing the relation of dam-volume/dam-height versus size of drainage system was used to assess dam stability. Results show that the Norwegian dams follow with DBI < 2.3 for stable dams and DBI > 3.0 for unstable dams, a similar trend as dams elsewhere on Earth. Likelihood of dam longevity thus relates to a decrease of the DBI.

We will use this rockslide dam inventory to establish empirical relationships relating the rockslide volume, expected shape, width and length of the rockslide deposits, and the valley width to the rockslide dam height. These relationships will be integrated in a tool for dam height prediction of future rockslide dams in Norway.

References:

Hermanns, R. L., Hewitt, K., Strom, A., Evans, S. G., Dunning, S. A., & Scarascia-Mugnozza, G. (2011). The classification of rockslide dams *Natural and Artificial Rockslide Dams* (pp. 581-593): Springer.