Adam Emmer: Potential hazardousness of selected moraine-dammed lakes in the Cordillera Blanca, Peru

ABSTRACT:

This work is devided into the two parts. Firs part reviews contemporary methods of assessment of potential hazardousness for moraine-dammed lakes (eight qualitative methods and three quantitative methods). Second part has two main aims: 1) Assessment of potential hazardousness of seven selected moraine-dammed lakes in the Cordillera Blanca, and 2) Analysis of suitability of these methods for use in this region. Required input data for potential hazardousness assessment were gained from analysis of remotely sensed photographs, research papers of INRENA/ANA institute (Huaráz), and from fieldwork realized in 2012. Ten methods of potential hazardousness assessment were applied on seven studied moraine-dammed lakes. There are no significant differences in results obtained in each method. These results showed, that potentially most hazardous lake is that of Arhueycocha, followed by Palcacocha. On the other hand potentially less hazardous lake is that of Rajucolta. Based on analysis of regional specific of causes and mechanisms of glacial lake outburst floods from moraine-dammed lakes in Cordillera Blanca, five groups of characteristics which reflect these regional specifics were merged: A) possibility of dynamic slope movement into the lake; B) possibility of flod wave form a lake situated upstream; C) possibility of dam rupture in case of a large earthquake; D) distinction between natural dam and those with remedial work; and E) the dam freeboard (or ratio of dam freeboard). It is shown that none of the summarised methods uses all these groups of characteristics with, at most, three of the five considered by the summarised methods. All methods account points (A) and most of them (E), but low number of metods account B), C) and D). New qualitative method was also created. These method is more detailed than summarised methods and takes into consideration all groups of regional specifics with exception of possibility of dam rupture in case of a large earthquake.

Keywords: natural hazards; moraine-dammed lakes; potential hazardousness; Cordillera Blanca