New planning process for flood protection projects after severe flooding events

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INTRODUCTION

In recent years, the Bernese Oberland has been often struck by severe flooding, causing catastrophic damage in different towns und cities. Main reasons of the events, which occurred from 2005 to 2011, were unfavorable weather conditions with either heavy short duration precipitation or rapid snow melting in combination with enduring precipitation. In addition, some flooding was triggered by changes in periglacial areas of the Alps due to global warming. On account of the very heterogeneous topography different processes occurred reaching from debris flow in steep gullies to flooding along large rivers and lakes. Side effects often were extensive erosion and extraordinary bed load transport.

As a result of the increasing number of events, but also of their extent, complexity and ultimately of the resulting destruction, the entire process from event analysis to planning of protection measures had to be altered and optimized. Optimization was also necessary, since this intellectual work was governed by difficult conditions such as extreme time pressure in case of ongoing danger, destruction of life lines and infrastructures, anxious residents and high expectations of the public, politicians and media with respect to solutions.

METHODOLOGY AND OBJECTIVES

During the flooding of 2005 about 60 of the Bernese Oberland's 80 communities faced limited or no accessibility due to destroyed traffic ways. Subsequently, emergency work had to be performed with limited technical and human resources, mainly available on site. In addition to these difficulties, some communes were further stressed by supply demands as well as the need for evacuation of tourists. Especially tourist destinations asked for immediate reconstruction of traffic and public infrastructure. Quick decisions and solutions were expected. However, the risk of wrong action had to be taken into account and minimized. In light of the 70 millions Swiss Francs spent for urgent reconstruction of river courses and 150 millions invested in additional river engineering and safety projects after the events in the year of 2005, it furthermore seemed appropriate to establish a special analysis and planning process. Within a few days after the events, so called „local, solution focused event analyses" were initiated. In 2005, six local, solution focused event analyses were successfully executed under the project management of the District I in the communities of Diemtigen, Reichenbach, Lütschental, Brienz, Meiringen/Hasliberg and Guttannen. In 2011, the same process was applied in the communities of Kandersteg, Kandergrund and Frutigen.

The new process comprises immediate and coordinated documentation as well as analysis of an event and leads to the conceptual solution for future flood protection. Therefore and at the start of the process, a complete project team is installed at each event site including specialists in the fields of geology, geomorphology, hydraulics, civil engineering as well as landscape architecture and environment, and others if necessary.

Typically, the first step is mainly performed by geologists and morphologists – possibly even during the lasting event. They have to determine what triggered the event and what happened where

(e.g. areas of failure and erosion scars, locations and quantities of bed load transport, spatial extent of flooding and destruction). Simultaneously, engineers assess the extent of damage at the river bed, its protection structures and at the traffic ways and other infrastructures. Without time loss, possible future event scenarios and according protection deficiencies are identified and conceptual protection solutions are determined in a second step. Early cooperation and communication among the different team members and also

involving the affected public, local authorities and the essential cantonal and federal offices allow for a fast and effective planning. Finally, during the third step, the preliminary design of the protection project is carried out in a comprehensively participative process (see Fig. 1).
Local, solution focused event analyses shall therefore lead to:

- A unitary process and the application of the same analyses and planning principles at all disaster sites.
- An efficient and effective project organization by reducing interfaces.
- Time gain, also related to the necessity to communicate with public, politicians and media.
- Minimum opposition against the protection projects.

FINDINGS

The execution of extensive protection projects following the 2005 disaster in Diemtigen, Reichenbach, Lütschental, Brienz and Meiringen/Hasliberg was successfully finished between 2009 and 2012. In comparison with their total costs of approx. 105 millions Swiss Francs and especially their complexity it seems to be an extraordinary short period of time.
Three key factors are relevant for a successful process: Immediately establishing an interdisciplinary team allows for fast and thorough action with just-in-time interaction between the team members from the beginning of the event analysis. The second key factor is communication. Residents as well as local politicians such as municipal councils are involved into the analysis and planning process. They personally know the key team members and gain confidence as a basis for the necessary acceptance of the later protection project, which can have a significant impact on the settlement area or on residents and their private property. The early understanding of the particular natural hazard process also allows for immediate and continuous information of the public, further increasing confidence and acceptance. Finally, adequate quality assurance in terms of hydraulic and technical aspects as well as costs and sustainability has to be ensured. Peer reviews of crucial project elements performed by independent specialists or laboratory testing as well as periodical consulting with the essential cantonal and federal offices are of major importance.

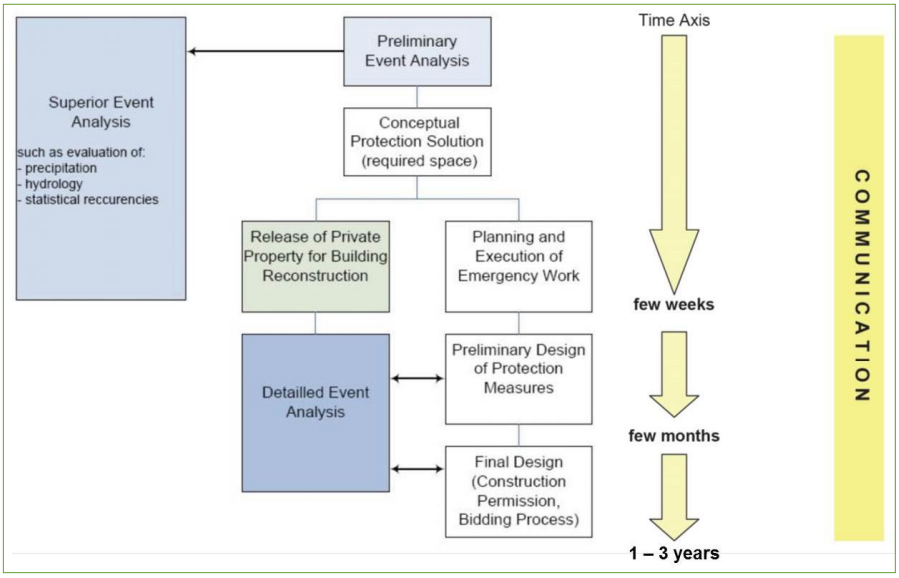

Figure 1. flow chart of the local, solution focused event analysis

KEYWORDS

event documentation; event analysis; mitigation planning process; communication; Partizipation

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