

FLOOD AND LANDSLIDE CAUSED DAMAGE IN SWITZERLAND 1972-2007

WITH SPECIAL CONSIDERATION OF THE FLOOD IN AUGUST 2005

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Since 1972 the research unit “Mountain Hydrology and Torrents“ of the Swiss Federal Research Institute WSL has been systematically collecting information on storm damage in a database. Damage, originating from floods, debris flows, landslides and rockfalls, have been related to the corresponding weather conditions.

In August 2005, large parts of Switzerland were flooded. Damage caused by these inundations were documented and analyzed. The objective of this study is to compare this flood to previous events available in the database.

RESULTS

With a total sum of damage of approximately 3 billion Swiss Francs, the floods of August 2005 represent the most expensive event since the beginning of the systematic data collection in 1972. Even years with large events like 1987 (Uri (Reuss-valley), Valais, Ticino, Grisons (Puschlav)) and 1993 (Valais (Brig)) – with costs of about 1.7 and 1 billion Swiss Francs respectively (considering inflation) – produced significantly less costs to the society.

Floods, debris flows, landslides and rockfalls caused an average damage of 275 million Swiss Francs every year in Switzerland in the period 1972-2004. Considering the year 2005 with its high costs, this average increases up to 355 million Swiss Francs.

The development of damage since 1972 is shown in Figure 1. A certain increase of the costs can be noticed. But the short observation period of 36 years does not allow the identification of a statistically significant trend.

In Figure 1 it is also shown that all events since 1972 together caused damage of totally 13 billion Swiss Francs. This amount is dominated by a few major events. Four single flood events in the years 1978, 1987, 1993 and 2005 (with damage of more than 750 million Swiss Francs each) contributed to 45 percent of the total sum.

In August 2005, 92 percent of damage were caused by water alone (inundation, ground water surge or surface runoff), mostly without bed load impacts. These floods caused particularly high costs in mainly settled areas - mainly in industry areas respectively. Debris flows were less important, with only 3 percent of the total damage. This percentage seems to be somewhat too small and may be an indicator for limits of accuracy in data collection. 5 percent of

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all costs were caused by landslides. Figure 2 shows the percentage of the total damage caused by the different processes in the period 1972-2007. These percentages do not differ much from those of the event in 2005. Normally landslides lead to lower damage than floods. With about 18 percent of the number of events, landslides only caused about 6 percent of the total costs.

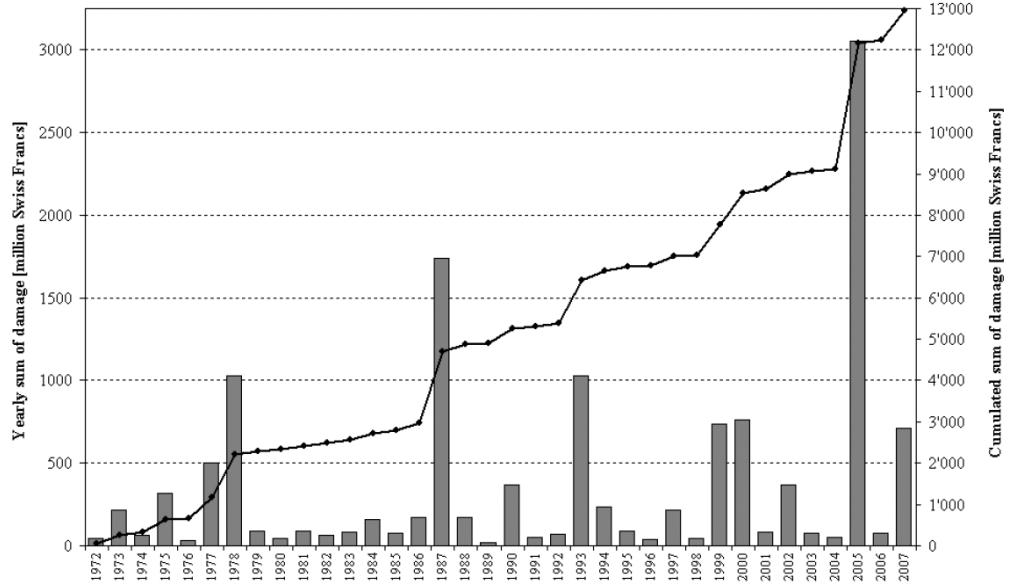


Fig. 1: Damage caused by floods, debris flows, landslides and rockfalls in the time period 1972-2007 (considering inflation).

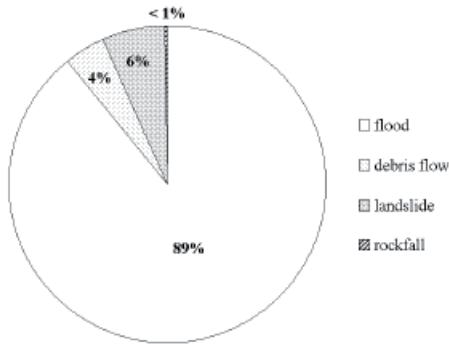


Fig. 2: Percentage of the total costs caused by different processes from 1972-2007.

DISCUSSION

The WSL flood and landslide damage database can give answers to different questions about temporal and spatial distribution of damage and their causing processes. In the time perspective of 36 years the 2005 event seems to be extraordinary. On the other hand, it is documented that there have been several events in the 19th century that are at least comparable with the one in August 2005. Therefore one must suppose that such major events are not singular and that they could occur again in the future. The population and settled areas have increased, thus augmenting the damage potential. However, institutions like insurances and foundations mitigate the financial losses incurred by such catastrophes. Furthermore, many protective measures against natural dangers (especially the recent ones) proved a success (e. g. project on the river Engelbergeraa, canton Nidwalden).

Keywords: Inventory, storm damage, flood, debris flow, landslide, rockfall, August 2005.