



Distribution of large floods in Switzerland in the last 400 years

F. Naef (1), P. Schmocker-Fackel (2), Ch. Hegg (2)

(1) Institute of Environmental Engineering, ETH, Switzerland, (2) Swiss Federal Institute for Forest, Snow and Landscape Research, Switzerland

Many catchments in Switzerland were severely hit by extreme floods in August 2005. In some catchments, it was the third flood within 7 years with a magnitude of a 100year flood according to the pre event statistic. As the 100year flood plays a key role in the design of flood protection measures, the concerned authorities have to decide whether this accumulation of floods has to be seen as random or as an effect of a climatic change which requires a change in the procedure to estimate 100year floods. This decision requires an understanding of the events of the last years and how they compare with previous events.

To this purpose, a systematic survey of the flood records in Switzerland was started. Data was collected from 50 catchments where discharge measurements extended over more than 70 years. And for 10 catchments, historical flood records over more than 500 years have been reconstructed. By analysing these data, the events of the last years could be put in a better perspective. The main findings were:

The frequency of floods in moving 25 year periods over the last 400 years varied strongly with a period of 130 years. Looking over these 400 years, the period from 1920 to 1980 was quiet. The increase in the last years is strong compared to the preceding quiet period; however, it is not yet extraordinary if the whole period is considered. This cyclic behaviour is the reason why short and long term trend analyses do not produce consistent result.

Despite its smallness, Switzerland can be divided into distinctly different climatic regions. Not all the regions have been affected by the events in the last years. And even within a region, not all the catchments have been affected similarly. Besides differences in the distribution of the precipitation, the individual reactions of the catchments

have to be considered. Catchments with large retention capacities could retain large amounts of the precipitation; others reacted sharply after their storage capacities had been exceeded.

The further development and frequency of flood producing meteorological events remains uncertain, causing large uncertainties in the estimation of design floods. In this study, it is tried to reduce these uncertainties by considering and weighting the large variations of flood events in the past.