



Morphological processes and parameters of extreme floods

G. Krapesch , H. Habersack

Institute of Water Management, Hydrology and Hydraulic Engineering, BOKU - University of Applied Life Sciences Vienna (Gerald.Krapesch@boku.ac.at , 0043 1 3189900 149)

In summer 2005 in Austria mainly the Western Alpine regions were affected by catastrophic floods. This was after 2002 the second more than 1000 years flood in Austria in a short time. The floods were far beyond the design event of technical flood protection measures. Especially in Alpine regions where space for human use is limited due to the topography, pressures arise to make more greenfield sites in inappropriate areas available. The morphological effects of the extreme floods in August 2005 of four alpine rivers in Tyrol and Vorarlberg were analyzed and parameters to describe the spatial need of these rivers were conducted. The catchments areas of the rivers vary between 172 km² (Alfenz) and 843 km² (Bregenzerach). Basis of the research were vertical aerial photographs of the rivers before and after the floods. Measurements of the width at cross sections approximately every 200 m were taken. It is assumed that the minimum required space of the river is the width where banks are eroded or sediment is deposited during and after the flood. The researched river length of all 4 rivers was 133 km. Average widening factors were calculated. The widening factor is the relation between the modified width after the flood to the width before the flood. Depending on the topography of the river environment widening from the factor 1,35 (Bregenzerach) to 3,45 (Trisanna) were observed. For the floods 2002 a widening factor of 1,77 was measured for the lowland Kamp river. These measurements do not consider the maximum inundation. Only the required width for erosion and deposition during the extreme flood was measured to gain the minimum required morphological river space. The average width of the rivers before the flood was between 12 m (Trisanna) and 39 m (Bregenzerach). Because of the flood some rivers widened

to a maximum of 142 m. Material from lateral mountain rivers caused a significant input of sediments. The effects of the extreme flood on the river length were also studied. As a fact of the narrow valleys with hardly any possibility for the river to change the course the river length before and after the flood did not change substantially. The total length increase of all 4 observed rivers was 845 m, equal 1%. On basis of longitudinal sections of the Lech, Trisanna, Rosanna and Bregenzerach Rivers morphological process analysis was conducted. The sediment input of the tributaries at the extreme flood event in August 2005 was considered as well as the infrastructural constraints to gather a better understanding of the morphological effects and hence the risks for settlements and industry. Parameters to describe the morphodynamics of lowland rivers will be presented.