

IMPLEMENTING THE RESULTS OF AN EVENT-ANALYSIS

FLOODS 2005 IN THE DIEMTIGTAL VALLEY

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INTORDUCTION

The floods of August 20-22, 2005 affected large areas of the northern ridge of the Alps, among others the Diemtigtal Valley in the Bernese Oberland (Switzerland). The River Chirel, known so far as a tame alpine creek, became a ravaging torrent that heavily remodelled the valley. In its lower reach, the river covered the bottom of the valley on its entire width and on the fan it deposited large amounts of solids. It has been the largest event in the area during the last 150 years.

In the Village Oey, located on the alluvial fan of the River Chirel, more than 80 buildings were damaged, some of them seriously. In addition, the road, which continues along the River, was destroyed on a length of 3 km. The road gives access to two ski resorts in the upper valley, which are of great economic importance for the region. An emergency access could be established, however, its capacity was insufficient and it could not have been kept open in winter. The rehabilitation of a safe access to the valley was therefore of utmost importance. Furthermore, high priority was given to sustainable immediate measures to protect the settlements from potential floods during the following snowmelt. In doing so, the status quo ante should not have been re-established without learning lessons from the event.

REQUIREMENTS ON THE EVENT ANALYSIS

The lessons were learnt through a "local, answer-oriented event analysis". In short terms, the analysis should result in knowledge about the relevant physical processes and their causes, define scenarios on possible future events, identify potential hazards and propose protection measures for settlements and infrastructure.

A close collaboration between the expert team for the event analysis, the project engineers and the cantonal and municipal authorities should reassure, that knowledge gained from the event analysis was implemented directly into the design of the road and the emergency protective measures.

The event analysis had to be elaborated quickly. Only two weeks after the event, preliminary results concerning the key processes and the classification of the event were presented. One month after the event, the relevant parameters for the reconstruction of the road were given and on December 2, 2005, i.e. only three and a half months after the event, the re-established

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road was opened. The emergency protective measures for the Village Oey were completed before the snowmelt period.

RESULTS OF THE EVENT ANALYSIS AND IMPLEMENTATION

The 3-days-precipitation in the larger area had a relatively short recurrence interval of 50 years, although some of the rain gauging stations measured precipitations with a recurrence interval of 100 years and longer. This shows, that the event of August 2005 was rare but not extraordinary and that similar events have to be faced in the future. For the design of the protective measures, though discharges as in 2005 have to be considered.

In the frame of the event analysis, the hydrographs of the River Chirel and its receiving stream as well as the amount of mobilised and transported bed load have been deduced. River reaches with different morphological behaviour were identified:

- In reaches with a relative deficit of bed load, the channel migrated forming meanders and mobilised bed load through bank erosion in the outer bends. (Fig. 1, left).
- In reaches with a relative excess of bed load, solids were deposited and the channel enlarged itself, forming a braided river bed (Fig. 1, right).
- On the alluvial fan, bed load was deposited, because the sediment yield of the River Chirel exceeded the transport capacity of the receiving stream.

These processes were considered in the design of the road and in the flood protection concept for the Village Oey. The valley bottom will be kept as clear as possible in order to obtain the maximum space for the retention of bed load. Isolated buildings are resettled and the road is being protected locally. On the alluvial fan the channel and the bridges across the channel are designed in a way to achieve an optimum in capacity for bed load transport and deposition. Floods that exceed the discharge capacity of the channel are being diverted to a bypass passage.

LESSONS LEARNT

The local, answer-oriented event analysis proved itself. The knowledge gained in the analysis resulted in sustainable measures of reconstruction and flood protection. The pressure of time made great demands on all actors. Thanks to a regular exchange between expert team, project engineers and political decision makers of the municipality effective measures could be implemented although they were not popular, as e.g. the abandonment of houses in the valley.

Fig. 1:
Morphological changes during the
2005 flood event in the River
Chirel: formation of meanders
(left) and braiding (right).
Existing channel dotted, new
channels solid. Flow direction
from bottom to top.

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