

FLOOD CONTROL PROJECTS: BREGENZERACH IN AU, MELLAU, AND BEZAU-REUTHE

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The elaboration of the 3 projects should be considered to be a consequence from the high water disaster during the night of August 22nd, 2005. At this point the highest discharge of the Bregenzerach ever, since the beginning of registration, has been registered at the reference level in Mellau. It showed 450 m³ / sec. The maximum discharge measured until then was 390 m³ / sec, registered at the flood in 1999. Caused by the enormous flow velocity all three sections showed scours at certain places which led to the complete failure of the bank revetment in other consequence.

- In Au the industrial area of Argenstein was flooded and covered with mud and stone.
- In Mellau a single-family home and a part of a butcher's enterprise were carried away by the floods.
- In Bezaú and Reuthe the water swamped over the borders on the right bank on the industrial area of Wilbinger and on the left bank the houses of the Baien neighbourhood were partly set under water up to the upper floor.
- In Reuthe-Baien one resident was surprised in the cellar of his house by the water and mud masses and was killed. Two other persons were seriously hurt by a gas explosion caused by the high water.
- Substantial damage considering different infrastructural facilities like streets, waste water collecting pipes, cables and bridges situated close to the river, appeared in all 3 sections, too.

The enormous damages in not known size led to high emotions throughout the population. There for the politic side demanded rapid actions of effective preventive river training activities. Right from the beginning nobody doubted that a bare recovery of the previous conditions would not be enough, and that for the dimensioning of the protection structures new standards, concerning design discharges, have to come in use. Farther the event has shown that when calculating the channel, increasing reserves for deposit of bed-load and vegetation must be considered.

Several engineers were instructed to develop the plans for submission and do the detailed design having to follow a tight schedule. The sections enclosed in each case approx. 3 km of the channel. The open planning process started out with meetings with the residents at which the preferred variants were presented and opinions as well as suggestions of directly affected persons were collected and considered. Farther the design was already constantly brought into agreement with various experts, who would be involved in the upcoming administration

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procedures. Particularly the required property transfer negotiations with the estate owners represented a big challenge for the mayors of the affected municipalities.

Fundamentally a spatially larger channel design with more retention possibilities would have been desirable, first of all, from sight of the water ecology, but also regarding hydraulic engineering concerns. However, at this point limits have appeared. On the one hand restrictions were given by roads parallel to the channel (L200, cycle tracks) which verge right against the public water property in nearly every section. On the other hand, the high priority of ground in the restrained and populous valley caused some difficulties when acquiring the properties. Some properties could finally only be bought because of the strong personal commitment of the mayor as well as the representatives of the government. Occasionally only countless negotiations led to the necessary results.

In spite of limited formation possibilities of the shoreline as a result of the restrained circumstances the whole project was judged as an ecological improvement by the experts. Positively emphasized must be the reinstallation of the river continuum in every section of the project. The river training of the individual sections was initialized in long parts mainly by deepening the riverbed which could be achieved by dismantling the existing barrages. As a result of these deepening the existing bank revetments must be established new or at least the foundation have to be rebuilt.

Tab.1: Tabular list of the essential indexes and facts of all 3 projects

BEZAU/REUTHE:	
Overall project:	Vakanz till the gallery Mellau (Klause)
Length:	approx. 3,8 km
All-in cost:	approx. € 21,0 Mio
completion:	2015 (9 construction stages)
Design discharge:	520 m ³ /sec
MELLAU:	
Overall project:	gallery Mellau (Klause) till the confluence of the Dürrenbach
Length:	approx. 3,0 km
All-in cost:	approx. € 17,0 Mio
completion:	2015 (6 construction stages)
Design discharge:	480 resp. 380 m ³ /sec
AU:	
Overall project:	gravel pit Rūf till the border of the community Schoppernau
Length:	approx. 4 km
All-in cost:	approx. € 14,0 Mio
completion:	2015 (4 construction stages)
Design discharge:	310 resp. 230 m ³ /sec

In some sections respectively in combination with the deepening of the bottom the channel will be widened, too. This is partly done for stabilizing the riverbed, but also meant to be a substitute for formerly existing ramps. After the official approvals for the whole projects could be given in February and March, 2006, the first sections of most of the projects were realized in 2006. Approximately 100.000 tons of hydraulic engineering stones came to use only in 2006. The whole projects will be continued in separate sections and will be completed structurally up to 2015.

Keywords: extreme flood, deepening of river bed, slope stabilisation