How a Catastrophic Flood of the Gürbe River Triggered the Rethinking of Local Flood Protection

Melanie Salvisberg

Summary

The Gürbe Valley, located south of Bern, is very prone to floods due to hydrological and geological conditions. In the mid-nineteenth century, the lower course of the Gürbe River was channelized and the upper reach was consolidated by a large torrent-control structure. Even though these measures ameliorated the situation, landslides and floods continued to cause damage. The hydraulic structures were therefore continuously expanded. In the second half of the twentieth century, flood-protection philosophy began to change, but the new principles—renaturation and passive measures instead of hard engineering—were only (partly) realized after the catastrophic flood of 1990.

On the evening of 29 July 1990, after a warm and sunny day, the sky over the Gantrisch region in the Swiss pre-Alps suddenly darkened. A huge thunderstorm appeared—a thunderstorm that not only set a meteorological record, but also changed the approach to flood protection in the Gürbe River area profoundly. Within a short period, the water level rose rapidly, causing the 29-kilometer-long river, a tributary that joins the Aare River south of Bern, to overflow. The water and the bed load caused severe damage to hydraulic structures, farmland, settlements, and traffic facilities near the river. The total cost of the damage was estimated to be 40 million Swiss francs.

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Print date: 04 November 2026 03:24:42



Flooded settlement in Toffen after the event of 29 July 1990.

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Although the Gürbe Valley was known to be flood-prone, due to frequent thunderstorms, steep slopes, soil with low water-storage capacity, and soft rock in the upper reaches, the extent of the event was a shock, especially because extensive measures had been taken to prevent inundations since the mid-nineteenth century. The efforts had started with alterations to the Gürbe River from 1855 to 1881. With the intent of protecting the Gürbe Valley from flooding but also of reclaiming new land from the swampy flood plain, the previously meandering river was straightened and channelized in its flat lower course. In the steep upper reaches, numerous workers erected dozens of wooden and stone dams to control discharge and sediment transport. Dikes to deflect the flow of debris, drainage systems, and slope stabilizations completed the torrent control.

Although the measures ameliorated the flooding situation, the goal of completely preventing inundations was not achieved. Again and again, landslides and floods led to damage. The hydraulic structures were therefore renewed and expanded in numerous consecutive projects. The main focus lay on the upper reaches, where the workers built larger and additional transverse structures (made from concrete since the early 1900s) and completed the slope stabilizations. Similar structures were built in the tributaries. On the valley floor, the channel was extended and widened. In addition to the hydraulic structures, hundreds of hectares of alpine meadow were reforested in the river's catchment area, despite resistance from landowners. In the beginning of the twentieth century, the Gürbe River was embanked and consolidated from its mouth to its source.

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Plan of the natural course of the Gürbe River and the planned channel in Wattenwil, 1881.

Courtesy of Staatsarchiv des Kantons Bern, StAB AA V 123.

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These efforts allowed intensified use of the riverine zone: people planted crops and vegetables on the newly won farmland and built houses, roads, and a railroad on the valley floor. This created a vicious circle: the more the space around the river was used, the more important and profitable flood protection became. Therefore, large hydraulic engineering projects were implemented without interruption throughout the whole of the twentieth century, and the flood-control system grew bigger and bigger. Neither the land use nor the protection measures were questioned. As a result of the difficult, never-ending construction works, the Gürbe River became one of the most expensive torrents in Switzerland. The complex financing of the projects caused repeated conflicts: it was necessary to negotiate not only the cost allocation between the federal state, the canton of Bern, and landowners, but also the compensation payments from areas benefiting from flood protection along the lower course to those providing flood-protection services along the upper course.

From the 1960s—caused by increasing environmental awareness—flood-protection philosophy slowly began to change among the experts at the canton and the federal state level. In the following decades, they gradually reviewed the principal goals and protection strategies: instead of hard engineering, watercourses should be improved ecologically, and passive protection measures such as risk maps and land-use planning should be preferred. The new principles were included stepwise in guidelines and, ultimately, in laws.

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Torrent check dams in the gorge of the Gürbe River.

Photohraph by Melanie Salvisberg in Wattenwil, August 2017.

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On the local level of the Gürbe River, this rethinking did not occur contemporaneously. In the 1980s the new principles were discussed hesitantly, but not realized. Finally, the flood of 1990 proved to be a turning point: the catastrophic event made it clear that inundations cannot be avoided completely—no matter how large the torrent-control structures and the protection forest were. The flood demonstrated the necessity of a new flood-protection concept and provoked a discussion about if and how hydraulic structures should be rebuilt.

As with many other Swiss rivers, the renaturation of the Gürbe River was only partially feasible due to the intense use of the riverine zone. Larger revitalized stretches could, however, be developed in the area of the river mouth and on the alluvial fan. For the valley floor, the hydraulic engineers planned retention areas.

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Partly restored stretch of the Gürbe River on the alluvial fan today.

Photo: Melanie Salvisberg in Wattenwil, May 2013.

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Implementation of these projects soon proved to be difficult. Conflicts of interest arose: several landowners were not willing to provide their land, and the demands of the drinking-water supply, nature protection, and recreational use of the area also needed to be considered. Long-lasting negotiation processes delayed the projects for years. In 2019, 29 years after the flood, many of the new protection measures have still not been implemented, and the process of rethinking flood prevention and, especially, land use along the Gürbe River continues.

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How to cite:

Salvisberg, Melanie. “How a Catastrophic Flood of the Gürbe River Triggered the Rethinking of Local Flood Protection.” Environment & Society Portal, *Arcadia* (Summer 2019), no. 27. Rachel Carson Center for Environment and Society. doi.org/10.5282/rcc/8762 .

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ISSN 2199-3408
Environment & Society Portal, Arcadia

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Melanie Salvisberg is an environmental historian at the University of Bern, Switzerland. She holds a PhD in history from the University of Bern and a degree from the Graduate School of Climate Sciences of the Oeschger Centre for Climate Change Research, University of Bern. Her research focuses on historical floods and flood protection, water, and climate history. Her PhD thesis is published as a monograph with the title *Der Hochwasserschutz an der Gürbe. Eine Herausforderung für Generationen (1855–2010)*.

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