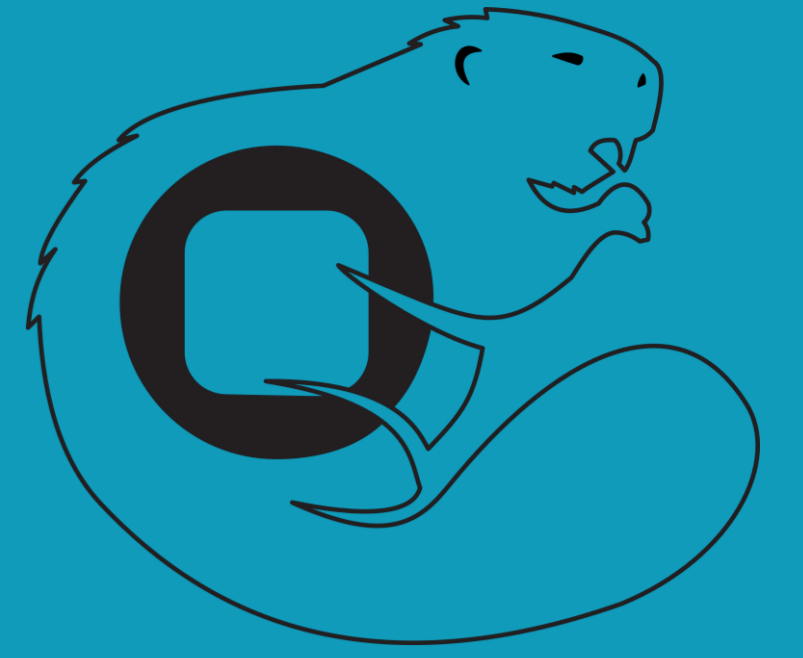


# A Boost in Biodiversity through Beaver Dam Analogs (BDAs) on the Swiss Plateau

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**Introduction and approach** Artificial beaver dams, known as “beaver dam analogs (BDA)” were built for the first time in Switzerland in a large project along the Schlossbach brook (Fig. 1). By enhancing aquatic habitats through simple measures, brooks can be revitalised efficiently and cost-effectively. This approach promotes diverse habitats with alternating moisture levels and supports a wide range of species, including fish, macroinvertebrates, macrophytes, amphibians, reptiles, birds, and bats. The structures, consisting of rows of stakes and wickerwork sealed with stream substrate, guide stream water into the overbank area. Like their natural counterparts, the BDAs delay water runoff, increase infiltration, mitigate heavy rainfall, and make streams more resilient to climate change. BDAs can stop erosion in incised stream beds (Fig. 3B).

**Material and methods** We erected six BDA structures over a distance of 220 m. Data were collected prior to implementation (2022) and again two years later (2024). For the biogenetic approach, we focused on macrophytes (semi-quantitative), amphibians (quantitative for grass frogs) and fish (quantitative). In addition, we used a simple but effective method (French Fish Microhabitat Index = IAM) to investigate the proportion of attractive substrates in the improved water space along the Schlossbach brook throughout the study area.

**Results** BDA construction increased the water surface area by 600% (Fig. 2A). Attractive substrates increased (by up to 25%), while substrates less attractive for fish decreased (by up to 30%) (Fig. 2A). Across all measurement points, depth variability rose significantly, while flow variability fell slightly (Fig. 2B). The number of fish increased by a factor of 17 (Fig. 2C and 3A) and the number of macrophytes by 9 species (Fig. 3A/B). Grass frog spawn was recorded for the first time (Fig. 3A/B).

**Conclusion & take aways** Like natural beaver dams, BDAs increase species diversity and abundance. As the sponge effect intensifies, the water surface area expands (Fig. 1). In times of climate adaptation, this is particularly important in agricultural areas. The BDA revitalisation method is an effective and cost-efficient way to curb the decline of aquatic species in small and medium-sized streams. The sponge effect slows the drying out of areas near the banks and raises the groundwater level.

**Figure 1:** Drone image of the BDA perimeter illustrating the sponge effect. The drone photo was taken in summer 2024, two years after the construction of the six BDA structures.

**Figure 2 A B C:** A) Maximum and average width of the stream before and after the construction of the BDAs. In addition, the attractiveness of the microhabitats for fish has increased enormously. B) The large increase in depth variability and slight decrease in flow variability are shown here. Both factors further increase habitat heterogeneity and thus the niche for many animal and plant species. C) Fish abundance increased by a factor of 17, rising from 17 fish to 287 (minnow and brown trout). The largest increases occurred in the new BDA ponds. red dots: minnow; blue dots: brown trout

**Figure 3 A B C:** A) The BDAs strongly influence species diversity and abundance in all three species groups. The diversity and abundance of aquatic plants increased markedly (from 2 to 11 species between 2022 and 2024), as did that of amphibians (1 species recorded in 2024) and fish (2 species, minnow and brown trout, recorded in 2022 and 2024). Blue = 2024 ONLY, yellow = AVERAGE for 2022 and 2024; the circle size compares abundance of species found in the 2022 and 2024 surveys. B) New macrophytes and grass frog spawn in the newly created BDA pools. C) Siltation and various stages of succession BDA-6 2022 to 2024 (see Fig. 1).

**Reference:** Minnig, S.; Polli, T.; Werdenberg, N.; Egloff, N. & Vonlanthen, P. (2025). Expert:innenbericht: Beaver Dam Analogs (BDAs) – Monitoring Schlossbach 2022–2028 (Phase 1 2022–2024), Genossenschaft umweltbildner.ch, Bern, p. 39.

