



Beaver dams in the context of a factor shaping the hydromorphological and hydrological conditions of small lowland streams

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Motivation for research



Beavers to the rescue

These eager beavers saved the Czech government \$1.2 million

After plans stalled for a new dam in the Czech Republic, eight beavers saved the day seemingly overnight. "At this point, nothing that beavers do surprises me."

The New York Times

Bittel
7, 2025



Sport Culture Lifestyle

Energy Pollution

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Eager beavers: rodents engineer Czech wetland project after years of human delay

Beavers accomplish long-stalled conservation plan on former army site, sparing crayfish and taxpayers alike



Beavers have long been championed by environmentalists for their ability to reduce flooding, improve water quality and boost wildlife. Photograph: Bohumil Físer

Beavers have saved Czech taxpayers \$1.2m (€1m) by flooding a

Czech Dam Project Was Stalled by Bureaucracy. Beavers Built Their Own.

The dam project, drafted in 2018 and based on a former military training site south of Prague, had been delayed by land negotiations. Local beavers built several dams, saving the government more than one million euros.

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NCA CR

How can beavers save government's money

11. 2. 2025

A beaver colony in the Brdy Protected Landscape Area in the Czech Republic has gained overnight fame by building several dams.

The beavers created a natural wetland exactly where it was needed. It saved the local authorities 30 million crowns (1,2 mil EUR).

They could not have chosen their location better - erecting the dams on a bypass gully that was built by soldiers in the former military base years ago, so as to drain the area. The revitalization project drafted by environmentalists was supposed to remedy this. Bohumil Físer, head of the Brdy Protected Landscape Area from the Nature Conservation Agency of the Czech Republic says: "Nature took its course and the beavers created the necessary biotope conditions practically overnight".

More information on this case can be found at the news of Czech Radio - Radio Prague International.

Official beavers in Czech on the YouTube Channel of the Nature Conservation Agency of the Czech Republic

s in the Brdy region of the Czech Republic were at an impasse.

securing more than one million dollars' worth of funding for a new dam to solve water issues, the project had stalled after seven years of planning because the necessary building permits for such a structure couldn't be acquired.

Beavers build planned dams in protected landscape area, while local officials still seeking permits

01/31/2025



Beaver | Photo: Fritz Geller-Grimm, Wikimedia Commons, CC BY-SA 3.0

A beaver colony in the Brdy region has gained overnight fame by

Beaver dams in the context of a factor shaping the hydromorphological and hydrological conditions of small lowland streams

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Introduction

Beavers create temporary water reservoirs that significantly affect local hydrology and ecosystems. This study examined the role of beaver (*Castor* spp.) dams in supporting water retention in three small lowland streams in central Poland. Even in modified channels, beaver dams enhanced instream retention, enabling the formation of shallow floodplains and ponds (Fig. 1). Innovative analyses included dam materials and their influence on hydromorphology and sediment transport. The findings underline the importance of beavers in stabilizing water levels during low flows, improving soil moisture, prolonging retention time, and enhancing biodiversity. The results highlight the potential of beaver dams as a natural tool for water resource management under climate change. Further research could inform sustainable conservation and landscape planning strategies.

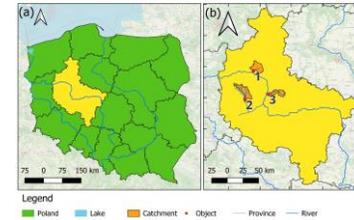


Fig. 1. Location of Wielkopolskie voivodship (yellow) in comparison to Poland (green) (a), and beaver dams in the figure, based on the administrative map of the Wielkopolskie Voivodship: 1—beaver dam Kończak km 4+075, 2—beaver dam Mogilnica km 24+935, and 3—beaver dam Cybina 4+835 (orange – catchment).

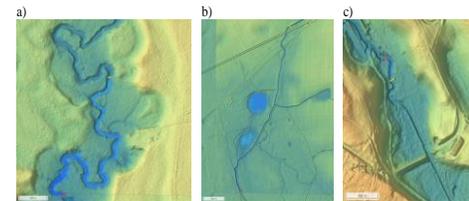


Fig. 2. Fig. 1. The extent of backflow due to the construction of the Beaver Dam on the: a) Kończak River (WL 54.22 m a.s.l. – damming 0.31 m), b) Mogilnica River (WL 76.16 m a.s.l. – damming 0.74 m), c) Cybina River (WL 60.52 m a.s.l. – damming 0.37 m) (The red line represents the location of the beaver dam, and the yellow line indicates the extent of the backflow at the speci-fied water level elevation).

Methodology

The poster presents an analysis of beaver dam impacts on the hydromorphological and hydrological conditions of small lowland streams. Data were collected during field studies from 2020 to 2023 using tools like an optical level, RTK GPS, and a Valeport 801 electromagnetic flow meter. Discharge was calculated based on velocity measurements taken at several cross-sections upstream and downstream of the dams. Dam construction materials were identified through field surveys and branch diameter measurements. Hydrological analyses were supported by SCALGO Live software, which uses ALS-based digital terrain models to assess runoff paths and land use effects on catchment hydrology.

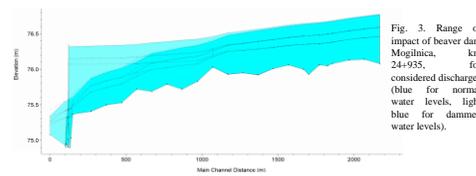


Fig. 3. Range of impact of beaver dam Mogilnica, km 24+935, for considered discharges (blue for normal water levels, light blue for dammed water levels).

Results

Field measurements of dam materials (Fig. 3) showed that, besides wood, beavers used mud to seal the structure, which was partially overgrown with herbaceous vegetation. Surveys allowed for estimating the extent and volume of dammed water. The impact varied depending on the terrain. The largest range was recorded on the Mogilnica River (1,800 m), followed by the Kończak (over 500 m) and Cybina (approx. 80 m). Terrain shape also influenced retention — on the Mogilnica, around 6,500 m³ of water was stored in adjacent areas (Fig. 2).



Fig. 5. The percentage share of branches of a given diameter in the construction of beaver dams.

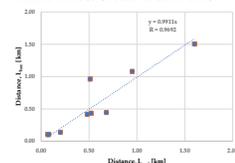


Fig. 6. Correlation of backscatter ranges obtained with the SCALGO and Hec-Ras models.



Fig. 7. Changes in water level in channel and ground

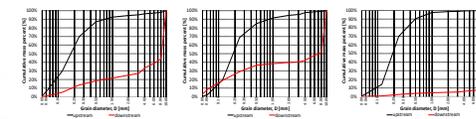


Fig. 4. The grain size curves of sediment samples taken from the riverbed of the Kończak River (a), Mogilnica River (b) and Cybina River (c) both upstream and downstream of the beaver dam.

Conclusion

Studies on three small lowland watercourses in central Poland have shown the influence of beavers on shaping local hydromorphology and water retention. Even in transformed, narrow channels (e.g., the Mogilnica River), where retention was low and valley layout did not favor pond formation, beaver dams enabled the development of shallow floodplains and ponds in depressions hydraulically connected to the main channel. Precise data on dam size and their effects on water retention and sediment transport enhance understanding of the beaver's ecological role. Despite many benefits, research is still lacking on how beaver dams compare to other anthropogenic water bodies, particularly regarding impacts on agriculture and forestry. The findings also highlight the potential of beaver dams as a water management tool under climate change, especially in maintaining stable water levels during low-flow periods (Fig. 7).

Funding

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Thank you for your attention

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