



SMALL-SCALE, NATURE-BASED WATER MANAGEMENT SOLUTIONS

IN THE HILLY PILOT CATCHMENT AREA
OF THE LIFE LOGOS 4 WATERS PROJECT



GENERAL
DIRECTORATE OF
WATER MANAGEMENT



On the way to climate conscious river basin management

In hilly and mountain areas, flash floods and mudflows caused by climate change are increasingly problematic. **Protecting against flash floods running down small streams and repairing damage caused by surface runoff** is a constant task for municipalities, requiring substantial force majeure payments from the State Treasury.

In Hungary, more than 1,400 settlements are exposed to the risk of flash floods.¹ In addition, heatwaves and droughts have also become recurring phenomena also in hilly regions. Addressing these two interconnected problems requires looking beyond and intervening in the catchment area upstream, where flash floods begin. Applying nature-based solutions can help prevent or at least reduce damage.



¹ Pikhoffer Ervin, Czigány Szabolcs, Geresdi István: Kisvízfolyások előzetes kockázatbecslési térkéje. Árvízi kockázati térképezés és stratégiai kockázati terv készítése, 2008

Slowing runoff and making use of retained water can also be linked to other local development goals, such as expanding recreational opportunities and creating better conditions for wildlife. This **often requires cooperation with neighbouring municipalities** or other stakeholders and land owners, as effective solutions are not always located within the damaged settlement itself.

This cooperation serves as a good practice example within the LIFE LOGOS 4 WATERS project, where nine municipalities sharing the **Szilágyi and Gombás stream** catchments, implement small-scale natural water retention measures and runoff-slowng interventions to promote integrated, cooperation-based, climate-conscious river basin management.

The map of cathment area with intervention points

-  shrub lane and stump path
-  stream rehabilitation
-  log dam
-  gully erodin
-  forest water reservoir



Involving local community through Multi-Stakeholder Catchment Forum

The LIFE LOGOS 4 WATERS project aims to **enhance local municipal climate adaptation capacity and promote the integrated, nature-based water management solutions.** The selection of intervention sites was preceded by detailed preparatory and consultation work. In some locations – Püspökszilágy, Kosd, Kisémedi, Penc, and Galgagyörk – the local municipal leaders and project experts defined the measures during the grant proposal drafting phase. For remaining interventions and implementation sites, the **Multi-Stakeholder Catchment Forum**, consisting of local farmers, civil society members, and water management experts,

selected the locations from suggestions received from mayors and residents. Some interventions involve privately owned land, which required significant coordination efforts by the Municipality of Püspökszilágy, responsible for implementation. Within the administrative boundaries of the nine small villages located in the approximately **200 km² hilly pilot catchment** – after obtaining the necessary permits – more than twenty small-scale, nature-based solutions were implemented at various points.





Installation of live and deadwood hedges

On the outskirts of **Vácduka**, on the hillside above the new 'container school', a 120-meter long 'Benjes hedge' has been established, supplemented with a live hedge, in a newly parceled but undeveloped area. The hedge combines a woven structure of deadwood and branches placed perpendicular to the slope between rows of stakes, supplemented by a line of living shrubs. Its aim is to slow down surface runoff, reduce erosion, and prevent soil washout and mudflows. In future built-up areas, the live hedge will remain even after plots are developed. Similar live and deadwood hedges were installed in Püspökszilágy on an actively cultivated hillside.





Water erosion control against gully erosion

In **Püspökhatvan**, runoff from deeply incised gullies coming from the Takács Hill regularly causes flooding near houses at the edge of the village. To reduce this problem, five different types of energy-dissipating, runoff-slowing log and natural check dams are being installed in the upper section of the gullies, where water from the adjacent farmland currently gains kinetic energy. These gully stabilization dams reduce water velocity, thereby delaying accumulation, trapping sediment and debris, mitigating damage, and helping infiltration.

In smaller gullies, a series of such dams can even help refill and restore them to their original level. In **Püspökszilágy**, on a spontaneously reforested area along the Kisköves side branch of the Szilágyi stream, a deeply incised gully was stabilized with a double-row log dam. Below this, a small dam filled with local soil and stone, reinforced with riprap, was built. This structure created a roughly 255 m³ water storage capacity, designed to retain water from a seasonal spring and adjacent agricultural fields.





Forest Water Reservoir

In **Penc**, in the forest surrounding the Barina branch of the Mátyás-völgyi stream, a temporary water reservoir is being constructed. After completion, it will help retain runoff from heavy rains and cloudbursts within the landscape for a longer period. An approximately 2-meter-high, reinforced earth dam will create an intermittent storage capacity of about 2,500 m³ in the forest. By holding back surface runoff, it provides water for wildlife during dry periods (breeding sites for amphibians, drinking water for big game, extra moisture for vegetation). It is expected that subsurface water flow towards the valley will not be affected.

Runoff slowing with leaky log dams

Leaky log dams retain some of the runoff and sediment during heavy rains, thereby slowing down the flow of water. When used in many locations in the upper catchment, they can help flatten flood peaks and reduce the frequency of water damage. At the same time, low flows and wildlife can pass through the gaps under and between the logs, so they do not form impassable ecological barriers in intermittent or permanent streams. In **Váckisújfalu**, two log dams were constructed in a forested zone at the boundary of the settlement, where intermittent streams and dry channels meet, to prevent clogging of the village culverts and ditches. Similar runoff-slowing, sediment-trapping, and energy-dissipating log dams were built at seven other sites as part of the LIFE LOGOS 4 WATERS project:





- In Kosd on the upper section of Rádi stream to reduce flood risk in Rád
- On the upper course of the Némedi stream in Kisémedi;
- Below a Natura 2000 wetland near Galgagyörk, potentially improving its water supply.



- In Penc, at two points along a ditch crossing a marshy meadow, as well as on a deeply incised section of the Penci branch
- In a drainage ditch in Vácduka;
- And on the uppermost section of the Gombás stream running through pastures in Püspökszilágy.

Stream Rehabilitation and Demonstration Area

The straightened bed of the Szilágyi stream below Püspökszilágy runs through a wide, formerly water-rich valley floor. Here, a log dam was installed to improve water balance and ecological conditions. It allows the high flows of the Szilágyi stream to spread into the forested floodplain and the former shallow, meandering channel. This slows runoff, improve water supply to the floodplain habitats, and can raise the groundwater level. At the same location, a nature trail and outdoor demonstration area are being developed to engage visitors playfully with the principles and traditions of water retention.





Municipalities involved on the hilly pilot catchment:

- Galgagyörk
- Kisémedi
- Kosd
- Penc
- Püspökhatvan
- Püspökszilágy
- Rád
- Vácduka
- Váckisújfalu



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