Restoration of the Cerny Potok stream, Czech-Republic

Year of issue

2025

Summary

The Nature Conservation Agency of the Czech Republic (AOPK ČR) restored the Černý potok (Black Brook) in the Černá louka Nature Reserve (Ore Mountains, near Adolfov). Early trials began in 2001–2003; the main works in 2009–2010 (OP Environment/ERDF) went beyond in-channel fixes: shallow, meandering channels were newly excavated and reconnected to remnants of the historical course or led across alluvial meadows to reduce depth/volume, slow runoff and re-wet the peat meadows. Designed by Terén Design and built by EPS-Servis, the project reshaped ~2.5 km within the reserve and delivered c. 1,820 m of new channels, ~0.963 ha of ponds/wetland and an ~8 ha meander belt.

Post-restoration monitoring by UJEP found only very small lateral movement (≤10 cm), no significant incision, and that after 1980s straightening had shortened length by ~52% the restored reach in 2011 was ~43% longer than the straightened channel. AOPK notes continued monitoring and documented fish passage, incl. brown trout spawning. Media coverage during the 2019 drought reported the area stayed wet and ponds held water. In 2022, ČSOP with private partners extended restoration to a small tributary just outside the reserve.

Photo Gallery



Location

50.734, 13.8905

Project

NWRM

National ID

Czech_02

Sector

Hydromorphology

Installation Date

2010

Implementation status

Completed

Contact

Jovanka Ignjatovic, REC

Overview

Location of the project

The Cerná louka (Eng. black Meadow) is a national Reserve (NR), within the Ramsar site Krusnohorska Mountains mires at northwest Czech Republic, along the border with Germany 50°44'4" N, 13°53'26" E, 690–760 m

Country

Czechia

NUTS2 Code

Severozápad

Sponge measures implemented in the case study

Re-meandering

Stream bed re-naturalisation

Objectives

Restore natural hydromorphology: reduce the depth/volume of the straightened channel; create new, shallow meandering channels and reconnect them to relic courses or route them across alluvial meadows.
Re-establish the water regime degraded by drainage and straightening: increase retention capacity and restore natural runoff conditions/retention space in PR Černá louka.
Support biodiversity associated with wetland habitats in the reserve (Natura 2000 mire meadows).

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
National water authority	Nature Conservation Agency of the Czech Republic	Initiation of the measure	Nature Conservation authority	Responsible
NGO	Czech Union for Nature Conservation	Monitoring	National association	Supporting
NGO	Local Chapter Teplice Fergunna	Monitoring	CUNC Teplice is one of hundreds of the Czech Union for Nature Conservation, which operates throughout the Czech Republic. A new activity of this organization is to create a basic land league (PS) Fergunna, whose main objective is the protection of nature and landscape of the Ore Mountains.	Supporting

Documents

cs-cz-01-final_version.pdf (1.28 MB)

Site Information

Climate Zone

Cool temperate dry

Precipitation

850.00 mm

Temperature (°C)

10.00 °C

Runoff

0.02 mm

Runoff coefficient

0.25

Elevation range

713 m

Slope range

2-5%

Vegetation class

Grassland

WFD Ecological status

Poor

WFD Chemical status

Failing to achieve good

Water quality status

Cu < 0.02 mg/l Zn < 0.005 mg/l max T = 9 °C

Design and Implementation

Project scale

Meso

Project scale specifications

Cerný potok watershed (the main stream and its tributaries). In total 43,000m2 of restored marches with still or running waters

Project area

7,4

Project area specifications

Both new and restored marshes with still or running waters 43,000 m2

Area subject to Land use change or Management/Practice change (ha)

7.40 ha

Size

4.00

Size unit

km

Basis of design

Natural overflow in case of Q100 foods (along meandering segment in the alluvium) 74000 m2

Principles

The project was based on common principles of stream restoration. The main aim of the restoration was to decrease the volume of the restored streambeds especially by reducing their depth. Other important criteria included re-establishment of a natural gradient, near-natural proportions of the stream cross-section, and natural variety in current and calm ri9es
Modifications within the channelized streambed were not sufficient to respect all these criteria, therefore new streambeds were proposed and constructed. They were reconnected with the remains of the original stream course or directed freely to the alluvial meadows.
The volume of the new beds was designed at 30-day design flows (or max. one-year flows).

Factor constraints

The area of interest is an important site for many rare and endangered plants (e.g. Menyanthes trifoliata, Pinguicula vulgaris) and animals (e.g. shore-birds, amphibians) of wetlands. It was necessary to take the conservation of these species into account during the restoration works.

Constraints

The works would have to be conducted out of the nesting season of birds and metamorphosis of amphibians.

Favourable preconditions

part of Natura 2000 network

Financing

Total cost

316000.00 €

Total cost information

2001†“2003: €52,000; 2008†“2010: €264,000

Costs investment

316000.00 €

Costs investment information

2001-2003: €52,000; 2008-2010: €264,000

Financing authorities

Authority name	Financing share
Free State of Saxony, Operational Programme Environment	100 %

Compensations

No

Policy and Governance

Policy description

Comprehensive remediation of the hydrology of the area, initiation of natural, dynamic re-development of the stream channel and cessation of degradation processes in valuable habitats. These restoration measures are the main prerequisite for biodiversity protection including both stabilisation of local populations and spontaneous return of important wetland species, e.g. Snipe (Gallinago gallinago).
Also expected are flood control elements, e.g. reduction of the outflow velocity and retardation and flattening of flood waves.

Land ownership

dozens of cadastral parcels belonging to multiple ownership

Policy targets

Improved Biodiversity

Runoff control

Groundwater Recharge

Target remarks

Biodiversity and gene-pool conservation in riparian areas
Regulation of hydrological cycle and water flow
Flood control and flood risk mitigation

Policy pressure

Directive	Relevant pressure
WFD identified pressure	4.1.5 Physical alteration of channel/bed/riparian area/shore – unknown
Floods Directive identified pressure	Other pressure contributing to flooding /flood risk
Other EU	Birds Directive 2009/147/EC Surface drainage and peat cutting

Policy impact

Directive	Relevant impact
WFD identified pressure	Altered habitats due to hydrological changes
Floods Directive identified pressure	Protected areas
Other EU	Loss of natural habitats and wild fauna and flora

Requirement directive

Requirement directive	Specification
WFD-mitigation of significant pressure	Restored stream sections (including adjustment of channelized streambeds and making water flow into the alluvium)
WFD-restoring a HMWB	Restored meandering segment and pools with marsh habitats
Floods Directive-mitigating Flood Risk	Natural overflow in case of Q100 floods
The Birds and Habitat Directives	Both new and restored marshes with still or running waters

Policy challenges requirements

National Wetlands Conservation Plan National Biodiversity Strategy

Part of a wider plan

No

Public consultation

Yes

Consultation activities

Activity stage	Activity type

Design phase	NGOs were involved in the restoration project. Members of the Czech Union for Nature Conservation (Local Chapter Teplice †“ Fergunna) participated in study, project preparation and implementation.
Implementation phase	The restored site is used for education, and both experts and the public from the Czech Republic and abroad have visited it.

Has contractual arrangements

No

Impacts and Monitoring

Monitoring System

Monitoring parameters

Monitoring of the restored site was supported under the transboundary project “PestrýBunt”.
The effect of restoration on the local fauna and flora was monitored as well (Nature Conservation Agency of the Czech Republic, Czech Union for Nature Conservation, Local
Chapter Teplice – Fergunna, 2007–2011)
Biodiversity,flow velocity, kind and quantity of sediments and graphic cross section profiles

Maintenance

Maintenance requirements

Maintenance activities will be focused on preservation of re-established natural conditions in the area, by the Local Chapter Teplice – Fergunna

Impact Assessment Methodology

Performance impact assessment method

Catchment outlet

Performance impact estimation information

The two dimensional hydrodynamic SRH-2D model

Socio-economic Impacts

Direct benefits information

The efect of restoration on the flow rate and delays of the flood waves, as well as on local fauna and fora was monitored as well (Nature Conservation Agency of the Czech Republic, Czech Union for Nature Conservation, Local Chapter Teplice- Fergunna 2007-2011) but only preliminary results are available at present because of a relatively short post-restoration phase.

Ancillary benefits information

The effect of restoration on the flow rate and delays of the flood waves, as well as on local fauna and fora was monitored as well (Nature Conservation Agency of the Czech Republic, Czech Union for Nature Conservation, Local Chapter Teplice - Fergunna, 2007-2011) but only preliminary results are available at present because of a relatively short post-restoration phase.

Biophysical impacts: Hydrology

Information on retained water

Dynamic meandering of the restored stream-bed is being studied, but long-term monitoring is necessary to obtain statistically significant results.
1,820 m new channels, 0.963 ha ponds/wetlands, ~8 ha meander belt; ~4.3 ha wetlands created/restored.
Post-works morphology (UJEP 2013): lateral shift ≤ 10 cm; no significant incision; after 1980s straightening (−52 % length), the restored reach was ~+43 % longer than the straightened one (measured in 2011).
The area stayed wet and ponds held water during the 2018–2019 drought.

Information on increased water storage

In a model of a restored stream section of ca. 1 km in length, the delay was up to 2 hours for the 1-year flood compared to the regulated stream and a considerable 20 minutes for a 100-year flood.

Runoff reduction

45.00

Runoff reduction unit

% Percent

Information on runoff reduction

Very significant effect was recorded on the delay of the flood wave. As a consequence, the peak flow downstream can be reduced due to delayed peak flows from the tributaries

Peak flow reduction

5.00

Peak flow reduction unit

% Percent

Information on peak flow reduction

Only a small effect of the stream restoration on the peak flow was found with the exception of less frequent floods (N1, N2 and N5 peak flows were reduced by only 50-80 l/sec)

Ecosystem water supply

0

Information on ecosystem water supply

It is not relevant for this application

Biophysical impacts: Biodiversity

Improved biodiversity

Yes

Information on improved biodiversity

The abundance of some amphibians has considerably increased in the constructed pools (e.g. hundreds of individuals of frog species, e.g. Bufo bufo, Rana temporaria, and dozens of individuals of Triturus vulgaris). A more frequent occurrence of some bird species of waterlogged meadows and marshes (such as Crex crex and Gallinago gallinago) was recorded mainly in the restored wetland habitats created by conducting small tributaries to the floodplain.
In 2011 about 20 dragonfly species were recorded. The local population of the endangered plant species Menyanthes trifoliata has increased in the floodplain.
Connectivity/biota: fish passage confirmed during brown trout spawning after restoration.

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Neutral impact-no change in WQ status

Information on water quality overall

Classified as good and very good condiions. pH = 6-8, high concentrations of dissolved oxygen.

Water quality improvements - Copper (Cu)

0.02

Water quality improvements - Copper (Cu) - Unit

mg/L

Water quality improvements - Zinc (Zn)

0.01

Water quality improvements - Zinc (Zn) - Unit

mg/L

Water quality improvements - Water Temperature (W T°)

8.00

Water quality improvements - Water Temperature (W T°) - Unit

o C

Soil quality overall improvements

Not relevant for this application

Information on soil quality overall improvements

It is not relevant for this application

Biophysical impacts: Others

Ecosystem impact climate regulation

Not relevant for the specific application

Information on ecosystem impact climate regulation

It is not relevant for this application

Lessons Learned

Key lessons

Participatory approaches to wetland restoration design were critical for Project success, which hinged on changing people’s perceptions of wetlands, and gaining the full support for restoration among authorities and stakeholders. PA Local Consultative Councils and public awareness campaigns effectively supported stakeholder involvement.
Controlled restoration is a step in the right direction and is allowing further researches and studies concerning habitat restorations.
Solid knowledge on the baseline and the desired ecosystem status should be embedded early in project design phase.
“Let-nature-work” approaches (backfilling the entrenched channel and allowing free pathfinding) can reconnect the floodplain more fully than excavating a single new channel ; documented with rapid development of multi-thread flows and wetland formation.
Early post-restoration stability with minimal incision and measured lengthening supports using shallow, meandering designs on peat meadow streams.
Drought resilience is a tangible co-benefit worth monitoring and communicating (media-visible).
Pair public funding (OP Env/AOPK) with NGO/private finance to act on private land and speed delivery.

Barriers

Barrier type	Barrier role	Comments
Limited staff and consultant knowledge	Main barrier	Difficulties with technical design due to insufficient national expertise in wetlands restoration
Lacking financing sources	Secondary barrier	Absence of sustainable business cases for sustainable reed biomass utilization
Missing regulatory support	Secondary barrier	Not defined target ecosystem status (favourable conservation status) at the project start.

Drivers

Driver type	Driver role	Comments
Past flooding events	Main driver	Restoration of streams and their floodplains
Balancing different objectives	Secondary driver	Restoration of other wetlands in the landscape

Success factors

Success factor type	Success factor role	Comments

Specific incentives for stakeholder involvement	Main factor	New methods were applied in the design of shape and course of the streambed, and their successful implementation was enabled by good collaboration between investor, designer and subcontractors.
Financing possibilities	Main factor	Available financing for capital investments
Attitude of decision makers	Main factor	Commitment and support provided by competent authorities
Attitude of relevant stakeholders	Secondary factor	Local communities and NGO involvement and support.
Public participation	Secondary factor	The restored site is used for education, and both experts and the public from the Czech Republic and abroad have visited it

Flexibility / Adaptability

Adaptation to changing hydrological and habitat conditions have been achieved by a width range of structures reflecting surface, soil and geological conditions that are flexible concerning operation and further improvement of hydraulic conditions

Transferability

Similar restoration works could be designed for other (former) wetlands along medium rivers in their low-land segments.

Basin characteristics influence

The low inclination and the plain landscape allow the achievement of relatively large flooded areas, efficient restoration of meanders and habitats reconvention with no heavy structures.

Sources

Sources

Ecological restoration in Czech Republic

Revitalizace Černého potoka a jeho přítoků v Přírodní rezervaci Černá louka – dokončení

Projekt Voda pro českou krajinu pomůže s obnovou přítoku

Revitalizace Černého potoka a jeho přítoků (Adapterra Awards database)

Sledování vývoje koryta Černého potoka v Krušných horách / Research of channel development of “Černý potok” stream in Ore Mountains

Projekty AOPK ČR v Operačním programu Životní prostředí

Potoku vrátili původní koryto a jeho široké okolí je i za… (iDNES Ústí)