Wetland restoration and remeandering in SPA Dunajské luhy (Slovakia) and SPA Szigetkoz (Hungary)

Year of issue

2025

Summary

This project improves the conservation status of floodplain bird species protected in the Natura 2000 sites SPA Dunajské luhy (Slovakia) and SPA Szigetköz (Hungary). It is funded by the LIFE Programme. Since 2015, the follow-up LIFE Danube Floodplains (LIFE14 NAT/SK/001306) and partners have restored river connectivity and water regimes by reopening 18.5 km of tributaries, restoring >75 ha of wetlands and advancing earlier, better-timed simulated floods; water-regime improvement now covers ~1,805 ha. Recent actions in Slovakia include reopening 3.7 km of the lower Vojčianske side arm (2023–24), partial reconnection at Kráľovská lúka (2024) and re-excavation/reconnection of the Foki side arm in the Old Danube (~2.0 km; 2025). Monitoring reports note positive responses of rheophilic fish, amphibians and floodplain vegetation; hydromorphological works have restored extensive floodplain forest and riparian habitats (e.g., 482 ha of 91E0* and 115 ha of 91F0). In Hungary’s Szigetköz, the water-replenishment system was extended in 2014–15 and connectivity enhanced with fish passes at Dunasziget (1998), Ásványráró (2015) and at the Mosoni-Danube outlet in Vének (operational 2022).

Photo Gallery



Location

48.0176, 17.3035

Project

NWRM

National ID

Slovakia_08

Sector

Hydromorphology

Installation Date

2014-12

Implementation status

Completed

Contact

REC

Overview

Location of the project

On the Slovak side: in the Danube inland delta between Dobrohošť and Sap, with recent works near the villages of Vojka nad Dunajom, Kyselica and Dobrohošť. On the Hungarian side: in the Szigetköz floodplain (north of Győr) including reaches around Dunasziget–Ásványráró and up to the Mosoni-Danube mouth at Vének.

Country

Slovakia

NUTS2 Code

Bratislavský kraj

Sponge measures implemented in the case study

Re-meandering

Forest riparian buffers

Wetland restoration and management

Objectives

Initial (LIFE07) project :

Restore selected wetlands, dried-up river branches and oxbows.

Restore river-branch connectivity, water regime and flowing-water conditions.

Lease/purchase land and introduce appropriate habitat management.

Eliminate fish-migration barriers at two strategic points.

Restore abandoned meadows (feeding/nesting habitat).

Plant native trees to restore refuges/nesting areas; prevent disturbance; gather scientific data; raise awareness.

Following (LIFE14) project :

Acquire/lease ~70 ha for restoration.

Create/reconstruct ≥5 technical structures; improve water regime over ~1,850 ha.

Restore ≥2 major river branches over ≥4,500 m and reconnect side arms.

Decrease human disturbance on 135 ha; restore 4 wetlands (37 ha).

Establish gene pool (3.8 ha) with 45,000 seedlings; plant 57,500 native trees on 45 ha.

Remove invasives on 40 ha; restore targeted habitats over ~745.5 ha; clean waste/ammunition on 5 ha; restore 84 ha of grasslands; ≥150 pollard willows restored and 200 planted; plus outreach targets.

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
NGO	BROZ Regional Association for Nature Conservation and Sustainable Development	Implementation	Project Management, bookkeeping, networking with other projects, Project auditing and After-LIFE conservation plan	Responsible
Research institute / University	Prírodovedecká fakulta - Univerzita Komenského	Monitoring	Hydrological monitoring	Supporting
NGO	Szigetköz Nature Conservation Association	Monitoring	Monitoring impact of project actions on bird populations and other biota	—
Regional / sub-national water authority	North-Transdanubian Environmental and Water Directorate	Initiation of the measure	—	Supporting

Authority type	Authority name	Authority role	Comments	Authority responsibility
Architects / Engineers	Vodohospodárska výstavba š.p.	Implementation	Water management construction, state enterprise	Supporting
Local water authority	Agravia Ltd.	Other	—	Supporting

Site Information

Climate Zone

Warm temperate moist

Precipitation

600.00 mm

Temperature (°C)

10.00 °C

Runoff coefficient

0.20

Elevation range

123

Vegetation class

Predominantly floodplain forest (alluvial/riparian forests—EU habitats 91E0* softwood and 91F0 hardwood), in a mosaic with reedbeds, marshes and low-lying wet meadows.

WFD Ecological status

Moderate

WFD Chemical status

Failing to achieve good

Water quality status

Main pressures : sedimentation in side arms, fish-migration barriers, intensive forestry and invasive plants, and loss of traditionally managed meadows.

Design and Implementation

Project scale

Meso

Project scale specifications

This is a transboundary river-reach/floodplain project spanning multiple side-arms and wetlands of the Danube inland delta across two Natura 2000 SPAs (Dunajské luhy, SK, and Szigetköz, HU) — i.e., well beyond a single site but not nationwide. It targets the Dobrohošť–Sap branch system and adjacent areas on the Slovak side and the Szigetköz floodplain on the Hungarian side, restoring water regime and connectivity over large areas (e.g., water regime improved on ~1,850 ha; two major branches restored on ≥4.5 km expected; >75 ha of wetlands restored and 18.5 km of tributaries reopened reported).

Project area

2788

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

2014.00 ha

Financing

Total cost

4577663.00 €

Total cost information

LIFE07 NAT/SK/000707 – “Danube birds conservation” (2009–2015) Total eligible budget

Following project: LIFE14 NAT/SK/001306 – “Restoration and management of Danube floodplain habitats (LIFE Danube floodplains)” (2015–2024): Total eligible budget: €5,999,420.

Financing authorities

Authority name	Type of funding	Comments	Financing share
European Union	EU-funds: LIFE+	LIFE07 NAT/SK/000707 – “Danube birds conservation” (2009–2015) €2,288,831 Not counted : LIFE14 NAT/SK/001306 – “Restoration and management of Danube floodplain habitats (LIFE Danube floodplains)” (2015–2024): Total eligible budget: €5,999,420. EU contribution: €3,599,651 (60%).	50 %

Authority name	Type of funding	Comments	Financing share
Various beneficiaries	National funds	BROZ, VVB, VÚVH, NLC, DINPD	50 %

Compensations

No

Policy and Governance

Policy description

In the past, the Danube inland delta represented one of the largest and most diverse natural wetland complexes in central Europe. Large parts of it have been destroyed over the past few decades. Habitat loss and destruction is continuing as a result of earlier river regulation and poor area management. The decreasing habitat quality and several other factors (e.g. unregulated human disturbance) have led to major decreases in the populations of the typical floodplain bird species (black stork, night heron, little egret, sand martin etc.). Urgent actions are needed to recover or maintain the quality and quantity of the floodplain avifauna.

Land ownership

Dunajské luhy : Mixed Ownership (349.22 ha leased; ~70 ha acquired by BROZ; surface watersare state-owned). Szigetköz : exclusively state-owned.

Policy targets

Improved Biodiversity

Part of a wider plan

No

Public consultation

Yes

Consultation activities

Activity type	Comments
Information material	Raise awareness about target bird species, river restoration and nature conservation issues through the creation of information and promotional materials (book, calendars, leaflets, website, panels, etc) and through media coverage (local to international).
Regular meetings with stakeholders	—

Has contractual arrangements

Yes

Contractual arrangements

Arrangement type	Responsibility	Name	Comments
Contractual agreement	BROZ	Land long term leasing	349.22 ha leased

Impacts and Monitoring

Monitoring System

Monitoring requirements

Continuous & multi-disciplinary (2016–2024 and continuing via LIFE Living Rivers), led by VÚVH/BROZ in Slovakia and by the joint Hungarian–Slovak Szigetköz monitoring (ÉDUVÍZIG and partners), covering hydrology, groundwater, physico-chemistry and biota.

Monitoring parameters

Hydromorphology: continuous surface and groundwater levels (installed probes, public online stations), discharges, flow velocities, channel profiles, bed and suspended sediments; hydrodynamics during simulated floods are recorded (duration, peak flow). Hydrobiology: macrozoobenthos and macrophytes (pre/post), fish (pre-2023 vs post-2024), amphibians (2018–2024 with tailored spring/summer floods), snails, dragonflies, beetles, spiders, and pollinators. Physico-chemistry: temperature, conductivity, pH, dissolved O_2, total/organic N (incl. ammonia), total P, sulphate, chloride, CODMn, CODCr, TOC, nitrite/nitrate. The Szigetköz joint programme mirrors this with agreed physical, chemical and biological indicators plus morphology/sediment and hydrogeology modules.

Maintenance

Maintenance requirements

Operations focus on annual simulated floods (two per year since 2021, with peaks up to 120 m^3/s), operation/upkeep of weirs/sluices, and recurring habitat management (grazing/mowing, removal of invasive trees).

Socio-economic Impacts

Direct benefits

Outreach & awareness (SK/HU): Project communication reached >10 million people via TV, online, print and radio (monitored under action D.5).
Tourism, angling & agriculture (HU – Szigetköz): The water-replenishment programme reports positive socio-economic effects: better aquatic tourism opportunities, improved angling, and additional water for irrigation benefiting local farmers; it also supports drinking-water provision and enhances flood protection. (This is a parallel public works project in the same SPA, led by ÉDUVIZIG.)

Biophysical impacts: Hydrology

Information on retained water

3 river branches restored/reopened over 9.57 km; 12 wetlands restored on 64.09 ha; 7 technical structures built/rehabilitated; water regime improved on 1,805 ha.
Flood pulse (simulated floods): experimental 120 m^3/s for 4 days in 2023; 120 m^3/s for 15 days in spring 2024, reported as crucial for refilling branches, wetland inundation and spawning/reproduction windows.

Information on increased groundwater level

In Szigetköz, long-term monitoring shows +20–30 cm rise of spring/summer groundwater (recovering >⅓ of the post-diversion drop); however winter levels declined in upper areas over recent decades (an unexpected/negative trend needing further study).

Biophysical impacts: Biodiversity

Improved biodiversity

Yes

Information on improved biodiversity

Fish: post-works monitoring (2023–2024) reports positive responses of rheophilic species after barrier removal and flow acceleration in restored branches.
Amphibians: simulated spring/summer floods and wetland refilling led to high breeding activity/abundance at monitored sites.
Habitats restored (examples): floodplain forests and riparian types exceeded targets (e.g., 91E0* ≈ 482 ha, 91F0 ≈ 115 ha).

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

N/A info

Soil quality overall improvements

Not relevant for this application

Biophysical impacts: Others

Ecosystem impact climate regulation

Not relevant for the specific application

Lessons Learned

Key lessons

Restoring the water courses is the best way to help all the ecosystems surround it and all the species attached to them.
Early land tenure work is decisive. The project explicitly calls land purchase/long-term leases a “crucial” precondition, and pairing in-house experience with legal experts proved essential; by the end it had secured 67.07 ha purchased and 349.22 ha leased for durable management.
Hydrology must be managed as an integrated package. Physical works on side-arms went hand-in-hand with active operation (simulated floods); involving the project team in flood-planning improved outcomes, with peak discharges reaching 120 m^3/s in 2023–2024.
Timing matters for biota. Shifting to earlier spring controlled floods (from 2021 onward) increased suitability for amphibian reproduction; negotiating spring and summer releases each year became part of adaptive management.
Structured conflict resolution is a lever. A consortium of agencies, water managers, NGOs and users agreed a new water regime and an updated operational manual that aligns releases with Natura 2000 needs—unlocking restoration at scale.
Plan for longer monitoring horizons. The final evaluation notes that many ecosystem-function effects could not yet be measured in the field; medium-term monitoring is recommended, as several processes manifest over years to decades.

Barriers

Barrier type	Barrier role	Comments
Specific financing rules	Main barrier	Delayed national co-financing and late project start (grant signed Dec 2015; co-financing contract March 2018) slowed early actions.
Legal obligations / restrictions	Secondary barrier	Complexity of preparatory studies/permits (A1–A3) led to documented delays before works.
Limited staff and consultant knowledge	Secondary barrier	Insufficient time and data to evidence some ecosystem-function impacts during the project window.

Drivers

Driver type	Driver role
Organisation committed to it	Main driver
Availability of subsidies	Secondary driver

Success factors

Success factor type	Success factor role
Existing staff and consultant knowledge	Main factor
Financing possibilities	Secondary factor

Transferability

Transferable to regulated lowland rivers with side-arm networks: reconnect branches and run managed (simulated) floods. Success hinges on early land tenure, updated operational rules with the operator, solid modelling/monitoring, and an After-LIFE maintenance plan. Watch permitting/procurement timelines and the securing of annual releases.

Sources

Sources

Danube birds conservation - Conservation of Endangered Bird Species Populations in Natural Habitats of the Danube Inland Delta

Conservation of endangered bird species populations in natural habitats of the Danube inland delta

Final Report - Restoration and management of Danube floodplain habitats – LIFE Danube Floodplains (LIFE14 NAT/SK/001306)

Szigetközi Monitoring

Assessing the Long-Term Groundwater Level Dynamics in Szigetköz, Hungary

Restoring the Danube floodplain, the largest wetland area in Slovakia, through conflict resolution

Ochranári a vodohospodári obnovili dolné Vojčianske rameno Dunaja

D1.1 Detailed Analysis of Demonstrators’ Ecosystems

Ecological Restoration and Water System Development in the Protected Site and Floodplain Areas of Szigetköz in Hungary

BROZ: Ochranári obnovili prvé bočné rameno, rameno Foki, v starom koryte Dunaja

Fairway Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries: National Action Plans – Update May 2016

Monitoring Site 2 – Dunajské luhy, Slovakia