Babina Restoration Project, Romania

Year of issue

2025

Summary

The Babina polder (~2,100 ha) was reconnected to the Danube in 1994, with recovery monitored by the Danube Delta National Institute. Within a few years, site-specific biodiversity redeveloped and ecosystem services such as nutrient retention and fish recruitment became evident; the reopened polder also supports reed harvesting, grazing, fishing and ecotourism.

Recent evidence shows how the system has evolved after three decades: remote-sensing analysis in the Matița–Merhei complex (including Babina Lake) detected a decline in open-water area between 2006 and 2018 (−13.4% at Babina) alongside expansion of aquatic vegetation, indicating sedimentation and succession.

In 2022, the reserve authority and DDNI implemented dredging of key links (Babina–Matița and Babina South–Ocolitor Pardina) to improve hydraulic connectivity.

Ongoing biological monitoring includes fish surveys that sampled Babina and Merhei lakes in 2016, underscoring the role of the restored complex for recruitment and fisheries.

Overall, Babina remains a flagship deltaic restoration now managed adaptively to sustain connectivity and habitat mosaics.

Photo Gallery





Location

45.424722, 29.411667

Project

NWRM

National ID

Romania_02

Sector

Hydromorphology

Installation Date

1994-05

Implementation status

Ongoing

Contact

Imola Koszta, RECBogdan Barbu, REC

Overview

Location of the project

Babina polder is in the Danube Delta Biosphere Reserve, within the Matița–Merhei aquatic complex, between the Chilia and Sulina branches.

Country

Romania

NUTS2 Code

Sud-Est

Sponge measures implemented in the case study

Wetland restoration and management

Reconnection of oxbow lakes and similar features

Floodplain restoration and management

Objectives

Re-establish natural hydrology and connectivity of the former agricultural polder to the Danube by breaching the ring embankment at selected hydraulically effective points, in order to reflood the area and restore river-driven dynamics. In April 1994 the site was re-flooded via 4 breaches (two inlets, two outlets), each ~11–16 m² cross-section, to re-allow water circulation; works ran April–May 1994. Target area reconnecting to floods: ~2,100 ha.
Restore site-specific ecological functions (hydrological, biogeochemical and ecological) and the mosaic of habitats typical of the delta (reedbeds, shallow lakes, channels), as the prerequisite for biodiversity recovery.
Recover key ecosystem functions and services, explicitly expected to improve after reconnection:fish spawning/nursery habitat, waterbird breeding habitat, biodiversity reservoir, bioproduction, nutrient retention/turnover, and sediment & pollutant retention (i.e., “biological filter” function).
Enable sustainable traditional uses for local communities—fisheries, reed harvesting, grazing and ecotourism—once natural resources recovered.
Operate as a pilot/demonstration with planned monitoring, i.e., to document how fast characteristic habitats and functions would re-emerge and to guide adaptive management of restored areas.
Area reconnected ~2,100 ha; 4 breaches in the embankment (2 inlets, 2 outlets), ~11–16 m² each.

Involved partners

Authority name	Authority role	Comments
The Danube Delta National Institute for Research and Development, Tulcea	Monitoring	subunit of the National Institute for Research and Development for Environmental Protection
The Danube Delta Biosphere Reserve Authority	Implementation	Public institution, subordinated to the Ministry of Environment and Climate Change
WWF Germany	—	—

Site Information

Climate Zone

Warm temperate moist

Precipitation

375.00 mm

Temperature (°C)

11.50 °C

Evapotranspiration

950.00 mm

Elevation range

2

Slope range

0-1%

Vegetation class

Predominantly reedbeds (Phragmites australis) and other emergent/floating aquatic vegetation; recent mapping documents the expansion of reed/aquatic vegetation in Babina.

WFD Ecological status

Good

WFD Chemical status

Good

Water quality status

2006–2018 decline of open water at Babina (~−13.4%) with expansion of aquatic vegetation, indicating sedimentation/succession; authors also note a general deterioration of lake water quality in recent years.

Design and Implementation

Project scale

Micro

Project scale specifications

This is a single-site restoration of the ~2,100 ha Babina polder within the Danube Delta

Project area

2100

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

2100.00 ha

Constraints

n.a.

Favourable preconditions

n.a.

Financing

Total cost

2407000.00 €

Total cost information

n.a. info

Costs investment information

n.a. info

Financing authorities

Authority name	Type of funding	Comments	Financing share
World Bank/GEF	Other	Delta Biodiversity Project, that includes the Babina site restoration	94%
Government of Romania	National funds	—	6 %

Compensations

No

Policy and Governance

Policy description

Reconnection of polder Babina, formerly destined for agricultural purposes, to the flood regime of the Danube.

Policy targets

Improved Biodiversity

Pollutants Removal

Runoff control

Oher Societal Benefits

Erosion Control

Part of a wider plan

Yes

Wider plan

Wider plan focus	Name	Comments
Environment & Biodiversity	Danube Delta Biodiversity Project	Management master plan for the Danube Delta Biosphere Reserve

Public consultation

No

Has contractual arrangements

No

Impacts and Monitoring

Monitoring System

Monitoring requirements

Long-term monitoring of the restored polder led by the Danube Delta National Institute, with multi-year “success control” covering hydrology, morphology and biota; also environmental status at complex level (Matița–Merhei incl. Lake Babina).

Monitoring parameters

Hydromorphological quality elements (hydrological regime and sediment transport); Biological quality elements (limnological studies conducted in consideration
of phyto- and zooplankton, macrozoobenthos,
phytophile fauna, fish and aquatic
vegetation etc); Physico-chemical quality elements (nutrient retention and transformation); socio-economic (evaluation of the grassland and its usability by the local population;
analysis with regard to a possible use of the agricultural potential for eco-tourism)

Maintenance

Maintenance requirements

Hydraulic-connectivity maintenance by dredging of the short links that connect Babina to the lake network has been programmed/implemented by the Danube Delta Biosphere Reserve Authority (ARBDD)

Impact Assessment Methodology

Performance impact assessment method

Edge of Field/Plot

Performance impact estimation information

Field measurements; to monitor the area†™s filter function as for the solid matters suspended in the water, water samplings were taken. The limnological samples were taken within the frame of five field studies, together with the studies on terrestrial and aquatic macrophytes as well as
terrestrial and semi-aquatic macroinvertebrates.
The sampling sites of the studied area were determined
in a way to include all types of waters. Evaluation of reed areas available for sustainable use have been identified by means of remote sensing and on-site surveys. Spatial data of
the TM Mapper type have been used for the investigation
area.

Socio-economic Impacts

Direct benefits information

After restoration, Babina generated >71.4 t yr^{-1} of usable fish (~34 kg ha^{-1} yr^{-1}) and created ~10 fishermen jobs (plus additional jobs in fish processing).
For the Babina + Cernovca pilot polders (36.8 km^2 combined), restored fisheries provide 20–25 jobs; diversified livelihoods include fishing, tourism, reed harvesting, and seasonal livestock grazing, earning on average ~€40 ha^{-1} yr^{-1}.
Ecotourism: the renewed wetland landscape supports nature-based tourism, with Babina/Cernovca highlighted as having strong observation/recreation potential linked to nearby villages

Ancillary benefits information

Interesting aquatic landscapes for tourists thus may increase ecotourism in the area.

Biophysical impacts: Hydrology

Information on retained water

Restored flood pulse + connectivity. After the 1994 breaches, DDNI measured flows at the inlets/outlets and tracked bed changes; lateral connectivity returned, but the flood regime differs from fully natural levee overtopping (water enters mainly via the new openings).
Sediment dynamics (needs maintenance). Inlet canals accumulated 0.60–2.17 m of alluvial deposits between 1996–2003 (main canal 0.80–1.50 m in 1994–2001); outlet sections showed 0.10–0.60 m of bed erosion. Authors flagged likely maintenance needs at inlets.

Biophysical impacts: Biodiversity

Improved biodiversity

Yes

Information on improved biodiversity

Rich and abundant zooplankton community that provides an excellent food source to fish. the fish fauna of Babina island found its own level with 29 species. The high diversity of macro- and microhabitats in the terrestrial and semi-aquatic area allow the reactivation of an extremely high biodiversity especially with regard to the arthropode fauna. The species spread along ecological gradients that cover a broad range between arid and moist. The reestablishment of site-characteristic habitats and food sources has also been to the benefit of both the European mink (Mustela lutreola) and the European otter (Lutra lutra).
Fish. Species richness rose from 2 species (autumn 1993) to 15 species (1995) soon after reconnection; fish spawning/nursery function re-established.
Birds. Avifauna diversity increased from 34 → 72 species in the early years post-restoration.
Macroinvertebrates & others. High densities of native molluscs near inlets (e.g., Lithoglyphus naticoides up to ~400 ind m^{-2}); 43 spider species recorded (including 10 new for the Delta); Natura 2000 species noted (European mink, otter; Aldrovanda vesiculosa observed one season).
Longer-term trend (habitat mosaic shift). In Babina Lake, the free-water surface declined between 2006–2018 (e.g., from 81.67 % → 73.44 %, a loss of ~67.8 ha), with expansion of reed/floating vegetation—consistent with silting and succession (terrestrialisation).

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Positive impact-WQ improvement

Information on water quality overall

Suspended solids “filter.” DDNI measured 95–115 mg/L TSS at the upstream opening vs 5–7 mg/L at the outlet after passage through reedbeds—evidence of strong clarification.
Nutrient retention. A field-based annual balance estimated ~702 t N yr^{-1} retained (≈334 kg N ha^{-1} yr^{-1}) and ~30 t P yr^{-1} retained (≈14.5 kg P ha^{-1} yr^{-1}). Later modelling estimated ~229 t N yr^{-1} on Babina’s reedbeds (with Babina + Cernovca ≈ 356 t N yr^{-1} across ~2,435 ha of reed).
Seasonal P behaviour (unexpected). Reedbeds act as a P sink in spring (sediment-bound P deposition), but can become a P source in summer (release of ortho-phosphate).
Oxygen & EC patterns (episodic stress). Channels often had 7–14 mg O_2 L^{-1} at the surface (100–180 % saturation); temporary sunlit waters even > 200 % saturation, but deeper layers could be oxygen-poor. A summer 1999 eutrophication episode caused macrofauna mortality at one lake site. Conductivity ranged ~420–1210 µS cm^{-1} across spots.

Information on water quality Improvements (N)

229.4 tons of N/year (Total reduction N)

Soil quality overall improvements

N/A info

Information on soil quality overall improvements

n.a. info

Ecosystem erosion control

Yes

Biophysical impacts: Others

Ecosystem impact climate regulation

No information available

Information on ecosystem impact climate regulation

n.a. info

Lessons Learned

Key lessons

Re-establishing hydrological connectivity at a few, well-chosen breach points was the keystone. Even though floods inside the former polder no longer spread as broadly as under fully natural conditions, opening the dikes in hydraulically and ecologically effective spots quickly re-started near-natural processes and biodiversity recovery, and it set off a demonstration effect for further restorations in the Delta.

Long, multi-disciplinary monitoring proved essential. Over a decade, teams tracked water levels, flow velocities, canal cross-sections, nutrient retention, plankton, macrophytes, fish, birds, and mammals—evidence that guided management and underpinned claims of rapid ecological redevelopment.

Adaptive management is needed to keep connections open. Monitoring documented sediment deposition and cross-section changes in artificial canals; more recently, authorities scheduled dredging of key links (e.g., Babina–Matița; Babina-south to Ocolitor Pardina) as emergent and floating vegetation expanded and free-water percentages declined (at Babina, from ~82% in 2006 to ~73% in 2018).

Strong institutions and partnerships mattered. The World Bank/GEF project built DDBRA and DDNI capacity, and WWF’s collaboration helped pilot and scale works; lessons highlighted the need for early, professional public communication and participatory work with local communities.

Barriers

Barrier type	Barrier role	Comments
Other	Secondary barrier	Hydrology remains constrained by the polder setting: inundation concentrates near breaches rather than over the whole island.
Expected maintenance needs	Main barrier	Ongoing sedimentation and vegetation expansion reduce open-water areas and flow efficiency, necessitating periodic dredging of canals (Babina–Matița; Babina-south–Ocolitor Pardina).
Attitude of the public	Secondary barrier	Public awareness/engagement needed stronger, earlier investment; project lessons call for professional communication and participatory socio-economic work.
Lacking financing sources	Secondary barrier	Dependence on parallel financing created risk (a related EBRD loan did not materialize), underscoring the need not to hinge design on unconfirmed operations.

Drivers

Driver type	Driver role	Comments
Balancing different objectives	Main driver	Ecological reconstruction/restoration to restore the natural, site-specific hydrological, biogeochemical and ecological functions, to ensure the redevelopment of the ecosystem and its functions and thus to promote the development of site-specific habitats and their biodiversity. Moreover, the redevelopment of the natural resources should enable the local populations to proceed to their sustainable, traditional use.

Success factors

Success factor type	Success factor role	Comments
Other	Main factor	Focused dyke breaching at hydraulically effective locations that rapidly re-activated flood dynamics and habitats.
Conducted assessments (incl. economic)	Main factor	Robust, long-term monitoring across hydrology, morphology and biota to steer management decisions.
Successful coordination between authorities	Main factor	Institutional capacity and continuity (DDBRA/DDNI) strengthened by GEF/World Bank support and WWF partnership.
Other	Secondary factor	Demonstration value that catalyzed further reconnections elsewhere in the Delta (e.g., Cernovca) and fed into basin programs.

Success factor type	Success factor role	Comments
Conducted assessments (incl. economic)	Secondary factor	Documented ecosystem-service returns (fish, reed, nutrient retention; tourism) that built local buy-in.

Transferability

Transferable to embanked floodplains/polders where selective levee breaches can re-establish flood pulses. Key needs: careful siting of openings, long-term monitoring, and adaptive maintenance to counter siltation/terrestrialisation. Check ownership, permits and local uses early. Watch for constrained inundation patterns and seasonal phosphorus release; design for sustained connectivity, not a one-off dig.

Sources

Sources

Case study:The Babina Restoration Project

Evolution of Babina polder after restoration works

Assessment and representation of spatial changes of aquatic vegetation distribution in the Danube Delta. Case study: Babina, Corciuvate and Ciortic lakes – Matița-Merhei aquatic complex

Babina and Cernovca islands - From abandoned polders and fish farms to rich wetlands in Romanian Danube Delta (WWF Factsheet, September 2010) Author: WWF DCP RO (no individual author listed)

156 de kilometri de canale vor fi decolmatate în Delta Dunării

ARBDD: Decolmatări de canale în Delta Dunării, 156 de kilometri în perioada 2021-2023

Delta Dunării: Trei mari proiecte de decolmatare a unor complexe lacustre, finalizate

The Fish Communities of Lake-Complexes from Danube Delta Biosphere Reserve (DDBR) in Spring-Summer and Autumn of 2016

Implementation Completion Report (TF-28614; TF-28660) on a GEF Grant to the Government of Romania for Danube Delta Biodiversity Project