Holbina-Dunavat Restoration Project, Romania

Year of issue

2025

Summary

In the Danube Delta Biosphere Reserve, the ARBDD pursued ecological restoration by reconnecting the former Holbina–Dunavăț fish-farm basins to surrounding wetlands through breaches in the ring dikes, restoring natural hydrological exchange. The 5,630-ha complex was investigated from 1994, with works implemented in 2003–2004, and the project is recorded as complete. Post-restoration monitoring by the Danube Delta National Institute (2016–2017) in the Holbina 1 sector reported 25 fish species and a natural fish productivity of ~159 kg/ha/yr, indicating recovery of aquatic habitats. Today these areas are administered within the Biosphere Reserve and continue to appear in ARBDD annual activity reports (e.g., Holbina I, Holbina II, Dunavăț III). Socio-economic use has shifted towards regulated ecotourism and catch-and-release recreational fishing (e.g., Holbina – 3 Bibani), alongside traditional activities. Overall, the project has re-established wetland habitats, breeding grounds for fish and waterbird, and a sustainable local economy based on nature-compatible use.

Photo Gallery



Location

44.893333, 29.122778

Project

NWRM

National ID

Romania_04

Sector

Hydromorphology

Installation Date

2003-01

Implementation status

Ongoing

Contact

Bogdan Barbu, REC Imola Koszta, REC

Overview

Location of the project

Within the Danube Delta Biosphere Reserve, on/near the Sf. Gheorghe branch, the restored “Holbina–Dunavăț” basins lie between Dunavățu de Jos village and Lake Razim/Dranov Canal; access is typically by boat from Dunavățu de Jos

Country

Romania

NUTS2 Code

Sud-Est

Sponge measures implemented in the case study

Basins

Wetland restoration and management

Objectives

Restore hydrological connectivity by opening the ring dikes to reintegrate the Holbina–Dunavăț fish-farm basins with surrounding wetlands.
Protect and maintain populations and habitats of high ecological value, and carry out ecological restoration where natural/semi-natural character had been lost.
Limit eutrophication risk by avoiding direct flushing with nutrient-rich canal water and using fringe marshes as nutrient filters (design premise for the restoration strategy).
Spatial scope (quantified): target area 5,630 ha (Holbina I 1,270 ha, Holbina II 3,100 ha, Dunavăț II1+2 1,260 ha).

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
Research institute / University	The Danube Delta National Institute for Research and Development, Tulcea	Monitoring	Scientific lead for ecosystem monitoring and pilot polder/wetland restoration tasks; conducted the Holbina-1 (2016–2017) study	Supporting
Local water authority	ARBDD	Initiation of the measure	Site manager/administrator for renatured enclosures; issues permits; contracts civil works for wetland restoration on behalf of DDNI under WB/GEF project; runs ongoing management & reporting (annual reports).	Responsible
National water authority	Government of Romania / Ministry of Environment	Financing	Recipient of the GEF grant and provider of state co-financing (e.g., US$0.5 M in 2000 for polder reconstruction); policy framework and oversight.	Supporting

Site Information

Climate Zone

Warm temperate moist

Precipitation

350.00 mm

Temperature (°C)

11.00 °C

Evapotranspiration

760.00 mm

Elevation range

7

Groundwater level

shallow phreatic water influenced by Danube levels; depths ~0.5–1.0 m in interdune depressions.

Vegetation class

Reed-marsh wetlands dominated by common reed (Phragmites australis) with aquatic macrophytes (typical delta reedbeds).

WFD Ecological status

Good

WFD Chemical status

Good

Water quality status

Mid-1990s eutrophication/turbid state documented for Holbina II. Peat substrates under Holbina I & II generate acidity that limited aquaculture

Design and Implementation

Project scale

Micro

Project scale specifications

It targets a specific site—the Holbina–Dunavăț former fish-farm basins inside the Danube Delta—where ring dikes were breached to reconnect ~5,630 ha to the natural flood pulse. This is a localized hydromorphological intervention within one delta sector (Dunavăț–Dranov), not a whole sub-basin or region.

Project area

5630

Financing

Total cost

200000.00 €

Financing authorities

Authority name	Type of funding	Comments
Romania	National funds	National budget
ARBDD	Private funds	—

Compensations

Non

Policy and Governance

Policy description

Flood risk management; Hydromorphology- Quantity and dynamics of flow, Continuity for organisms, Width and depth variation; Biology - Fish, Macrophytes, Phytoplankton; Physico-chemical - Nutrient concentrations; Other reasons for the project- Landscape enhancement, Reintegration of the fish farm basins with the surrounding wetlands, Biofilter for the Danube, Razim and Black Sea

Land ownership

4,335 ha renatured fish-farming enclosures included in the public domain of national interest and administered by ARBDD (Danube Delta Biosphere Reserve Authority).

Policy targets

Pollutants Removal

Oher Societal Benefits

Part of a wider plan

Non

Public consultation

Non

Has contractual arrangements

Non

Impacts and Monitoring

Monitoring System

Monitoring requirements

Monitoring is led scientifically by the Danube Delta National Institute (DDNI) and managerially by ARBDD, with dedicated studies in Holbina (e.g., Holbina-1 in 2016–2017) and recurring ARBDD monitoring actions in “ecological restoration zones”

Monitoring parameters

Integrated wetland monitoring used 14 biotic/abiotic parameters to compute biogenic capacity and natural fish productivity; field campaigns covered water quality, phytoplankton, zooplankton, benthos, macrophytes and ichthyofauna; 25 fish species were recorded; natural fish productivity was ~159 kg/ha/yr in 2016–2017.

Maintenance

Maintenance requirements

ARBDD carries out hydrotechnical maintenance that sustains water circulation in the Dunavăț–Dranov/Razim–Sinoie complex (incl. Dunavăț & Dranov canals), chiefly through periodic canal de-silting and related works, under permitting and oversight procedures

Socio-economic Impacts

Direct benefits

25 fish species and natural fish productivity around ~159 kg/ha/yr (biological recovery indicator).
renaturation, the area is used for regulated recreational fishing and ecotourism; ARBDD designates Holbina 1 & Holbina 2 among the official recreational-fishing zones, under an ARBDD permit regime. A private operator at Holbina runs catch-and-release pike angling and lodging.
ARBDD’s management rules allow year-round grazing in the Dranov–Dunavăț complex (the Holbina/Dunavăț hydrological unit), indicating ongoing pastoral use.

Biophysical impacts: Hydrology

Information on retained water

Reconnection & breaches. The site was re-opened by breaching ring dikes; for example, four small breaches were recorded on Holbina II in 2002 (before works finalisation), evidencing restored exchanges with the canal network.

Biophysical impacts: Biodiversity

Improved biodiversity

Oui

Information on improved biodiversity

DDNI’s 2016–2017 study in Holbina 1 reported 25 fish species

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Positive impact-WQ improvement

Information on water quality overall

State shifts (clear ↔ turbid). Holbina II demonstrated bistability: it shifted from a mesotrophic clear-water state to a turbid state in the mid-1990s, then reverted to clear water in 2002. Management was advised to retain the clear state and avoid strong inflows of eutrophic canal water unless paired with monitoring. No quantified flood-storage, groundwater, or “retained water” volumes were reported for this site.
Nutrients / reed-bed filtering (unexpected). Field studies found high retention of suspended silt and nitrogen in reed filters, but no effective phosphorus retention; in summer, reed beds acted as a phosphate source, contradicting the initial “nutrient filter” hypothesis. Implication: direct flushing with reed-filtered water could still drive eutrophication under stagnant conditions.
Peat acidity constraint. Holbina I–II sit on peat deposits whose generated acidity hampered fish-farm performance—one of the rationales for renaturation.

Soil quality overall improvements

Positive impact-SQ improvement

Information on soil quality overall improvements

Nutrient concentrations

Lessons Learned

Key lessons

Reedbeds did not behave as universal nutrient filters. Field work around Holbina II showed reed marshes retained silt and nitrogen but released phosphate in summer, undermining the initial “flush-through-a-reed-filter” concept. Design assumptions about nutrient removal must be tested in situ and paired with monitoring before scaling up.

Hydro-ecology is bistable and sensitive to residence time. Holbina II toggled between turbid and clear-water states in the 1990s–2002; breach size/number/placement change residence time and sedimentation, which can tip the system either way. The recommendation was to retain the then-clear state and avoid major works unless accompanied by systematic study.

Post-restoration monitoring pays off. A DDNI one-year survey in Holbina 1 (2016–2017) recorded 25 fish species and ~159 kg/ha/yr natural fish productivity—evidence that functional habitat can recover and that outcomes are quantifiable for management.

Governance clarity was pivotal. A 2000 court decision confirmed DDBRA’s administrative/user rights over the area, removing a key procedural obstacle for restoration management and enforcement.

At program level, communication and participation matter. The World Bank’s implementation review flags early public-awareness and community involvement as critical—and warns not to rely on unconfirmed parallel investments (e.g., the EBRD loan) when designing restoration programs.

Barriers

Barrier type	Barrier role	Comments
Other	Secondary barrier	Nutrient dynamics contrary to expectations (reedbeds as phosphate sources in summer), heightening eutrophication risk.
Other	Secondary barrier	Ecological instability (clear↔turbid) and high sensitivity to residence time, demanding careful hydraulic design.
Other	Secondary barrier	Need for rigorous, concurrent study - authorities were advised to avoid major works without systematic monitoring.
Attitude of relevant stakeholders	Main barrier	Earlier tenure/use-rights disputes, resolved only in 2000, which delayed coherent management.
Lacking financing sources	Main barrier	Dependence on external co-investments/communication gaps noted at program level

Success factors

Success factor type	Success factor role	Comments
Successful coordination between authorities	Main factor	Strong institutions & partnerships (DDBRA–DDNI with Dutch RIZA support) and targeted GEF/World Bank backing.

Success factor type	Success factor role	Comments
Existing institutional framework	Secondary factor	Legal/administrative clarity after 2000 enabling coherent site management.
Other	Secondary factor	Hydrological reconnection via breaches applied cautiously and adaptively.
Conducted assessments (incl. economic)	Secondary factor	Evidence-based monitoring (Holbina 1) to verify recovery and guide operations.
Conducted assessments (incl. economic)	Secondary factor	Programmatic learning loop from the Danube Delta Biodiversity Project (methods, indicators, replication).

Transferability

Highly transferable to other reclaimed fishponds or diked wetlands—if reconnection is tailored. Handle with care: nutrient dynamics (reedbeds can release P in summer); avoid importing eutrophic canal water; size/place breaches to manage residence time and avert turbid-state shifts; secure land tenure/permits; couple works with multi-parameter monitoring (water quality, macrophytes, fish); plan socio-economic transition (access, fishing rules) early.

Sources

Sources

Case study:The Holbina-Dunavat Restoration Project

The evolution process in Holbina-Dunavat area during restoration works

Plan de management al Rezervației Biosferei Delta Dunării (2008–2012)

Study of fish fauna and natural fish productivity in Holbina 1 ecological reconstruction area, part of wetland Danube Delta

Danube Delta Biosphere Reserve (D.D.B.R.): reed dynamics within actual context

RAPORT ȘTIINȚIFIC ȘI TEHNIC – Restaurarea și Prognoza formării turbei în mlaștini… (Contract 95/2016), Faza IV – 2019

„Servicii realizare analiză de piață a datelor privind produsele și serviciile cu specific local în teritoriul GAL DELTA DUNĂRII”

AMDTDD la bilanț – Creștere sustenabilă a turismului deltaic în 2019

The evolution process in Holbina-Dunavat area during restoration works

RAPORT DE MEDIU – Strategia Integrată de Dezvoltare Durabilă a Deltei Dunării (2030) – rev. 05

RAPORT DE ACTIVITATE AL ADMINISTRAȚIEI REZERVAȚIEI BIOSFEREI DELTA DUNĂRII – Anul 2024

RAPORT DE ACTIVITATE AL ADMINISTRAȚIEI REZERVAȚIEI BIOSFEREI DELTA DUNĂRII – Anul 2023

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Research for ecological restoration in the Dunavăț-Dranov region, Danube Delta (summary of results)