Restoration within the Srebarna Nature Reserve, Bulgaria

Year of issue

2025

Summary

A linking canal with a lock, constructed in 1994, restored the hydrological connection between Srebarna Lake and the Danube, enabling an annual inflow of river water and preventing the lake’s isolation that began in 1949. This intervention improved water levels, reduced eutrophication trends and supported the recovery of biodiversity, notably the Dalmatian pelican colony. The site, inscribed on the UNESCO World Heritage List, is managed by the Ministry of Environment and Water through the Regional Inspectorate (RIEW) in Ruse, and has been part of Natura 2000 since 2008, with a 673-ha buffer zone.

Recent UNESCO reporting (2024) confirmed the site’s official area at 638 ha after correcting a cartographic error from 2007. Management faces new challenges: predation of pelican eggs by invasive raccoon dogs and, more rarely, golden jackals, sometimes facilitated by late ice formation after mild winters. These factors have prompted measures such as protective fencing around nesting sites. The hydrological system and monitoring remain essential to maintain ecological values, while updated management planning and maintenance of hydraulic structures are priorities for sustaining the lake’s ecological health.

Photo Gallery





Location

44.10972, 27.07305

Project

NWRM

National ID

Bulgaria_09

Sector

Hydromorphology

Installation Date

1994

Implementation status

Completed

Contact

REC

Overview

Location of the project

The Srebarna Nature Reserve is located in north-eastern Bulgaria, on the right bank of the Danube River, about 2 km south of the river’s main channel and roughly 18 km west of the city of Silistra, near the village of Srebarna (Vetren). It lies along European route E70/Silistra–Ruse road. The site covers 638 ha, with a 673-ha buffer zone, and borders Romania across the Danube.

Country

Bulgaria

NUTS2 Code

Северен централен (Severen tsentralen)

Sponge measures implemented in the case study

Elimination of Grey River Bank Protection

Reconnection of oxbow lakes and similar features

Objectives

Restore hydrological connection between Srebarna Lake and the Danube River through a controlled inflow, reversing the isolation caused by the 1949 dike.
Stabilise and raise water levels in the lake to support wetland ecological functions.
Reduce eutrophication by flushing the lake annually with Danube water, thereby improving water quality.
Enhance biodiversity, with a focus on maintaining and increasing populations of key wetland species such as the Dalmatian pelican (Pelecanus crispus).
Comply with international commitments under the Ramsar Convention and later UNESCO World Heritage requirements, by halting ecological degradation.

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility

National water authority	Ministry of Environment and Water (MOEW)	Financing	National authority responsible for overall management and conservation of the reserve. Financing (state budget), policy direction, approval of management plans, coordination with UNESCO and Ramsar.	Responsible
Regional / sub-national water authority	Regional Inspectorate of Environment and Water – Ruse (RIEW Ruse)	Monitoring	Operational management authority at regional level. Day-to-day management, implementation of conservation and maintenance activities, local enforcement, site monitoring.	Responsible
Local water authority	Municipality of Silistra	Implementation	Local stakeholder and partner in site access, tourism infrastructure, and awareness activities. Support for visitor facilities, coordination with reserve staff for local development compatible with conservation.	Supporting
Other	UNESCO World Heritage Centre / IUCN	Monitoring	Oversight and periodic reporting for World Heritage status. Evaluation of conservation state, recommendations to the State Party, inclusion in monitoring cycles.	Supporting
NGO	Bulgarian Society for the Protection of Birds (BSPB/BirdLife Bulgaria)	Monitoring	NGO partner in species monitoring and conservation, particularly Dalmatian pelican protection. Field monitoring, anti-predation measures (e.g. fencing), public awareness, participation in LIFE projects.	Supporting

Site Information

Climate Zone

Warm temperate dry

Precipitation

547.00 mm

Temperature (°C)

12.80 °C

Imperviousness

0.20 %

Elevation range

11

Slope range

0.02

Vegetation class

The reserve is dominated by extensive reed beds (Phragmites australis) and other emergent aquatic vegetation, with associated wet meadow and aquatic plant communities.

WFD Ecological status

Poor

WFD Chemical status

Good

Water quality status

A 2025 DEIMS site description notes recent shifts towards strong eutrophication and accelerated vegetation succession, partly linked to changes in Danube connection and groundwater use in the catchment.

Design and Implementation

Project scale

Micro

Project scale specifications

It involves a single, clearly defined site (638 ha lake and wetland, plus 673 ha buffer zone) on the right bank of the Danube, near the village of Srebarna. The intervention - construction and operation of a linking canal with a sluice (1994) - is a localised hydromorphological measure aimed at restoring water exchange between the lake and the Danube, improving ecological conditions within the reserve. While it benefits biodiversity of regional significance, its direct management and operations occur entirely at the site level.

Project area

60200

Size

638.00

Size unit

ha

Constraints

Interrupted connection with Danube River, Distance fom the main river

Favourable preconditions

Designated to Strict nature reserve

Financing

Financing authorities

Authority name	Type of funding	Comments
Bulgarian State	National funds	The 1994 construction of the linking canal and sluice
Ramsar Small Grants Fund	Other	2001 Ramsar Management Plan co-funding
Municipality of Silistra	Local funds	2001 Ramsar Management Plan co-funding
European Union	EU-funds: LIFE+	Pelican Way of LIFE 2019–2025

Compensations

No

Policy and Governance

Policy description

Decrease of the water level, Eutrophication, Sediments accumulation,

Land ownership

The Srebarna Nature Reserve is state-owned. The land and water body are under the jurisdiction of the Bulgarian state, managed on behalf of the state by the Ministry of Environment and Water.

Policy targets

Runoff control

Improved Biodiversity

Increase Water Storage

Part of a wider plan

No

Public consultation

No

Has contractual arrangements

No

Impacts and Monitoring

Monitoring System

Monitoring requirements

The site requires regular ecological and hydrological monitoring led by RIEW Ruse under MOEW oversight.

Monitoring parameters

Hydrology: water levels in the lake, inflow from the Danube via the canal.
Water quality: nutrient concentrations (e.g. total phosphorus, total nitrogen), chlorophyll-a, transparency (Secchi depth).
Biota: population size and breeding success of key species (especially Dalmatian pelican), composition of aquatic vegetation (extent of reed beds), presence of invasive species.
Threat factors: incidence of predation on pelican colonies, climatic events affecting ice formation, and habitat condition in the buffer zone.

Maintenance

Maintenance requirements

Maintenance focuses on ensuring the canal and sluice remain operational, through inspection, repair, and dredging as needed.

Impact Assessment Methodology

Performance impact assessment method

Catchment outlet

Performance impact estimation information

Measurment of the water level; Monitoring of the bird species

Socio-economic Impacts

Direct benefits information

Ecotourism and local economy : The restored hydrological regime has helped maintain the ecological character of the reserve, which underpins its appeal as a UNESCO World Heritage and Ramsar site. The visitor centre and observation points around the lake attract both domestic and international tourists, benefiting local businesses in the village of Srebarna (Vetren) and the municipality of Silistra (accommodation, food services, guided tours). Educational visits and eco-interpretation activities have increased environmental awareness in the local community, particularly on wetland conservation and species protection.
Cultural and scientific value : The site’s international designations have increased its profile, drawing scientists, students, and NGOs for research and conservation projects, and providing opportunities for capacity building among local staff.
Job creation : The reserve’s management provides employment for guards, maintenance workers, and guides, mainly under the RIEW Ruse administration, as well as seasonal work during specific conservation actions (e.g. fencing the pelican colony).

Biophysical impacts: Hydrology

Retained water

14.00

Retained water unit

mio m3/year

Increased water storage

4.00

Increased water storage unit

mio m3/year

Information on increased water storage

The construction of the canal and sluice in 1994 restored seasonal inflow from the Danube to the lake, reversing hydrological isolation since 1949.
This intervention raised and stabilised water levels in the lake.

Biophysical impacts: Biodiversity

Improved biodiversity

Yes

Information on improved biodiversity

The improved hydrological regime benefited wetland-dependent species, notably the Dalmatian pelican (Pelecanus crispus), whose breeding colony persisted after the intervention.
Other wetland bird populations and aquatic vegetation (extensive reed beds) were maintained or expanded in the years following reconnection.
Recent monitoring highlights negative impacts from predation by invasive raccoon dogs and, occasionally, golden jackals, sometimes facilitated by ice cover in late winter. Anti-predation measures (e.g. fencing) have been implemented to protect nests.

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Positive impact-WQ improvement

Information on water quality overall

Monitoring between 1998–1999 showed chlorophyll-a concentrations dropped to levels typical of mesotrophic conditions, indicating a reduction in eutrophication compared to the early 1990s. A 2025 DEIMS site profile reports more recent trends of strong eutrophication and accelerated vegetation succession, linked to changes in Danube connectivity and groundwater use in the catchment.

Soil quality overall improvements

N/A info

Biophysical impacts: Others

Ecosystem impact climate regulation

Increased permanent biomass

Lessons Learned

Key lessons

The hydrotechnical restoration of Srebarna demonstrates that local-scale interventions can deliver clear biophysical gains. The 1994 canal and sluice improved water levels, reduced eutrophication trends, and enhanced biodiversity within the reserve. These outcomes confirm that targeted hydromorphological restoration is effective for reversing site-level degradation in wetlands. However, the impacts at the wider river basin scale are insignificant or difficult to assess because of the scale difference, underlining the limits of local projects in influencing broader hydrological systems.

Another lesson is that restoration requires ongoing management. Infrastructure such as the canal and sluice must be maintained to keep hydrological functions effective. Without regular inspection, dredging, and repair, the benefits could be lost.

The case also highlights the need for continuous monitoring and adaptive responses. Tracking water quality, water levels, and biodiversity allows managers to react to emerging threats, such as invasive raccoon dogs and golden jackals preying on pelican nests, which required new measures like protective fencing.

Finally, Srebarna shows the value of linking conservation with socio-economic benefits. Its status as a UNESCO and Ramsar site has attracted ecotourism, education, and scientific research, benefiting local communities. At the same time, restrictions on resource use illustrate the need to balance ecological protection with local livelihoods through participatory planning.

Barriers

Barrier type	Barrier role	Comments
Other	Main barrier	Emerging ecological threats : Invasive predators such as raccoon dogs and golden jackals have significantly impacted Dalmatian pelican breeding success, requiring new and sometimes costly management measures.
Lacking financing sources	Secondary barrier	Financial constraints — Long-term management, monitoring, and infrastructure upkeep depend on consistent budget allocations, which may be vulnerable to policy or funding changes.

Success factors

Success factor type	Success factor role	Comments
Legal obligations	Main factor	Strong legal protection and designation : UNESCO World Heritage and Ramsar statuses, plus Natura 2000 listing, ensured high conservation priority and obligations for management.

Success factor type	Success factor role	Comments
Attitude of decision makers	Secondary factor	The Ministry of Environment and Water, through RIEW Ruse, provides an institutional framework for daily management, enforcement, and monitoring.
Conducted assessments (incl. economic)	Secondary factor	Ongoing ecological monitoring : Regular tracking of hydrology, water quality, vegetation, and bird populations allowed adaptive management and targeted interventions (e.g. anti-predation measures).
Conducted assessments (incl. economic)	Main factor	Integration of socio-economic benefits : Ecotourism, education, and research activities linked to the reserve’s international profile have generated local economic opportunities and public support for conservation.

Sources

Sources

Srebarna Nature Reserve

Periodic Reporting Cycle 3 – Section II : Srebarna Nature Reserve

Local Conservation of Nature Heritage as an Important Component in the Water-Energy-Food Nexus Approach – A Case Study of Srebarna Lake, Bulgaria

Srebarna – Bulgaria (DEIMS.iD site profile)

UNESCO World Heritage List – Srebarna Nature Reserve

Changes of Biological Quality Elements during rehabilitation activities in LTER site Srebarna Lake, (LTER EU BG 007 “SREBARNA”)