Restoration of hydrological system in the Middle basin of Biebrza Valley, Poland

Year of issue

2026

Summary

The EC LIFE programme’s co-financed project aims to restore the hydrological system in the Middle Basin of the Biebrza Valley to support the conservation of water-dependent habitats and open marshland bird species. It focuses on controlled water management and re-irrigation to halt the degradation of peatlands within the water system of the Rudzki Canal, Ełk River, Jegrznia River, and Woźnawiejski Canal. Key measures include constructing water retention infrastructure to maintain wetland conditions, especially during dry years.

Phase I (LIFE09, completed in 2016) included redirection of water flows, construction of barrages and thresholds, partial riverbed restoration, land acquisition, and mowing of overgrown areas across 9,000 ha. Phase II (LIFE13) is ongoing and expands interventions to an additional 13,452 ha, aiming to further restore wetland hydrology while maintaining agricultural and tourism use.

Recent works include the construction of a new hydrological junction at Modzelówka, designed to direct approximately 80% of the Kuwaski Canal's flow toward the Rudzki Canal and 20% to the reactivated Ełk riverbed. In 2023, a high-durability PE-HD siphon system was installed to support this redistribution, designed for minimal ecological impact. These efforts have already shown benefits such as improved groundwater retention, reduced fire risk, and better conditions for both biodiversity and local agriculture. Full implementation of Phase II is expected by 2026–2027.

Photo Gallery



Location

53.602265, 22.734504

Project

NWRM

National ID

Poland_03

Sector

Hydromorphology

Implementation status

Ongoing

Overview

Location of the project

The case study is located in the Middle Basin of the Biebrza Valley, within Biebrza National Park, in northeastern Poland, primarily near the villages of Kuligi, Modzelówka, Ruda, and Brzeziny. It is situated east of the town of Goniądz, and lies between national road DK65 (Grajevo–Białystok) and voivodeship road DW668. The site encompasses the Jegrznia and Ełk river valleys, and includes parts of the Woźnawiejski and Kuwaski canals.

Country

Poland

NUTS2 Code

Podlaskie

Sponge measures implemented in the case study

Basins

Wetland restoration and management

Peak flow control structures

Objectives

1. Restore the natural hydrological regime over a combined area of over 22,000 hectares (9,000 ha in Phase I, 13,452 ha in Phase II) in the Middle Basin of the Biebrza Valley.
2. Redirect water flows to restore wetland water conditions:
In Phase I: divert ~70% of Woźnawiejski Canal water back into the Jegrznia River.
In Phase II: divert ~80% of Kuwaski Canal flow into the Rudzki Canal and 20% into the old Ełk riverbed.
3. Improve conditions for hydrogenic habitats and Natura 2000 wetland species, particularly open marshland birds like the Aquatic Warbler (Acrocephalus paludicola).
4. Reduce peatland degradation, fire risk, and mineralisation by raising and stabilising water tables.
5. Build and modernise water infrastructure: 6 barrages and 1 threshold in Phase I, an hydrotechnical junction and siphon system in Phase II.
6. Mow or clear vegetation on hundreds of hectares of overgrown peatland to maintain open habitats.
7. Increase awareness and cooperation with local stakeholders, including landowners and farmers, through consultation and information campaigns.

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
Nature park	Biebrza National Park	Other	Project planning and management Construction works and ecological restoration Monitoring and stakeholder coordination	Responsible
Regional / sub-national water authority	Regional Water Management Authority (RZGW Białystok)	Determination of design details of the measure	Provided technical input on hydrological infrastructure and canal operation.	Supporting
Research institute / University	University of Białystok / Warsaw University of Life Sciences	Monitoring	Participated in ecological monitoring, hydrological modelling, and habitat assessment.	Supporting
NGO	NGOs and local stakeholders	Other	Involved in awareness campaigns, consultations with landowners, and promotion of sustainable land use practices.	—

Site Information

Climate Zone

Cool temperate dry

Precipitation

615.00 mm

Temperature (°C)

6.70 °C

Evapotranspiration

50.00 mm

Elevation range

115

Groundwater level

Natural groundwater occurs at shallow depths, typically 0.5 to 10.95 m, with most first aquifer levels between 1–3 m depth

Vegetation class

Peat-forming wetland vegetation, primarily consisting of:
Moss communities (Sphagnum species)
Sedge meadows (Carex species)
Reed beds (Phragmites australis)
Alder and willow shrubs in wetter areas

WFD Ecological status

Moderate

WFD Chemical status

Failing to achieve good

Water quality status

Water quality is mainly impacted by historic drainage and peat degradation, causing nutrient release. Secondary pressures include diffuse pollution from agriculture. Restoration efforts aim to rewet peatlands and stabilize hydrological and nutrient cycles

Design and Implementation

Project scale

Meso

Project scale specifications

The restoration project in the Middle Basin of the Biebrza Valley is implemented at the regional/river scale, covering approximately 22,000 hectares across phases I and II. It focuses on sub-basin hydrological restoration, specifically targeting the Jegrznia River – Ełk River – Rudzki and Woźnawiejski Canals system, within the Biebrza National Park. This places it clearly at the meso-scale, as it involves catchment-scale planning, regional water flow management, and restoration of hydrological connectivity across a portion of the larger Biebrza River basin, rather than a site-specific or national-level intervention.

Project area

9000

Financing

Total cost

10314274.00 €

Total cost information

Phase I (LIFE09) had a total eligible budget of approximately €3,672,468
Phase II (LIFE13) amounted to €6,641,806

Financing authorities

Type of funding	Comments
EU-funds: LIFE+	LIFE09 NAT/PL/000258 LIFE13 NAT/PL/000050

Compensations

Non

Policy and Governance

Policy description

The main environmental problem is caused by a network of draining canals built in XIXth century under Russian Tsar administration which significantly lowered ground water table of neighbouring peatlands and changed habitat conditions in the region of two rivers – Jegrznia and Ełk as well as two canals: Rudzki and Woźnawiejski.

Land ownership

The land is mainly state-owned and managed by Biebrza National Park, with some areas privately owned and partially acquired during the project to support restoration.

Policy targets

Improved Biodiversity

Increase Water Storage

Runoff control

Part of a wider plan

Oui

Wider plan

Name
Local spatial plan of Goniądz

Public consultation

Oui

Consultation activities

Activity stage	Comments
Design phase	To implement the measures, the local spatial plan had to be ammended. Therefore SEA study was implemented, including public consultation.

Has contractual arrangements

Non

Impacts and Monitoring

Monitoring System

Monitoring requirements

The park authority monitors water levels, vegetation, and biodiversity indicators to assess ecological outcomes of restoration.

Monitoring parameters

Monitored parameters include hydrological data such as surface and groundwater levels, peat soil moisture, and flow distribution across canals and riverbeds. Ecological indicators like plant community composition, extent of open wetlands, and presence of target bird species are tracked to evaluate habitat recovery. In selected areas, water quality monitoring includes nutrient concentrations (e.g., nitrogen and phosphorus) to assess the effect of peatland rewetting on water chemistry. Fire occurrence and peat mineralization risk are also monitored, especially during dry periods.

Maintenance

Maintenance requirements

Regular mowing and upkeep of water structures are carried out by the Biebrza National Park to preserve habitats and maintain hydrological function.

Impact Assessment Methodology

Performance impact assessment method

Edge of Field/Plot

Performance impact estimation information

The methods involves field works, setting up monitoring sites for hydrological measurements

Socio-economic Impacts

Direct benefits

Local Jobs Creation : 4 positions at pelleting facility
Fuel Production : Biomass-based OTOPellet (~16 GJ per pellet)
Integration into 2014–2020 Rural Development Programme, securing agri-environment subsidies
Cultural Preservation : Recognition and use of traditional knowledge in management planning

Biophysical impacts: Hydrology

Increased groundwater level

0.40 m

Information on increased groundwater level

While the ground water level in the river is estimated to be increased, the growundwater level in the vicinity of channel will decrease.

Biophysical impacts: Biodiversity

Improved biodiversity

Oui

Information on improved biodiversity

Habitat & Bird Population Growth : Managed area rose from 1,551 ha to 6,344 ha; Aquatic Warbler rose 26% (575 individuals)

Biophysical impacts: Water & Soil Quality

Water quality overall improvements

Neutral impact-no change in WQ status

Information on water quality overall

The area is haveing minor economic activities, therefore change in water qyality is not monitored.

Lessons Learned

Key lessons

Hydrological restoration must be systemic.
The project showed that restoring peatlands requires managing the full water network—rivers, canals, and groundwater—not isolated sections.

Monitoring enables adaptation.
A dense network of piezometers and gauges, linked to a DSS, allowed real-time tracking and flexible, evidence-based management.

Groundwater inflow is essential.
Modeling proved that even small increases in lateral groundwater recharge significantly improve peatland water balance and resilience.

Use of durable, low-impact materials is key.
PE-HD siphons were well suited to wetland conditions—long-lasting, corrosion-resistant, and minimally invasive.

Local economy and ecology can align.
Harvesting biomass for fuel (e.g. OTOPellet) helped manage vegetation, reduce fire risk, and support rural employment.

Land ownership matters.
Access to private land through purchase or agreement was vital to restore hydrological continuity and ecological function.

Restoration supports climate resilience.
Rewetting reduced drought and fire risks, while enhancing biodiversity and buffering climate extremes.

Barriers

Barrier type	Barrier role	Comments
Legal obligations / restrictions	Main barrier	The long time of preparing the relevant papers to undertake investment and construction works

Drivers

Driver type	Driver role	Comments
Legal obligations	Main driver	to protect biodiversity in the Park area
Availability of subsidies	Main driver	LIFE+ funding provides co-financing for such activities

Success factors

Success factor type	Success factor role	Comments
Attitude of relevant stakeholders	Main factor	The project is still in the implementation phase

Sources

Sources

Evapotranspiration in a temperate peatland ecosystem in NE Poland

Decision Support System for Biebrza National Park

Renaturyzacja sieci hydrograficznej w Basenie Środkowym doliny Biebrzy. Etap II

Renaturyzacja sieci hydrograficznej w Basenie Środkowym doliny Biebrzy. Etap I

Actual and reference evapotranspiration for a natural, temperate zone fen wetland – Upper Biebrza case study

Dalsza realizacja projektu LIFE pn. „Renaturyzacja sieci hydrograficznej w Basenie Środkowym doliny Biebrzy. Etap II”

Natural groundwater outflows in the Biebrza Valley: Temporal stability, geochemical composition and role in ecohydrological processes of valley wetlands

Assessing temporal changes in the quantity and quality of shallow groundwater in the Biebrza valley in the 21st century