Small Water Retention Program in Forests (lowlands) of Poland

Year of issue

2025

Summary

Forest ecosystems in Poland have long suffered from drought and rapid surface water runoff. Since the mid-1990s, the Polish State Forests (Lasy Państwowe) have implemented small-scale water retention measures, supported by internal and external funding (e.g. the Polish Ecofund and the National Fund for Environmental Protection and Water Management). In 2006, these initiatives were consolidated into a nationwide programme entitled "Increasing retention and preventing floods and droughts in forest ecosystems in lowlands", supported by the EU Cohesion Fund (2007–2013).

It was the first programme of this scale to combine forest-based retention with flood and drought mitigation. Over time, thousands of small hydraulic structures (ponds, weirs, ditches, culverts) were installed, enhancing water retention and reducing peak flows. For instance, in the Świętokrzyskie region, 43 reservoirs and 61 small barriers retain over 1 million m^3 of water.

The programme has continued under successive phases and remains a key component of Poland’s climate adaptation strategy. As of 2023–2025, additional funding (including EU funds) supports the development of lowland and mountain retention systems, with proven benefits: higher groundwater levels, improved soil moisture, and enhanced biodiversity. The approach focuses on restoring natural hydrology without disrupting forest functions.

Institutional coordination has improved, with national guidelines, monitoring tools, and good practices shared via the State Forests Centre for Coordination of Environmental Projects (CKPŚ). The programme is now considered a model of nature-based climate resilience in forestry.

Photo Gallery



Location

52.2316, 21.0065

Project

NWRM

National ID

Poland_02

Sector

Hydromorphology

Installation Date

2014

Overview

Location of the project

Nationwide across lowland forests in Poland, with documented implementation in forest districts of Świętokrzyskie Voivodeship (e.g. under the Radom Directorate of State Forests), and in other voivodeships such as Mazowsze, Podlaskie, and Lubelskie.

Sponge measures implemented in the case study

Basins

Ponds and scrapes

Peak flow control structures

Infiltration Trenches

Objectives

1. Increase water retention capacity in forest ecosystems : by 31.4 million m^3 in lowland forests through the construction of ~3,180 small retention structures.
2. Reduce the risk of floods and droughts
3. Restore natural hydrological functions of forest landscapes
4. Support biodiversity and improve habitat conditions
5. Integrate water retention into sustainable forest management

Involved partners

Authority type	Authority name	Authority role	Comments	Authority responsibility
Other	Lasy Państwowe : State Forests – National Forests Holding General Directorate of the State Forests	Implementation	Coordinating the implementation of the programme	Responsible

Authority type	Authority name	Authority role	Comments	Authority responsibility
Other	17 Regional Directorates of the State Forests	Implementation	—	Responsible
Other	178 Forest Districts	Determination of design details of the measure	—	Responsible
National water authority	Ministry of the Environment	Initiation of the measure	In charge of the programme	Responsible

Site Information

Climate Zone

Cool temperate dry

Temperature (°C)

7.00 °C

WFD Ecological status

Unknown

WFD Chemical status

Unknown

Design and Implementation

Project scale

Large

Project scale specifications

The Small Water Retention Program in Forests (lowlands) of Poland is a macro-scale initiative. It was implemented nationwide, across multiple voivodeships and forest districts, under the coordination of Lasy Państwowe (State Forests) and national ministries. The programme spans various lowland catchments and aims to address national-scale issues such as drought, flooding, and climate resilience in forest ecosystems. It involved thousands of small retention structures and has been integrated into Poland’s broader climate adaptation and water management policies, making it clearly aligned with the definition of a macro-scale intervention.

Project area

1e+06

Financing

Total cost

50000000.00 €

Total cost information

Without the mountain retention program : around €39 million

Financing authorities

Authority name	Type of funding	Comments
Polish EcoFund	National funds	Contributed funding in the initial phases of the programme before its closure in 2010
State Forests (own funds)	Local funds	Significant contribution from internal budgets of Lasy Państwowe for planning, execution, and maintenance.

Compensations

Non

Policy and Governance

Policy description

The seasonal climate variation including higher spring precipitation and summer dry periods combined with a long lasting drainage have led to excessive drought occurring in forest ecosystems. In response to water management needs, the State Forests since the mid-90’s have been undertaking small scale water retention works. Small scale retention actions have been financed from own and external funds (i.e. Ecofund, National Fund for Environmental Protection and Water Management).

Land ownership

The land is publicly owned by the State Treasury and managed by Lasy Państwowe (State Forests).

Policy targets

Increase Water Storage

Groundwater Recharge

Runoff control

Part of a wider plan

Non

Public consultation

Non

Has contractual arrangements

Oui

Contractual arrangements

Arrangement type	Name
Institutional arrangement	Agreement between between the Ministry of Agriculture and Food Economy and the Minister of Environmental Protection, Natural Resources and Forestry of Poland on cooperation in the field of the development of small water retention

Impacts and Monitoring

Monitoring System

Monitoring requirements

Monitoring is coordinated at the national level by the State Forests' Centre for Coordination of Environmental Projects (CKPŚ), using internal databases and technical guidelines to assess the condition and hydrological performance of the structures.

Monitoring parameters

Monitoring focuses on both technical and hydrological parameters. These include the structural condition of retention installations (e.g. stability, blockage, erosion signs), the volume of retained water, and groundwater levels in adjacent areas. In some cases, biodiversity indicators such as wetland flora/fauna presence are also tracked. Forest districts conduct field assessments based on standardized national manuals and report data to central coordination units. During the 2007–2015 operational period, monitoring was linked to EU Cohesion Fund requirements, with data stored in structured project databases to evaluate effectiveness, support reporting, and plan maintenance operations.

Maintenance

Maintenance requirements

Maintenance of the small retention structures is carried out by local forest districts (Lasy Państwowe), who are responsible for regular inspections, cleaning, and upkeep of weirs, culverts, ditches, and reservoirs to ensure proper functionality.

Socio-economic Impacts

Direct benefits

Improved Access to Green Areas & Recreation.
Local Economic Functions at Community Level : Small water power (micro-hydro), Fish breeding, Water supply for agriculture and forestry, Recreational uses.
Broad Ecosystem-Based Socio-Economic Value : The Biodiversity Information System notes that combining forest retention with flood prevention provides a model of environmentally friendly infrastructure that supports biodiversity protection and has significant socio-economic influence, reinforcing benefits beyond strictly hydrological functions.

Biophysical impacts: Hydrology

Information on retained water

The programme created 43 new reservoirs and constructed 61 dams or water-damming devices, retaining over 1 million m^3 of water

Information on increased groundwater level

Preliminary observations showed increased groundwater levels in areas surrounding the retention structures

Information on soil moisture

The increased groundwater elevated soil moisture in adjoining forest habitats

Increased landscape storage capacity

27.00

Increased landscape storage capacity unit

%

Information on increased landscape storage capacity

increased water storage from the present 8 380 253 m3 (2007) to approx. 31 million m3 (in 2014)

Biophysical impacts: Biodiversity

Improved biodiversity

Oui

Information on improved biodiversity

There was a noted increase in biodiversity, greater accumulation of dead wood, and improved soil conditions near retention sites.
Providing habitat for typical wetland flora species: Iris sibirica; Cypripedium calceolus; Eriphorum vaginatum; Oxycoccus palustris; Nymphaea alba; Nymphaea candida
providing habitat for typical wetland fauna species: Hyla arborea; Emys orbicularis; Salamandra salamandra; Castor fiber; Lyrurus tetrix

Lessons Learned

Key lessons

Small-scale measures can deliver large-scale impact : Although the program relied on numerous small structures (ponds, weirs, culverts), their cumulative effect significantly improved water retention, groundwater levels, and ecosystem resilience across large forested areas. This demonstrates the effectiveness of decentralized nature-based solutions when implemented at scale.

Long-term national coordination is essential : The success of the program depended on a centralised coordination mechanism (via CKPŚ within Lasy Państwowe) and integration into national strategies and EU programmes. This long-term governance model ensured continuity across funding cycles and administrative changes.

Multifunctionality increases value : The project illustrates how forest infrastructure can be designed to serve multiple functions: hydrological regulation, biodiversity support, recreation, local livelihoods (fish farming, micro-hydro). This multifunctional approach strengthens public and institutional support.

Monitoring and adaptive management are needed : While basic monitoring was implemented (e.g. structure condition, groundwater), limited data on water quality, biodiversity trends, or long-term climate impacts suggests a need for stronger environmental monitoring to guide adaptive management.

Public forest ownership enabled rapid implementation : Because the land was publicly owned and managed, the program avoided complex land acquisition or permitting procedures, enabling efficient and large-scale implementation. This highlights the strategic value of public land in green infrastructure projects.

Barriers

Barrier type	Barrier role	Comments
Legal obligations / restrictions	Main barrier	Every object requires an development consent, however most of them needs environmental impact assessment.

Drivers

Driver type	Driver role	Comments
Balancing different objectives	Main driver	necesity to improve water amangement in forest lowlands
Availability of subsidies	Main driver	Cohesion Fund in frames of Operational Programme, 2007-2014

Success factors

Success factor type	Success factor role	Comments

Other	Main factor	Public ownership of land – Simplified implementation on State-managed forest lands without land acquisition issues.
Attitude of relevant stakeholders	Secondary factor	Strong institutional coordination – Led by Lasy Państwowe and CKPŚ, ensuring consistency across regions.
Financing possibilities	Main factor	EU and national co-financing – Stable funding from the Cohesion Fund, EcoFund, and national environmental budgets.
Existing staff and consultant knowledge	Secondary factor	Local implementation capacity – Forest districts had technical expertise and staff for design, maintenance, and monitoring.

Transferability

This measure is highly transferable to other regions with publicly managed forest land and seasonal water imbalance.

Sources

Sources

Mała Retencja – duża sprawa (Little Retention – Big Deal)

Small-scale retention in forests. Foresters on the trail of good solutions

Poland: Small retention – Big deal; national programme to improve water balance

Green Infrastructure (Poland page on BISE)

Small-scale Retention Programme in Forests as Nature-based Climate Change Mitigation

Mała retencja nizinna (Small Lowland Retention)