



State Forests
Poland

collect
PROTECT WATER
nature



Regional Directorate
of the State Forests in Katowice

NATURAL WATER RETENTION IN NUMBERS

NATURAL WATER RETENTION AND PREVENTION OF WATER EROSION IN STATE FORESTS

PURPOSE

Strengthen the forest resilience to the threat of climate change by the development of natural water retention and prevention of excessive water erosion in mountainous and lowland areas.

ON THE SCALE OF THE ENTIRE NATIONAL FORESTS:

WE HAVE BUILT
10 000
OBJECTS

WE HAVE RETAINED
50 mln m³
OF WATER

17
REGIONAL
DIRECTORATES OF THE
STATE FORESTS TOOK PART

TOTAL COST OF
COMPLETED TASKS
860 mln PLN
INCLUDING 85% SUBSIDY

REGIONAL
DIRECTORATE OF THE
STATE FORESTS IN
KATOWICE



We are one of the few institutions that deals with retention which is slowing down the outflow of water from the forest and then storing it. When there is an excess of water, we store it to retain it in the environment in order to improve both its condition and the conditions of natural environment.

Retention activities also help in forest fire protection, providing a source of water needed to extinguish fires. Retention also means protecting the forest environment from soil erosion when there is a rapid outflow of water from the mountains. We store water in small basins. Why small? Because it is important to diversify the tasks, scattering smaller basins over a larger area to maximize the benefits.

Acting Director of the
Regional Directorate
of the State Forests in Katowice
Damian Sieber



NATURAL WATER RETENTION IN THE FORESTS OF THE REGIONAL DIRECTORATE OF THE STATE FORESTS IN KATOWICE



Thanks to our activities, nature is revived and creates not only new areas for animals, but also places of rest for people.

The key role of retention activities is the performance of a social function by foresters. Areas covered by retention activities increase the natural and scenic richness, creating an excellent place for recreation and leisure. Retention is also the best way to combat the effects of drought. We observe the water retention not only in our forests, but most importantly, the increase of biodiversity in the natural environment.

Just like humans and animals, the forest needs water to live. That is why it is so important for foresters to fulfill this mission of protecting the forest and nature.

Head of the Developmental Projects
Coordination Department
Wojciech Jendroska

Basins created as part of natural water retention programs not only collect water and slow its runoff, but also add variety to the landscape and become frequented by local residents.

Over time islands built on larger water basins become convenient nesting sites for waterfowl.

EFFECTS OF ACTIONS TAKEN as part of projects

WE HAVE RETAINED
over **5** mln m³
OF WATER

WHICH IS EQUIVALENT TO FILLING MORE THAN 12 OF KATOWICE'S SPORTS ARENAS WITH WATER



28
FOREST DISTRICTS
TOOK PART

WE HAVE BUILT
1500
OBJECTS

TOTAL COST OF COMPLETED TASKS
86 mln PLN
INCLUDING 85% SUBSIDY

HOW TO KEEP WATER IN THE MOUNTAINS?

The negative phenomenon of rapid runoff of water following precipitation is particularly evident in mountainous areas. Therefore, there the activities carried out as part of retention projects focus on water retention in the environment and reduction of the erosive processes associated with the rapid runoff of water.

We use, among other things, **CONSTRUCTION** of inactive skid trails (1) and special **REINFORCEMENT** of slopes and banks of mountain streams in the form of **CAISSONS** (2). Solid stone **FORD CROSSINGS** (3) protect stream beds during timber skidding. Excess rainwater flowing down the overflowing **STREAMS** (4) is collected in **RETENTION BASINS** (5).

If the water level in a tank reaches about 95 percent of its total capacity, it begins to drain through the **SAFETY FLOW** (6), which protects the **LEVEE** (7) from breaking in a random place.

HOW TO COLLECT WATER IN THE LOWLANDS?

Declining groundwater levels observed for many years now and long periods of drought cause water deficit in lowland ecosystems. Collecting it is therefore a particularly important task.

One of the measures that serves this purpose is the **RENATURALIZATION** of areas crossed by ditches (1). Within the framework of retention projects, **THRESHOLDS** (2) are built on them to dam up the water, as well as **VALVES** (3) that further enable the water level regulation.

RETENTION BASINS (4) are an important part of the water collection system in the lowlands. An irregular **SHORELINE** (5), with **FLATTENED AREA** for reptiles and amphibians (6), makes the man-made object resemble a natural basin. **ISLANDS** (7) diversifying the water surface are an ideal place for birds to breed.

WHAT HAVE WE ACCOMPLISHED IN THE PROJECTS?

ANTI-EROSION DEVELOPMENT OF SKID TRAILS AND FOREST ROADS. Among other things, it included the construction of plank roads in wetlands, runoff retardants, sluice gates, caissons protecting banks from being washed away, and developments of disused skid trails.

IN THE MOUNTAINS

RECONSTRUCTION OF BRIDGES, CULVERTS AND FORD CROSSINGS to adjust them to increased volumes of water after heavy rainfall. Where possible, natural materials have been used to ensure that the hydrotechnical objects blend in with the natural mountain landscape.

CONSTRUCTION OF MOUNTAIN STREAMS AND RETENTION BASINS storing water during floods after heavy rainfall. Improvement and protection of wetlands, restoration of floodplains.



THRESHOLDS AND VALVES on old ditches and irrigation channels to restore formerly drained wetlands to their natural state. Stream banks protection from erosion with the riprap, tree and shrub plantings.

SMALL RETENTION BASINS AND DRY BASINS that collect water during rainfall and give it back when drought comes.

IN THE LOWLANDS

OBJECTS FACILITATING INCREASED BIOLOGICAL DIVERSITY, such as fish ladders, outcroppings for amphibians on the banks, or islands on large retention basins that provide habitat and nesting spots for numerous waterfowl species.



NATURAL WATER RETENTION MEASURES IN THE MOUNTAINS



Water is an untamed element that gives life, as well as carries destruction. As foresters we have met this challenge by implementing comprehensive measures to adapt our forests to climate change. The main goal of the objects built in mountainous areas is to slow down the water runoff and increase the retention capacity of the catchment area, which in turn reduces the impact of floods, the damaging impacts of stormwater and drought. Activities in mountain areas focus primarily on the restoration of watercourses, protection of stream banks, protection of slopes, forest roads and skid trails from excessive surface runoff. The investments we keep realizing ensure ecological continuity by modernizing existing structures and building fish ladders and ramps for living organisms. It is also worth mentioning that as part of the natural water retention project foresters use comprehensive treatments combining environmentally friendly natural and technical methods, preferably choosing natural materials.



One of the basic elements of road infrastructure in the mountains are specially designed and constructed **CULVERTS**. As part of the natural water retention programs 61 culverts have been built in the Regional Directorate of the State Forests in Katowice.



CAISSON is a structure in the form of a wooden frame box filled with stones which is used to protect the banks of streams and landslides.

PLANK ROADS in the Beskids have been made for decades. Thanks to them, forest roads running through the marshiest areas are not damaged or eroded. Wood submerged in water-soaked ground decomposes very slowly.

Senior Specialist
for national and EU projects
of the Developmental Projects
Coordination Department
Anna Szady

NATURAL WATER RETENTION MEASURES IN THE **LOWLANDS**



Retention basins that are designed and later built in lowland areas have a number of uses. First, their main purpose is to capture water during periods of its excess and retain it when there is no rainfall or when it is too low. The retained water is then used by plants and animals. Such basins should have an irregular shoreline (with shallows, bays, and promontories), stone outcroppings for amphibians, as well as natural and floating islands used as nesting spots for waterfowl. In recent years, we have observed the persistence of high temperatures in the summer months and the lack of rainfall, which result in an increased risk of fire in the forests. Our retention basins also serve as a fire water supply and are crucial during firefighting helicopter operations.

Forest Service Specialist of the
Developmental Projects
Coordination Department
Karolina Polaszek

Special **CONSTRUCTION** of permanent and temporary watercourses reduces the impact of excessive water erosion, especially that caused by heavy rainfall and intense spring melt. On the other hand, their **RENATURALIZATION** makes it possible to restore the permeability and natural character of the watercourse.



Thanks to the small but numerous **RETENTION BASINS**, forests and their neighboring areas are better adapted not only to drought, but also to periods with high rainfall. Excess water accumulates in forest ponds and other natural ponds, reducing the risk of flood. We also store water in wetlands to protect valuable natural areas.

DANGEROUS FACES OF DROUGHT



Polish forests, especially the lowland ones, are facing a water deficit which is mainly caused by natural factors related to climate change. The decrease of groundwater levels is particularly dangerous for species that require high soil moisture.

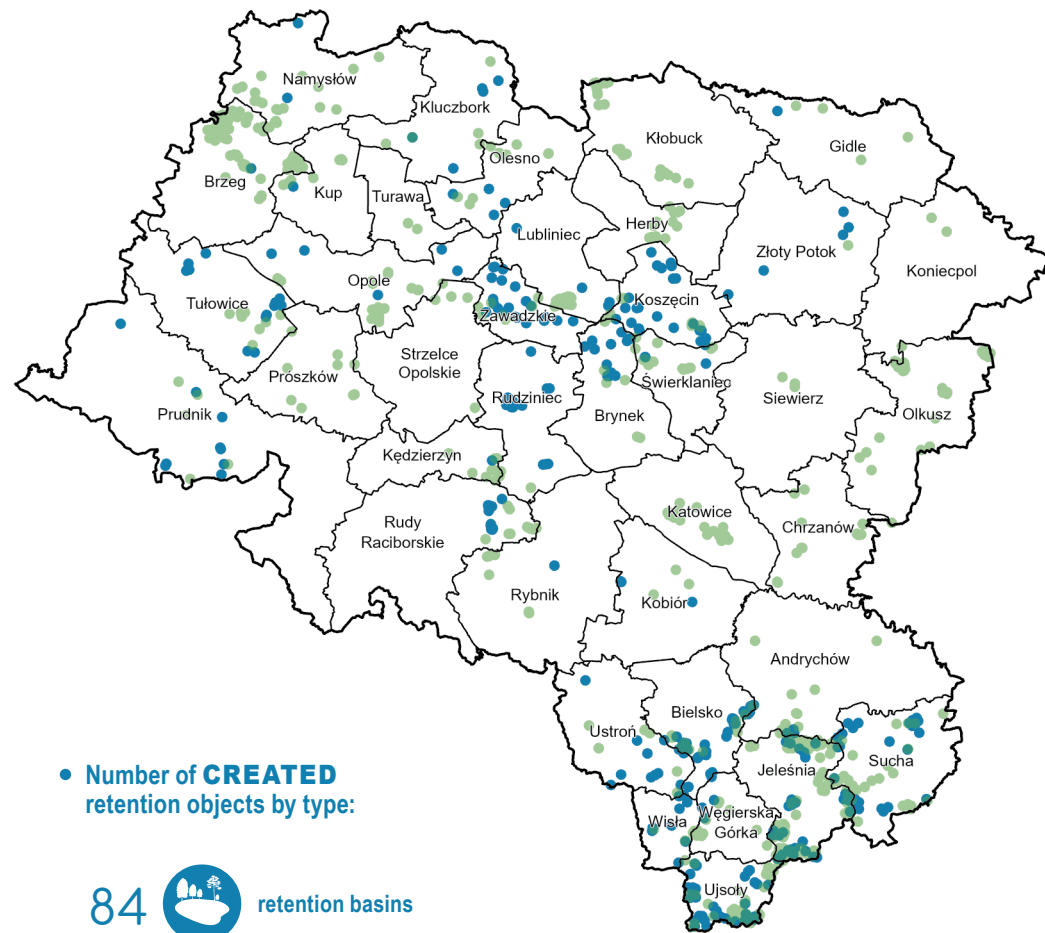
It causes, among other things, the death of spruce and ash trees. Trees weakened by drought are more susceptible to fungal diseases, as well as insect feeding. Water deficit is felt even by seemingly resistant pine trees. Over the past few years, we have been observing the dying of pine stands throughout the country, and one of the places where these problems are particularly acute is the Opole region.

NATURAL WATER RETENTION OBJECTS

in the Regional Directorate of the State Forests in Katowice



Foresters, by carrying out natural water retention tasks in the lowlands and mountains, **HAVE CONSTRUCTED MORE THAN 1500 DIFFERENT RETENTION OBJECTS** – water basins, culverts, caissons, ford crossings, cascades, and others. The objects not only contribute to water conservation and its more effective storage. Many of them – especially those created in mountainous areas – protect erosion-prone parts of slopes and stream banks. Last but not least, by the end of 2030, foresters **PLAN TO CREATE MORE THAN 1000 RETENTION OBJECTS.**

LOCATION OF NATURAL WATER RETENTION OBJECTS in the Regional Directorate of the State Forests in Katowice



• Number of **CREATED** retention objects by type:

84  retention basins

912   steps, thresholds, valves, crossing fords

93   culverts, bridges

more than 140  other objects

• Number of **PLANNED** retention objects by 2030:

more than 1000



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