

# RETENTION

KEEP THE WATER!

The Water scarcity prevention program





# Water resources of Poland

Poland is one of the countries facing the risk of a water deficit. Small water resources, influenced by factors such as geographical location, as well as seasonal variability and area differentiation related to them, may result in drought. The amount of renewable fresh water resources per capita in Poland is less than  $1,600 \text{ m}^3$ <sup>1</sup>, which indicates a risk of water stress. That is why it is so important to take care of existing water resources and take measures to increase retention.

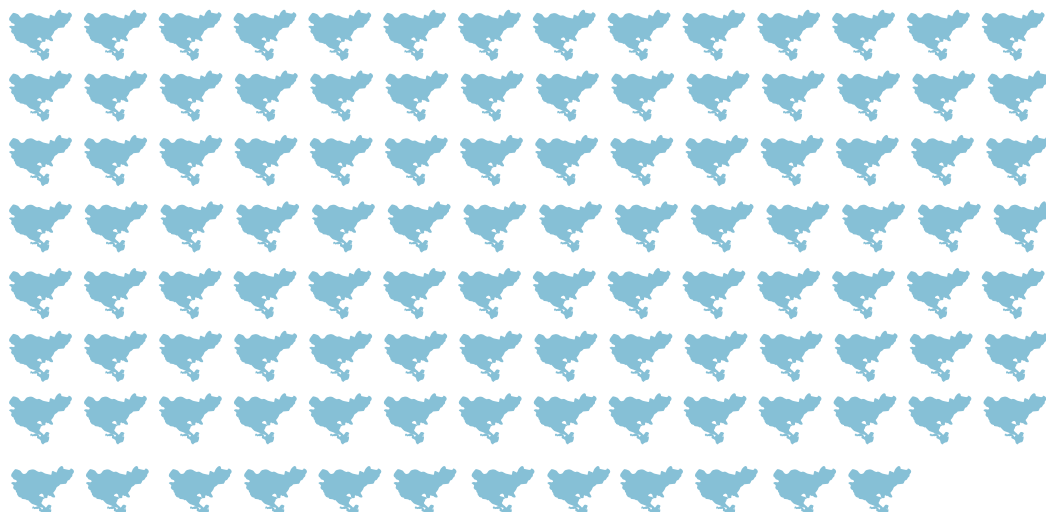
Surface waters are mainly used for economic needs and groundwater are used as a source of drinking water. According to the data of the Polish Geological Institute – National Research Institute, groundwater resources in Poland amount to approximately  $13.6 \text{ km}^3$  per year<sup>2</sup>.

For surface waters, the volume of water understood as available water resources is the amount of water flowing out of the country through rivers. According to the information of the Institute of Meteorology and Water Management,  $61 \text{ km}^3$ <sup>3</sup> of water flows out of Poland every year. Currently, 7.5% of this water is retained.

## 15 x the volume of Lake Śniardwy – surface water resources



## 110 x the volume of Lake Śniardwy – groundwater resources



1 <https://raportsdg.stat.gov.pl/2020/cel6.html>

2 <https://www.pgi.gov.pl/en/dokumenty-pig-pib-all/publikacje-2/biuletyn-pig/382-herbich-i-in/file.html>

3 Gutry-Korycka M., i in, 2014, Zasoby wodne a ich wykorzystanie, Nauka 1/2014



### What can we do to improve retention?

In Poland, 15% of water is planned to be retained in various ways by 2030.

Water can be stored in various ways – using the natural capabilities of the landscape, green and blue infrastructure, drainage irrigation systems or retention reservoirs. Such a wide range of retention alternatives allows for the involvement of various entities, from government units through local government administration to each one of us. Appropriate actions are dedicated to each measure. Some of them require the cooperation of several institutions in order to bring results. An example of such action is increasing water retention in wetlands. Water administrators, e.g. State Water Holding – Polish Waters, land owners, e.g. State Forests, as well as ecological organizations or representatives of the commune, may be involved in the renaturalization of the wetland.

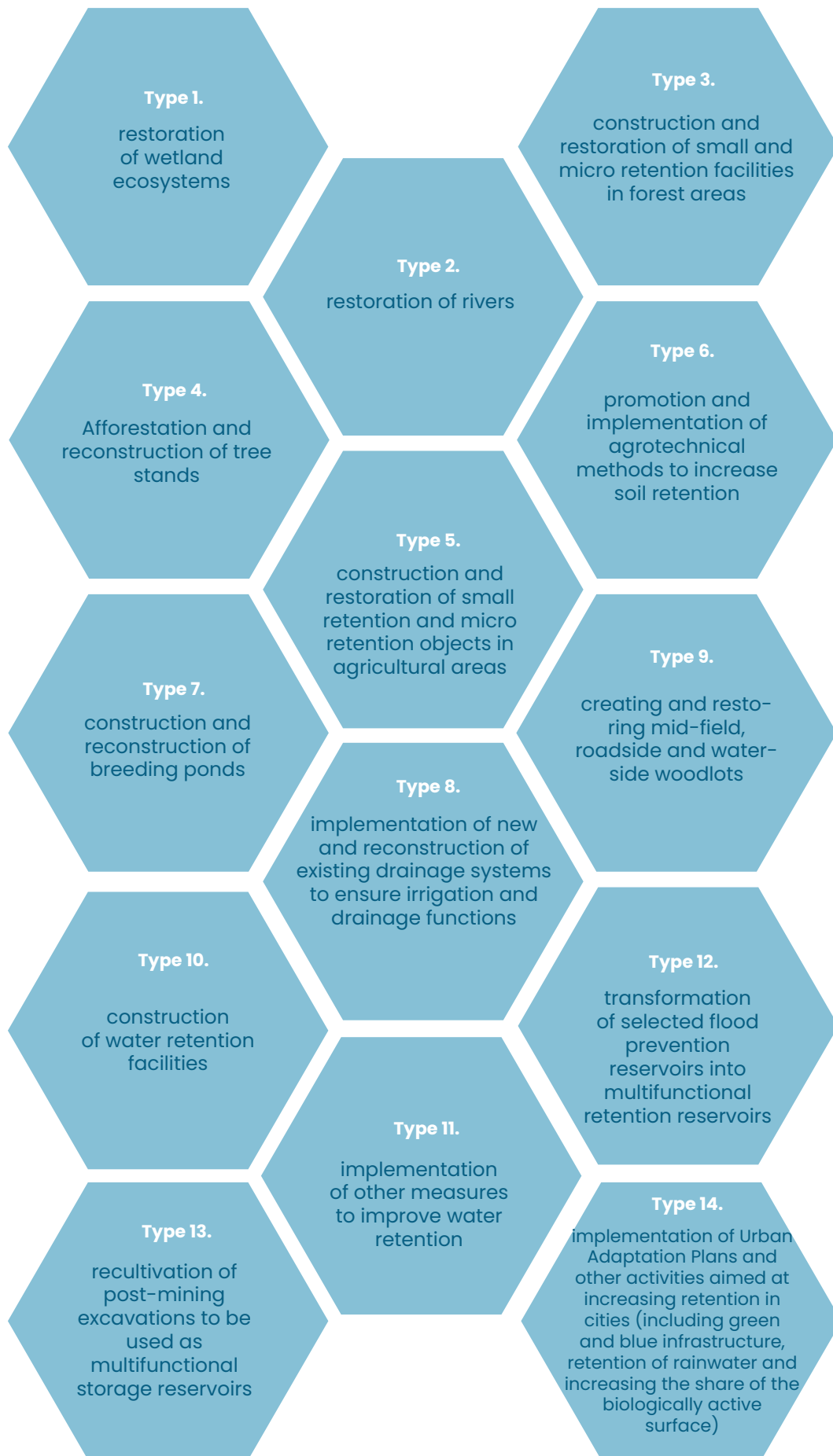
Activities related to water retention should also be supported through broadly understood education. Building social awareness of the importance of water retention is an essential element of achieving the objectives of the Water scarcity prevention program. Public awareness on this topic is essential, also taking into account the intensifying and increasingly widespread effects of climate change. Society has noticed the negative effects of droughts and floods more clearly and begins to seek information on how to counteract and mitigate these negative effects and adapt to the new hydrological and atmospheric conditions. The answer to these needs is, among others, an information and promotion campaign conducted by the Ministry of Infrastructure regarding the Water scarcity prevention program. Its aim is to increase awareness of the need to take action to increase the amount of water storage, primarily from precipitation.

### Measures to increase retention

Measures to increase retention have been summarized in a document developed by the Ministry of Infrastructure entitled Water scarcity prevention program for the years 2022–2027 with a perspective for 2030.



There are 14 types of such measures:



Depending on the nature of the activity, various entities may be responsible for its implementation.

## State Water Holding – Polish Waters

### Action type 1: Restoration of wetland ecosystems

The action is related to recovering wetland areas degraded due to human activity. The measures undertaken depend on the type and specifics of a given wetland. Possible tasks that improve wetland retention are water attachments, demolition of drainage systems and changes in the forms and techniques of use of wetlands. The Water scarcity prevention program indicates which areas should be restored first.

Polish Waters as a water administrator is an entity whose commitment can be a key element in the field of wetland renaturation. As river administrators, they are responsible for water devices which construction and/or demolition are needed to restore the natural character of the wetland.

Renaturation of wetlands can be undertaken by government units, local government administrations and non-governmental organizations. Most often, wetland restoration projects are carried out as a shared effort of several entities. The effect of the implementation of this action is to store approximately 79 million m<sup>3</sup> of water.

### Action type 2: Restoration of rivers

Restoring the natural character of rivers, i.e. their renaturation, is an effective way to improve channel retention as well as one of the ways to counteract drought and floods. State Water Holding – Polish Waters as a river administrator in Poland provides for the restoration of many rivers. In total, as a result of shaping more natural river troughs, it is possible to store 1.1 billion m<sup>3</sup> of water. It is proposed to start restoring the natural character of 11 selected sections of rivers with the highest needs: Rudawa, Mienia and fragments of the Wisłoka, Łęg, Ślina, Narewka, Krzna, Wda, Płociczna and Ina.

Polish Waters is already implementing renaturation on rivers throughout Poland. An example of such work is the renaturation of Biała Tarnowska as part of the Restoration of ecological continuity and implementation of measures to improve the functioning of the free migration corridor of the Biała Tarnowska River. The works carried out in the years 2017–2020 consisted of, among others, widening the trough, partial demolition of damaged water devices, including steps and creating honeycomb-type rapids. The restoration of the natural character of the river increased valley retention.

### Action type 10: Construction of water retention facilities and action type 11: implementation of other measures to improve water retention

The above types of activities include shaping artificial retention through, among others, the construction of artificial water tanks. By 2030, the implementation of over 700 projects aimed at storing water is expected. Their implementation will contribute to the retention of about 1.1 billion m<sup>3</sup> of water.

Artificial retention has been shaped for many years. The most famous retention reservoirs administered by Polish Waters are the Zegrze Lake, the Włocławek Lake, the Sulejowski Lake, Żywiec Lake, or Mucharskie Lake.

An example of an action recently undertaken by Polish Waters is the revitalization of the Rzeszów Reservoir. The implementation of this measure has contributed to improving the quality of water and doubling the reservoir's retention potential from 670,000 m<sup>3</sup> to 1.2 million m<sup>3</sup>, which results in a more effective counteraction against the effects of drought and floods. The Ruda Reservoir near Mława will be revitalized. The purpose of the work is to restore the original parameters of the object, increase retention and effectively counteract the effects of drought and floods. An important element of the task is also to increase the biodiversity of the reservoir, which will gain a state-of-the-art fish pass and will be stocked.

In Greater Poland Voivodeship, to increase the retention of this agricultural region, a Tulce Reservoir in the Kleszczewo commune is being built. It will be able to intercept almost 250,000 m<sup>3</sup> of water and use it for agricultural irrigation, including for irrigating grassland. The implementation of this project will also contribute to improving the water balance and the retention capacity of the catchment and securing the inhabitants of the region against periods of heavy rainfall interspersed with the occurrence of long-term drought.

### **Action type 12: Transformation of selected flood prevention reservoirs into multifunctional retention reservoirs**

Polish Waters takes preparatory steps to change selected dry reservoirs into wet, multifunctional reservoirs, also aimed at storing water. To perform such action, the structure of the reservoir usually has to be rebuilt, including its so-called “bowl” and devices located in the dam. The reconstruction of the reservoir should be preceded by the preparation of project documentation and obtaining all administrative permits.

### **Action type 13: Recultivation of post-mining excavations to be used as multifunctional storage reservoirs**

Actions implemented, among others, by companies responsible for the liquidation of mines. As a result of the reclamation of excavations for water purposes, new retention reservoirs are created. These measures require the cooperation of many entities, including Polish Waters. In 2023, an agreement was signed between Polish Waters, ZE PAK SA Capital Group and Poznań University of Life Sciences, which aims to rebuild water relations in Greater Poland, among others by reclamation of the mining areas by converting them into water reservoirs.

The retention potential of this activity is over 870 million m<sup>3</sup> of stored water.

### **Educational activities to spread information on water care, rational water management, flood and drought protection and safe water recreation.**

“Active Blue – Water Friendly School” is an educational program for primary schools implemented by the State Water Holding – Polish Waters from 2019.

In the third edition of the program, activities were carried out from September 2021 to June 2022. Over 300 primary schools and 60 partners from all over Poland joined this year’s edition. Almost 2,000 lessons were carried out for nearly 20,000 students thanks to diverse and extensive measures.





## State Forests

### Action type 3: Construction and restoration of small and micro retention facilities in forest areas

### Action type 4: Afforestation and reconstruction of tree stands

Forest retention is shaped by State Forests through afforestation and activities related to the construction of forest ponds, irrigation devices and wetland reproduction, among others.

State Forests, as the administrator of most forest areas in Poland, implement subsequent programs related to the improvement of retention and adaptation to climate change, as well as actions related to afforestation, under which it is possible to store about 450 million m<sup>3</sup> of water.

Measures to improve retention in forests may also be undertaken by other entities, e.g. national parks, local government administrations and private forest owners. Actions regarding afforestation are carried out by private individuals as well as by non-governmental organizations.

## Non-governmental organizations

Activities to improve retention can be implemented by both local and national non-governmental organizations. They are implemented based on broadly understood cooperation with business entities and local government administrations as well as governmental units. In particular, they can get involved in:

### Action type 1: Restoration of wetland ecosystems

An example of an action to improve retention undertaken by a non-governmental organization is the Wetland restoration project implemented by the Foundation for the Green Valley of the Odra and the Warta Rivers. The purpose of this project implemented in the years 2021-2024 was the restoration and maintenance of the natural character of the floodplain areas of river valleys by restoring wetlands and controlling the speed of the outflow of water from them and improving the breeding conditions of valuable bird species. The activities will also improve water retention in the Odra River basin.





## Action type 2: Restoration of rivers

The role of non-governmental organizations in the field of river renaturation is to support activities undertaken by the government and local government administrations. NGOs are actively involved in identifying the needs in the field of restoring the natural character of rivers and also conduct information and educational campaigns regarding the role and importance of renaturation.

## Action type 4: Afforestation and reconstruction of tree stands

NGOs are also an active entity that focuses on increasing afforestation in Poland. An example of a measure undertaken in order to increase forest coverage is the Forest forever initiative. As part of the foundation's activities, centuries-old forests are being protected and new mixed-species forests are being planted. Thanks to such activities, water storage in the forest landscape is increased, which promotes the improvement of retention.

## Action type 5: Activities related to green and blue infrastructure

Green and blue infrastructure is created in cooperation with various supporting entities. One type of such infrastructure is rain gardens.

## Local government administration

Protection against flood, drought and a shortage of water through the implementation of water retention is also a part of local government administration's activities.

Actions which can be implemented partially by communes are:

## Action type 1: Restoration of wetland ecosystems

## Action type 2: Restoration of rivers

## Action type 10: Construction of water retention facilities

## Action type 11: Implementation of other measures to improve water retention

Local government administrations play an important role as representatives of local residents in retention projects. Their active participation is beneficial to shaping retention locally. An example of a participation of a local government administration in a retention project is the Bzin reservoir. In 2022, an agreement was signed between regional and local government administrations and Polish Waters to build a retention reservoir on the Kamienna River. On the one hand, local government administrations will be an important beneficiary of the project and on the other, they will participate in construction costs. In cities and urban areas, retention can be further increased through:

## Action type 14: Implementation of Urban Adaptation Plans and other activities aimed at increasing retention in cities

As part of this action, retention is developed through the usage of green and blue infrastructure. These initiatives might be aimed at storing water: water retention ponds, basins, reservoirs, bioswales, rain gardens, green bus stops, tracks, roofs and walls. Such structures in urban spaces stop rainwater and protect against both flash floods and heat and drought effects.

An example of such a solution is the first green wall available in Poland. It was created in 2014 in Katowice. It takes up around to 250 m<sup>2</sup>.

Local government administrations, especially in cities, can actively educate and inform local residents



about the importance of water retention. More and more communes, in particular municipalities, are choosing to launch subsidy programs for rainwater retention and rain gardens.

### Water companies

Water companies are involved in the maintenance of drainage systems. Actions they can take include primarily:

#### **Action type 8: Implementation of new and reconstruction of existing drainage systems in order to ensure irrigation and drainage functions**

Newly built drainage systems should primarily have an irrigation function. Whereas modernization of existing drainage systems should improve their functioning and ensure irrigation. Local water partnerships should support this process.

Polish Waters also uses the potential of drainage systems, which allows for an effective fight against drought in agricultural areas. As part of the implementation of the Water management in agriculture program in the years 2020–2021, 182 investment tasks and maintenance activities on 640 water devices were carried out. In this way, retention of an additional 46 million m<sup>3</sup> of water was provided, irrigating 37,000 ha of land.

It is expected that as a result of the construction and reconstruction of drainage systems, 0.9 million m<sup>3</sup> of water can be retained.



## Farmers

A special group of stakeholders exposed to water deficiencies are farmers who can carry out activities within their farms. There are many ways to improve retention in rural areas. The retention of water in the agricultural landscape is an important element of the Common Agricultural Policy. This program provides funding for the implementation of environmentally friendly production methods that reduce CO<sup>2</sup> emissions, improve soil quality and increase water retention. Retention activities in agricultural areas reduce losses caused by drought. The retention of water in the soil profile allows primarily to increase the field's resistance to deficiencies. The improvement of plant growth conditions through the increase in the availability of water results in stability and in some areas also the growth of plants.

Measures that increase retention in agricultural areas are:

### Action type 5: Construction and restoration of small retention and micro retention objects in agricultural areas include:

#### Subtype of Action 5.1: Supporting micro retention by creating home water reservoirs

These activities include capturing rainwater in barrels and water tanks, as well as the creation of green roofs and walls. In addition, we can include the creation of rain gardens, from which the retained water gradually gets into the ecosystem. Water retention in home reservoirs has many advantages. The resources obtained in this way can be used in many ways, including to irrigate crops.

#### Subtype of Action 5.2: Protection of periodically flooded areas

These actions include the exclusion of periodically flooded areas from intensive agricultural production for an extensive type of use or abandonment of the use of these areas and the creation of natural plant communities characteristic of a given area. Extensive use is understood as one in which artificial fertilizers and plant protection products, including pesticides, are not used. It is also recommended to reduce swaths to a maximum of two in a year. Thanks to such activities, water can be stored in areas that were naturally the place of its retention. This water will also be available for crops. It can also be



delivered to distant fields using irrigation systems. This action will allow for the usage of a given agricultural area while ensuring water retention which in turn can supplement water deficiencies in nearby fields in the event of a drought.

### **Subtype of Action 5.3: Farming in wetlands**

These types of activities include changes in agricultural work in wetlands and the introduction of swamp agriculture (paludiculture). It is assumed that with the restoration of wetlands, one can achieve economic benefits by using hydrophilic crops and appropriate technologies. The use of plant matter in swamp agriculture does not violate the natural processes occurring in wetlands. As part of paludiculture, you can grow reed, peat moss and Black Alder. The production includes food and plants for pharmaceutical use. It is also possible to use biomass from wetlands for energy purposes and use wetlands as pastures. Paludiculture is an element of regenerative agriculture and can also provide materials for green building.

### **Subtype of Action 5.4: Protection of existing micro retention objects**

This action includes stopping the destruction of beaver dams in rural areas. The water stored in the overflow area will also supply nearby fields in dry periods, ensuring the stability of the growth of crops. An example of an effective implementation of this activity is the project of the Regional Directors for Environmental Protection in Olsztyn. The beaver dams were cleared by installing appropriate pipes. As part of the activity, 50 such devices were installed. It limited the scope of the overflow area created by the beavers, without the need to remove the gelding.

### **Subtype of Action 5.5: Supporting micro retention by creating mid-field reservoirs**

It is an action consisting of the construction of mid-field ponds and the use of natural depressions. Water retention in agricultural areas in the ponds increases groundwater levels, ensuring its availability for plants in dry periods. In long rainless periods, plants will use water from the mid-field ponds.

Creating small retention objects in agricultural areas can be a very effective way to retain water in a rural landscape. By implementing the actions mentioned above, it is possible to store over 1 billion m<sup>3</sup> of water.

## **Action type 6: Promoting and implementing agrotechnical methods to increase soil retention**

The procedures that limit erosion and help retention of water in the soil include:

- strip-till,
- no-plough tillage,
- conducting cultivation activities in the transverse direction to the inclination of the slope,
- sodding rainwater flow paths,
- using catch crops,
- in the case of permanent green use, mowing at least once a year.

Reducing the water outflow from fields will allow for soil retention. The water retained in this way will increase the resistance to droughts.

It is estimated that only by changing the method of conducting agrotechnical works about 601 million m<sup>3</sup> of water can be retained.

## **Action type 7: Construction and reconstruction of breeding ponds**

Since water is stored in fish ponds, apart from having the breeding function, they can also be used as retention reservoirs. Breeding ponds can positively shape local water relations by stabilizing the groundwater levels and increasing soil moisture in the areas adjacent to the ponds. They also reduce water runoff by retaining water necessary to fill the ponds and mitigate some of the negative effects of adverse weather.





### **Action type 9: Creating and restoring mid-field, roadside and waterside woodlots**

This action limits soil erosion and reduces evaporation by ensuring shading and reducing wind strength. This results primarily in the limitation of surface runoff and an increase of soil retention. Thanks to this, water in the soil will be available for plants and will allow for better crops.

You can learn more about activities that increase retention in agricultural areas from the websites of the Centre for Agricultural Advisory Services and regional agricultural advisory centers. Moreover, information on the co-funding of these activities can be found on the websites of the Ministry of Agriculture and Rural Development, the Agency for Restructuring and Modernisation of Agriculture, the National Fund for Environmental Protection and Water Management and the regional environmental protection and water management funds.

### **Private individuals, communities and housing cooperatives, entrepreneurs**

Each of us can improve retention through the implementation of:

### **Action type 14: Implementation of Urban Adaptation Plans and other activities aimed at increasing retention in cities**

As part of urban plans to adapt to climate change, each one of us can catch rainwater into home tanks and create rain gardens. An important aspect is also the liquidation of impermeable surfaces and the use of various types of openwork. Other ways of collecting water include green walls and roofs and ponds. In addition to the benefits of increasing retention, they improve air humidity and reduce the temperature in urban areas, which reduces the effect of the so-called "heat islands." It is also extremely important to take care of home gardens and trees, in particular, to care for old stands which retain more water than young plantings.

The "My Water" program, implemented by the National Fund for Environmental Protection and Water Management and the regional environmental protection and water management funds, is used to

promote this type of activity in which you can obtain funding for the construction of a rainwater tank. About 25,000 rainwater reservoirs were created in the first edition of the program, which allows for the retention of about 1.4 million m<sup>3</sup> per year.

## Water scarcity prevention program's goals and scope

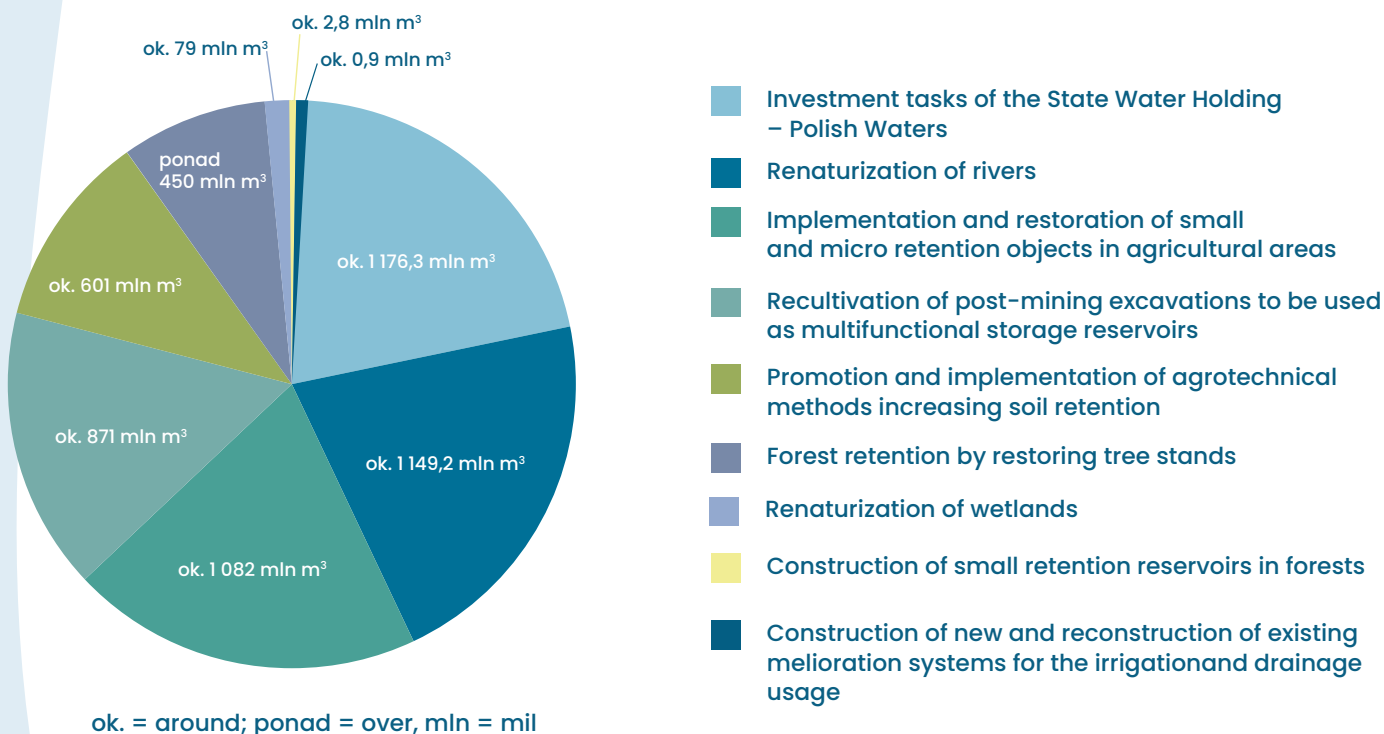
Actions to improve retention to be implemented by 2030 were collected in the Water scarcity prevention program developed by the Ministry of Infrastructure.

The purpose of this document is to increase retention from the current level of 7.5% to over 15% by 2030, i.e. to store an additional 5 billion m<sup>3</sup> of water, which amounts to over 8% of the average annual water outflow from Poland.

In order to improve retention, 14 types of activities are provided:

- 3 types related to hydrotechnical investments;
- 5 types focused on improving retention in agricultural areas;
- 2 types focused on increasing forest retention;
- 2 types in the field of renaturization;
- 1 type dedicated to urban areas;
- 1 type regarding mining areas.

The implementation of measures for the improvement of retention is to be supported by a number of educational and information and promotion activities, which are one of the most important factors ensuring the success of achieving the assumed goals. The total cost of implementing the program is estimated at PLN 41 billion.







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