

RETENTION
AS A
RESPONSE
TO DROUGHT



Update of the drought effects counteracting plan (uDECP): practical implementation of actions in municipalities

Drought in Poland - what the data and observations show

Drought is among the most costly and destructive natural disasters, and its associated threat increases with ongoing climate change. Current climate scenarios indicate an increase in the frequency, intensity, and extent of drought episodes. This phenomenon typically progresses in stages: from rainfall deficits, through soil water scarcity, to declines in river levels and flows, and lowering groundwater levels. The effects are visible simultaneously in agriculture, forests, and cities – and are not limited to environmental losses. They also include:

- limitations in water availability,
- increased costs of maintaining municipal services,
- deterioration of infrastructure functioning conditions,
- increasing risk of conflict between the needs of water users,
- indirectly on the health and well-being of society.

Why do municipalities play a key role?

In developing the updated DECP, we assumed that drought risk management should combine a catchment-based approach (hydrological, transcending administrative boundaries) with the real-world competencies of the entities responsible for implementing measures. Therefore, we assigned many of the measures included in the uDECP to the municipal level, as units with the tools to translate the plan's objectives into practice.

A catchment area is an area from which all rainwater and meltwater flows, either on the surface or underground, into a single common receiving body, such as a river or lake. The boundaries of a catchment area are defined by natural landforms (watersheds), not administrative boundaries.

Types of drought

uDECP addresses the issue of drought by analyzing four basic types (often occurring simultaneously):



atmospheric – rainfall deficit, the onset of multiple water crises,



agricultural – water shortage in the root zone of plants, crucial for agricultural production and green spaces,



hydrological – reduced flows and levels of surface waters (rivers, lakes),



hydrogeological – reduction in groundwater resources, crucial for municipal and local intakes.

What does it mean for local government units?

There is no single, universal “drought response”. The selection of drought countermeasures depends on:

- the prevailing drought type and local conditions, as well as the type of land use (agricultural, urban, forest areas),
- the phase of the drought and its intensity (no signs of drought, onset of drought, resource recovery).

In practice, different solutions will work in cities, others in agricultural areas, and still others in forests. Therefore, drought countermeasures require a diverse, integrated approach, tailored to the specific characteristics of a given area and the phase and intensity of the drought.

Key analysis results: what uDECP suggests nationwide

One of the main conclusions reached during the work on the uDECP is the high need for action aimed at improving available water resources (both “returnable” and “non-returnable”) across most of the country:

- for available returnable resources, the share of areas with the highest and high levels of need for action is approximately 77%,
- for non-returnable resources, the share of areas with the highest and high levels of need for action is approximately 83%.

Available returnable resources are those parts of water that humans can use temporarily and that, after use, return to the environmental water cycle. This primarily applies to rivers, lakes, and groundwater, which, after abstraction, are largely released back into nature – for example, as purified water or as groundwater infiltration.

Available non-returnable resources are the portion of water that, after use, is not returned to the local cycle. This includes water that is permanently lost, for example, through evaporation, consumption in production processes, or discharge outside the area from which it was drawn. The greater the share of such withdrawals, the greater the burden on local water resources and the greater the vulnerability of the area to the effects of drought.

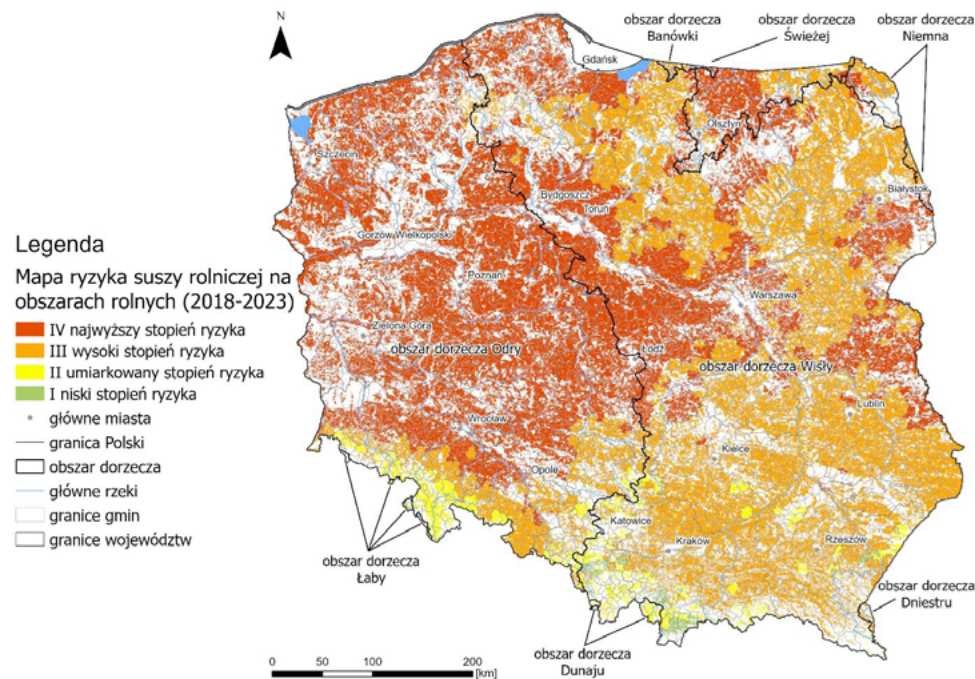


Figure 10: Risk of agricultural drought in agricultural areas

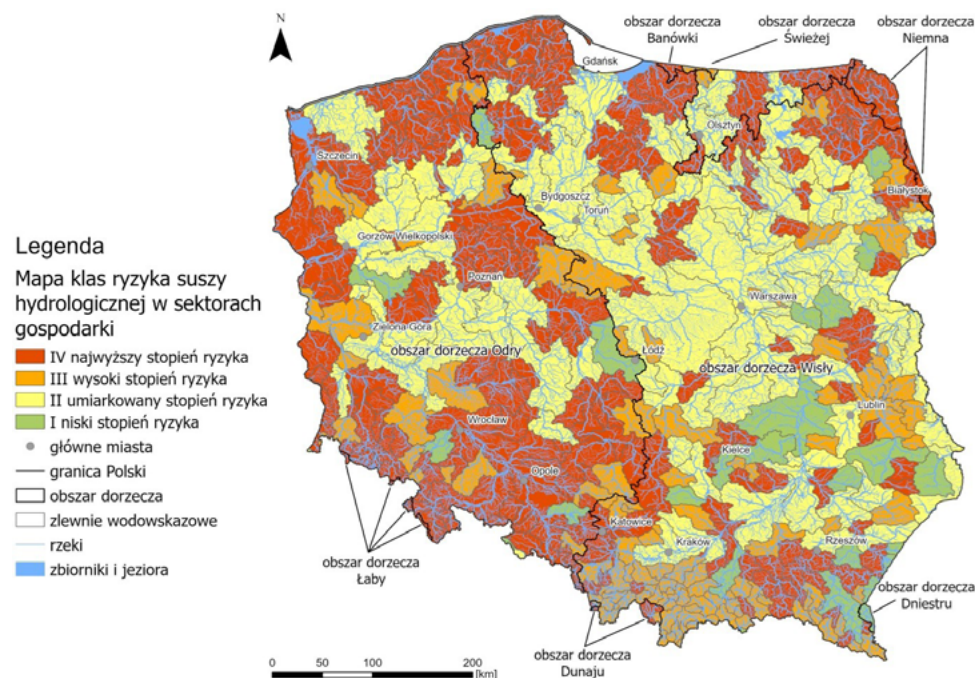


Figure 12: Risk of hydrological drought in economic sectors in relation to available returnable resources

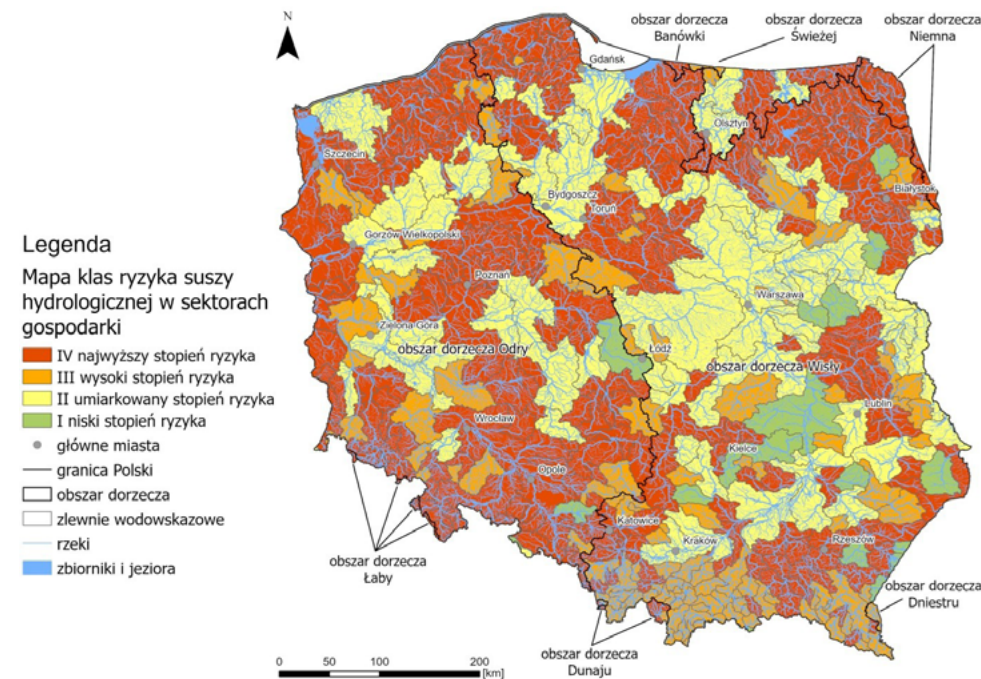


Figure 13: Risk of hydrological drought in economic sectors in relation to available non-returnable resources

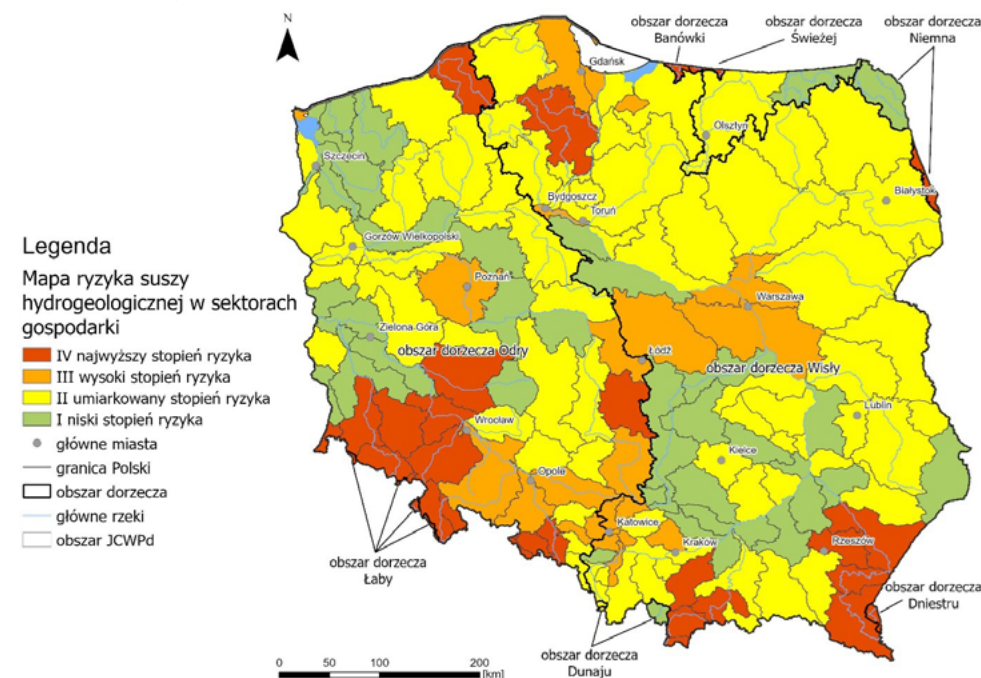


Figure 15: Risk of hydrogeological drought in economic sectors

Drought risk analyses conducted within the uDECP framework also indicated that:

- the risk of drought is widespread across the country, with its intensity and dominant drought type varying spatially,
- uDECP analyses showed that approximately 97% of the country's area was classified as having a high or highest risk of agricultural drought, approximately 83% for hydrological drought, and approximately 25% for hydrogeological drought, which clearly indicates a widespread and spatially dispersed drought risk across Poland.

The uDECP confirmed that drought sensitivity is exacerbated by observed and projected climate change, in particular:

- intensive climate warming across the country, including an increase in average air temperature during the cold season,
- increased evaporation,
- increasing temporal and spatial variability of precipitation (accumulation of precipitation into short-term, intense episodes), which translates into an increased risk of water shortages even in areas where average annual rainfall does not significantly decrease.

What does it mean in practice?

In much of the country, actions to improve water balance and retention should be regular, not one-off. A comprehensive set of solutions is needed, implemented on a large scale and in a planned manner. These actions should result in increased water retention in the landscape, maximizing soil moisture and improving local and regional water conditions. It is important to adapt these actions to local conditions, such as land use, soil type, terrain, and water availability.

Why are we updating DECP?

The main goal of updating the DECP is to reassess areas at risk of drought. It also identifies actions that will ensure the appropriate amount of available water resources – both surface and groundwater – at a given location and time, while simultaneously reconciling the divergent interests of water users.

Legal basis

The legal basis for the preparation of the plan is the Act of 20 July 2017 – Water Law (Journal of Laws of 2025, item 960, 1535), implementing the Water Framework Directive 2000/60/EC, in particular Article 13 paragraph 5 of that Directive.

What does the plan include?

Pursuant to Article 184, Section 2 of the Water Law, the plan includes:

1. an analysis of the possibilities of increasing available water resources,
2. proposals for the construction or reconstruction of water facilities,
3. proposals for necessary changes in the use of water resources and in natural and artificial retention,
4. measures to counteract the effects of drought.

What makes uDECP unique?

In uDECP, we placed a greater emphasis on practice – focusing on activities that can actually be implemented within the current administrative framework, taking into account the scope of competences of individual institutions.

From the municipality's perspective, three elements are of particular importance:

1) Connecting the catchment system with the administrative one

We combine knowledge about the possibilities of counteracting the effects of drought (in the catchment-hydrological system) with real possibilities of implementing actions at the administrative level (primarily municipal).

2) Assumption of the universality and variability of drought phenomena in Poland

In the uDECP, we assumed that drought affects virtually all municipalities in Poland. However, the scale, pace, and type of water shortage vary. Therefore, actions during the planning phase should be implemented in all municipalities, with an intensity adapted to local conditions.

3. The key importance of land development

In the uDECP, we assigned drought mitigation measures to the dominant land use type, not solely to the current risk class. Areas were identified as:

- agricultural,
- forest,
- urban.

Who is responsible for counteracting the effects of drought?

Countering the effects of drought requires shared responsibility – from state monitoring and water law tools to spatial planning and municipal investments. Pursuant to Article 183 of the Water Law, counteracting the effects of drought is the responsibility of central and local government bodies and Polish Waters. However, to effectively counteract the effects of drought, in addition to administrative, structural, and investment measures, all local actions are crucial, which each of us can implement, in accordance with the slogan: “Every drop of water counts.”

The role of municipalities

The municipality has a real, effective influence on the water balance in its area, because it is at the local government level that decisions are made that shape retention, infiltration, and surface runoff.

In urban areas, the municipality decides on:

- land use and the scale and standards of surface sealing (buildings, roads, parking lots),
- drainage and stormwater management systems, including practices that accelerate runoff (e.g., stormwater drainage systems without retention and infiltration solutions),
- green space planning and maintenance, including parameters of biologically active surfaces, solutions that increase soil retention, and green area maintenance standards,
- implementation of small-scale retention solutions and blue-green infrastructure, such as stormwater retention, infiltration, rain gardens, retention reservoirs, absorbent basins, and bioretention basins,
- local technical and municipal infrastructure, the design and modernization of which can reduce water losses, improve water circulation within the catchment, and increase resilience to water deficits.

In rural areas, the municipality decides on:

- the manner of using agricultural land and permanent grasslands (development directions, land transformation, maintenance of permanent grasslands),
- the functioning of water improvement systems, including the maintenance and operation of drainage ditches, water improvement facilities, and drainage systems – as well as the method of their modernization (e.g., with the aim of slowing down the outflow instead of accelerating it),
- management of rainwater and meltwater in areas of dispersed development and in road zones (e.g., road drainage methods, roadside ditches, culverts, discharge directions),
- protection and restoration of landscape elements that increase retention, such as field trees, field margins, ponds, oxbow lakes, depressions, wetlands, and wet zones,
- implementing small retention and measures to slow down runoff on a local scale (e.g., damming ditches, dams, gates, thresholds, field solutions that increase infiltration and water storage in the soil),
- local technical and municipal infrastructure affecting water collection and distribution (water supply networks, intakes, quality and security of supplies, water losses in the system) and, consequently, the municipality’s resistance to shortages.

Actions to counteract the effects of drought in uDECP – scheme and division

In uDECP, activities are organized according to the logic of the drought risk management cycle.

The preparation phase encompasses actions undertaken before a crisis occurs – specifically, spatial planning, stormwater management standards, local water retention, and reducing pressure on water resources. This is the stage where the implementation burden rests primarily with local governments.

The response phase is triggered when warning thresholds are exceeded and a crisis situation occurs; it includes operational activities (including restrictions and prioritization of water intake, emergency measures, securing water supplies), also implemented as part of the crisis management system.



Preparation phase activities

In uDECP, the preparation phase encompasses actions taken before serious water shortages occur. From the municipal perspective, this is a key part of the drought risk management cycle, as this stage builds “baseline resilience” through spatial and investment decisions, land use practices, and stormwater management standards. In practice, this means distributed actions implemented consistently across multiple locations, rather than individual, targeted interventions.

Urbanized areas – stormwater retention and infiltration

In relation to urbanized areas, the uDECP identifies actions that municipalities can implement through their own investments, planning instruments, technical standards, and requirements for new and modernized investments. Actions dedicated to urban areas include:

- **LR11 Implementation of micro-retention solutions in urbanized areas** – dispersed and “small-scale” actions that limit the rapid runoff of stormwater and promote water retention as close to the site of precipitation as possible.
- **LR12 Implementing blue-green infrastructure solutions** – solutions that combine retention, infiltration, and environmental functions in urban spaces (e.g., improving green spaces, lowering temperatures, reducing flooding).
- **LR13 Planting and protecting existing trees in urban areas** – actions that strengthen the city’s “green resilience” and influence water balance (e.g., by increasing soil retention and reducing surface overheating).
- **LR14 Creating domestic water reservoirs** – an action implemented at the household level, which in practice often requires municipal support (e.g., a subsidy program, simplified rules, informational activities).

Technical activities are also complemented by information and social activities, including **KE1 – Education on sustainable water management at the primary school level**, which raises awareness among the youngest water users about water retention and preventing the effects of drought

Environmental and restoration activities – typically requiring coordination

The uDECP also identifies activities that often go beyond a single municipal investment and require cooperation between entities (landowners, water administration, protected areas), and in practice may require obtaining appropriate agreements and decisions:

- **KR1 – Watercourse restoration**
- **KR2 – Restoration and protection of wetlands**

The role of local government units in implementing measures typically involves:

- initiating cooperation,
- incorporating measures into local planning,
- ensuring consistency with municipal investments,
- where appropriate, participating in the preparation and financing of projects.

Important practical note: uDECP emphasizes that formal requirements (including those related to the Water Law) may arise for measures affecting water conditions or streambeds. Therefore, already at the planning stage, it is important to clearly distinguish between “soft” measures (standards, education, support programs) and measures that may require administrative decisions.

Actions in agricultural areas – a key dimension of uDECP implementation and the role of rural municipalities

A significant portion of local actions in uDECP concern agricultural areas (LR1, LR2, LR3, LR6, LR7). This is crucial because it is in agricultural areas – due to their size and contribution to watersheds – that measurable landscape-scale effects can be achieved, such as:

- slowing runoff,
- increasing soil retention,
- reducing water losses during periods of water scarcity.

Therefore, implementing uDECP at the municipal level should not be limited to home-based solutions. Collaboration with farmers and implementing actions within the agricultural landscape is crucial.



LR10

KR2

KR1

LR3

LR12

LR13

LR7

LR2



Summary of activities in the uDECP preparation phase

Activities aimed at slowing down runoff and retaining water:

- **LR4 – Construction of small reservoirs,**
- **LR5 – Construction and reconstruction of hydrotechnical structures.**

Activities related to the organization and modernization of land improvement:

- **LR3 – Reconstruction of land improvement systems to enable irrigation level control in agricultural areas.**

Solutions enhancing retention and landscape functions:

- **LR1 – Water retention in permanent grasslands,**
- **LR2 – Creation and restoration of field reservoirs and wetlands,**
- **LR7 – Creation of field shelterbelts.**

How can a municipality support the implementation of these measures?

The implementation of these measures can be supported by:

- informing and mobilizing stakeholders,
- initiating local cooperation,
- coordinating projects within land improvement systems,
- incorporating retention issues into local planning and environmental programs.



Types of projects in agricultural areas

1. Management practices that do not require water law procedures because they do not involve the construction of water facilities or interventions in watercourses or ditches:
 - **LR6 – Application of moisture-conserving agricultural methods,**
 - **LR7 – Creation of mid-field shelterbelt.**
2. Activities that interfere with runoff and elements of land improvement infrastructure, which – depending on the location and scope of the work – may require the establishment of an appropriate formal procedure based on the Water Law and building regulations. This applies in particular to activities (LR1-LR5).

The role of the municipality is to clearly indicate in its communication with farmers which actions can be undertaken directly and which require prior verification of formal conditions – to ensure efficient and legal implementation of the actions specified in the uDECP.

uDECP actions – what is important in practice

The updated DECP continues the approach to counteracting the effects of drought adopted in the current DECP, but with an emphasis on:

- the operational dimension of action selection (it is important to determine which actions can be effectively implemented and which entity has the tools to implement them),
- assigning actions to administrative units and land use types,
- linking actions to planning and investment practices at the municipal level.

Response phase: what does “acting in a crisis” mean and the role of the municipality

In the uDECP, we indicated that the response phase is triggered when drought indicator thresholds are exceeded (from normal conditions, through pre-alarm and alarm, to emergency situations). At the same time, we emphasized that the system of indicators and alarm thresholds is not yet fully standardized at the national level. This means that crisis management procedures and tools are particularly important.

Actions in the response phase are operational in nature and are graduated: from voluntary restrictions on water consumption, through administrative restrictions, to the activation of emergency supply sources and support instruments.

Examples of actions in the response phase:

- drought and hydrological threat warnings (IMWM-NRI, Polish Waters),
- restrictions on water abstraction or sewage discharge under specific Water Law procedures (Polish Waters),
- bans on watering gardens and lawns (head of the municipality/mayor/city president),
- bans on filling swimming pools (head of the municipality/mayor/city president),
- organization of mobile water supply points (head of the municipality/mayor/city president).

In uDECP, we have linked this phase with the national crisis management system, in which the basic coordination tool is the crisis management plans (national, provincial, district, and municipal).

The most important problems and threats as identified in the planning process

In uDECP, we emphasize that counteracting the effects of drought is difficult due to various factors. These include not only natural conditions and hydrological variability, but also actions resulting from land development and water use.

Key takeaways for local governments:

- Limit activities that accelerate water runoff and reduce groundwater infiltration (e.g., avoid excessive concrete pouring).
- Protect and restore water retention, including natural water. Adapt solutions to land use (e.g., implement blue-green infrastructure).
- Prepare for water conflicts during droughts. It is important to have a plan in place in the event of limited water access.
- Act on multiple levels: planning, investment, organization, and education. Every drop of water counts.

Good practices – examples

The following examples show how the directions of action indicated in uDECP can be translated into specific solutions implemented in agricultural, forest, and urban areas.

These are not ready-made “patterns to be replicated”, because the scope and form of implementation each time depend on local conditions (including ownership relations, hydrological conditions, management organization, and available resources).



From the perspective of local government units, the following elements are important and can be used in individual municipalities:

- how to organize the entire process,
- how to divide roles and collaborate with land users,
- what technical and maintenance standards to adopt,
- what incentive and support mechanisms to use,
- how to link activities to planning documents and infrastructure maintenance practices.

Agriculture – demonstration farm in Karolewo (Łódź Voivodeship)

Beata and Dominik Pleśnierowicz’s family farm in Karolewo (Strzelce Municipality, Kutno County, Łódź Voivodeship) is a member of the National Network of Demonstration Farms. Crop production (cereals, legumes, and oilseeds) is carried out using a no-till system, which:

- reduces soil erosion,
- increases the soil’s water retention capacity.

The solutions used here include conservation tillage, balancing organic matter in the soil, crop rotation, and organic fertilization.

These activities increase the humus content of the soil and improve its ability to retain water.

Conservation tillage, as defined by the Institute of Soil Science and Plant Cultivation, involves:

- limiting intensive soil mixing and crumbling (no deep plowing),
- maintaining permanent plant cover or leaving crop residues behind,
- maintaining a diverse crop rotation (changing crops in successive years).

Forestry – reconstruction of pine monocultures

Projects implemented by the State Forests include the conversion of pine monocultures into mixed stands by introducing deciduous species such as oak, beech, linden, and hornbeam. These activities are aimed at improving habitat conditions and stand stability, which is important for resistance to water stress and for reducing soil degradation.

Adaptation projects include:

- • planting,
- • reforestation,
- • supporting natural succession.

All this contributes to the creation of more diverse forest structures.

Additionally, adapting the species composition to the forecasted climatic conditions and increasing the structural diversity of tree stands is an element that increases the resistance of ecosystems to drought.



Cities – Tree Protection Policy in Warsaw

In Poland, tree protection projects in urban areas are not yet common. Many cities plant trees and shrubs without developing parallel systemic standards for protecting existing trees. An example of a structured approach is the Capital City of Warsaw, which – in collaboration with the Greenery Board and the “Alter Eko” Foundation – developed a Tree Protection Policy.

Four standards for the protection and maintenance of green spaces have been developed:

- reporting logging,
- protection of green spaces in investment processes,
- dendrological reviews and analyses,
- tree care and pruning.

Additionally, there is a “Million Trees” program that allows residents to submit proposals for planting.

Blue-green infrastructure – LIFE Pilica Project

The LIFE Pilica project is a model for implementing blue-green infrastructure on a regional scale. The project, implemented between 2021 and 2030, covers 93 municipalities in five voivodeships and aims to improve stormwater retention and reduce the impacts of droughts and urban floods.

As part of the program, we are implementing Nature-Based Solutions, including:

- rain gardens,
- bioretention ditches,
- infiltration basins,
- retention ponds and permeable surfaces.

These activities are linked to planning documents, including the Municipal Climate Change Adaptation Plans and the Water Management Plan, ensuring consistency with local adaptation strategies. The result: local stormwater management reduces surface runoff and increases infiltration, which strengthens the hydrological resilience of urban areas and improves microclimate conditions during periods of heatwaves.



A few words to sum up

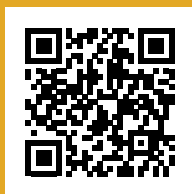
uDECP is a document that organizes the directions of action. It demonstrates how to combine a watershed approach with the competencies and real capabilities of individual entities. The municipality plays a crucial role here. It is at this level that land use regulations, drainage and stormwater management solutions, investment standards, retention measures in urban areas, and preparedness for emergency response are shaped, among other things.

From the perspective of the practical use of uDECP by local governments, several directions can be identified that may be particularly helpful:

- treating drought-related actions as part of ongoing spatial and infrastructure management (and not solely as a response to crisis episodes),
- streamlining local standards and procedures in areas directly influenced by the municipality,
- consistently combining investment activities with organizational and informational activities.

In practice, this means that effective implementation is built not through a single large undertaking, but through a coherent set of decisions made daily. This applies to spatial planning, investment preparation and implementation, infrastructure and green space maintenance, and dialogue with residents and water users. It's worth remembering that drought mitigation measures will positively impact not only the drought itself but also reduce the risk of other phenomena, such as floods and fires. Furthermore, they can also improve people's health and well-being.

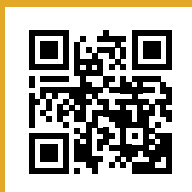




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