
Water management

- a challenge to Poland

A programme document

Water Roundtable

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Introduction

At the initiative of Professors Jerzy Hausner, Zbigniew Kundzewicz and Janusz Zaleski, in the spring of 2020 work was undertaken by a team consisting of several dozen experts. They prepared and disseminated nine Water Alerts (available on the website <https://oees.pl/dobrzewiedziec/>). This initiative is related to the activities of the Programme Council of the international Congress “City – Water – Quality of Life” – a joint effort of the City of Wrocław and the Open Eyes Economy Summit. Two editions of this Congress were organized in Wrocław in 2018 and 2019 (information and materials are available on the website www.watercity.com.pl)

On 8 September 2021 a Water Roundtable meeting was organized in Wrocław in order to prepare a programme document that would comprehensively complement the contents shown in the Water Alerts and would be a proposal for Poland’s water policy (the Water Roundtable website: www.watercity.com.pl/okraglystol2021/). This document will be presented to participants of the third edition of the Congress “City – Water – Quality of Life“ on 25 October 2021 and at the same time it will be addressed to the general public as well as to central and local government authorities.

The editing of this document – accepted by the Water Roundtable participants – was done by Professors Elżbieta Nachlik, Zbigniew Kundzewicz, Anna Januchta-Szostak, Janusz Zaleski, and Jerzy Hausner.

The starting point for conducting discussions and formulating proposals during the Water Roundtable debate was the assumption that water is a common good and should not be treated as a commercial product. This does not mean that no economic instruments should be applied towards water users in the form of charges designed to make water use as rational

as possible. At the same time, due to the nature of water as a common good, these charges must be reasonable and socially acceptable, ensuring access to water to the poorest classes of society.

Issues regarding protection of water resources and their quality as an essential requirement for water users, including the preference for solutions involving renaturalization of surface waters, were the second fundamental assumption of the discussion held.

The third assumption was the recognition that the implementation and observance of water and environmental regulations of the European Union (EU) are Poland's commitment as a member state. Therefore, national legislation may not undermine EU directives, including in particular the Water Framework Directive as the leading regulation in the area of water management.

Another basis for this debate was the recognition of the need to mitigate climate change and reduce its adverse effects. Thus, any political and administrative actions that separate water management from this most important civilizational challenge now should be considered to be inappropriate.

Drought and flood risk reduction

Session moderator: Zbigniew Kundzewicz

Panel members: Kazimierz Banasik, Krzysztof Kochanek, Roman Konieczny, Leszek Kuchar, Zbigniew Kundzewicz, Krzysztof Kutek, Artur Magnuszewski, Piotr Matczak, Elżbieta Nachlik, Mirosław Wiatkowski, Janusz Zaleski

Discussion participants: Piotr Nieznański, Tomasz Okruszko, Jacek Ossowski, Maciej Zalewski, Jan Żelazo

There are three major categories of problems with water: its scarcity, excess, and inappropriate quality. Speaking colloquially: too little, too much, too dirty. Droughts and floods may directly relate to the first and second categories of these challenges. Problems with water quality may intensify when there is a scarcity of water (no possibility of diluting pollutants) or an excess of water (leaching of pollutants). Drought and flood risk, understood as the product of the probability and negative consequences, is the function of three factors: hazard (the probability of occurrence of an adverse situation), exposure, and vulnerability (or susceptibility to the deepening of negative consequences). Over the last 25 years, there have been numerous large-scale droughts Poland (2000, 2003, 2006, 2008, 2011, 2015, 2018, and 2019), catastrophic river floods (1997, 2001, and 2010), regional floods, but also many flash and urban floods, virtually every year.

Weaknesses in flood risk management

The flood risk management plans (FRMPs) are strategic documents for river basins which contain a set of measures whose implementation should result in flood risk reduction. These plans are implemented over 6-year planning cycles and include both structural and non-structural measures. Unfortunately, the implementation of these ambitious documents has not been satisfactory thus far. During the period 2016-2021,

the level of implementation of flood retention measures in the Vistula River basin has been almost zero. The draft FRMP for the period 2022-2027 (called uFRMP, i.e. the updated FRMP) is ambitious in terms of flood storage capacity, but not very ambitious as regards an increase in the area of river valleys (171 km², i.e. barely 1.4% of flood-prone areas). For example, a marginal increase in the area of river valleys and an enormous amount of 70 reservoirs, polders, and related systems are planned for the Little and Upper Vistula catchment, out of which 14 reservoirs are located outside the problem areas. Seventeen reservoirs, which were constructed since the 1950's, are currently in operation there. The only clearly defined proposal included in the FRMP relates to the construction and improvements of river embankments along a length of 700 kilometres. Only 12% of the measures planned in the Flood Risk Management Plan for the Odra River basin for the period 2016-2021 have been implemented.

To sum up:

- The FRMPs contain too many activities, frequently small ones, and a lot of them raise doubts. The recommended measures include inapt and economically ineffective solutions. In this respect, flood risk management practice in the world has changed significantly in recent years, but the FRMPs prepared in Poland are distant from this practice.
- The methodology for preparing FRMPs¹, developed under an assignment commissioned by the National Water Management Authority (KZGW), provides that measures proposed to be included in the action plan should meet specific conditions. They should be well-thought-out (location and parameters), well-prepared (implementing agencies), adequate to the needs and objectives of flood risk reduction, and feasible for implementation (guaranteed financing). They should also satisfactorily meet the economic efficiency criterion. Unfortunately, in many cases the FRMPs do not meet these conditions. A significant part of measures do not apply to the problem areas characterized by the highest flood risk, while at the same time less valuable areas are not sacrificed for the benefit of more valuable ones. Also, a large part of them do not define benefits that their implementation should bring.

- ♦ The FRMPs include measures that do not have much to do with flood risk reduction but are linked to other objectives, for example improvement in navigation conditions.

Recommendations:

- ♦ A more realistic approach to the preparation of FRMPs is necessary, not the creation of a wish list where it is not possible to control the impact of their implementation on the achievement of the assumed goals given the lack of continuity of databases, analyses and evaluations, especially of economic efficiency.
- ♦ More should be invested in non-structural measures. Flood and drought resistance of systems can be enhanced through Nature-Based Solutions (NBSs). Solutions of this type include the moving of flood embankments away from the river channel (e.g. on the Odra River) or recovery of areas outside dikes by creating polders (e.g. on the Vistula River) in order to effectively increase river valley retention capacity.

The need to reduce the risk of flash and urban floods

Due to climate change, long rainless or dry periods, interrupted by intense rainfall, are becoming more and more frequent. With the increasing intensity of rainfall events in the warming climate, the risk of pluvial floods is growing. The risk of urban flooding is also increasing due to the expansion of urban agglomerations and paving of surfaces in city centres. When we compare the currently applicable FRMPs and their update for the period 2022-27, we note a lack of systemic solutions aimed at coping with flash floods and urban floods. We lack documents that could serve as road signs how to reduce the risk of such floods. Therefore, we need a strategic document and local strategies. Investors (e.g. developers) generate risk that may materialize and lead to future claims. A number of important questions arise – How to calculate hydrology?; What area should it relate to?; What methods should be used?; How to create lists of measures?; etc.

Recent years have demonstrated how severe flash floods are and that they do not affect only urban areas but also non-urbanised ones. We are not prepared to address these hazards now or to reduce the effects of such floods in the future. The sealing of catchments and their growing imperviousness aggravate the problem of violent rainwater runoffs of large volumes. The design capacity of stormwater drainage systems is too small in comparison with the increasing frequency and intensity of torrential rainfalls. In effect, flash flood related losses are sustained by local governments, businesses, and affected citizens.

Recommendations:

- It is necessary to develop central and local rainwater management plans and strategies in areas prone to torrential rains and flash floods as well as recommendations/guidelines for their implementation in practice.
- It is also very important for us to better understand the problems that we must tackle. We need improvement in identifying statistics of intense precipitation that change with climate change, the growing level of catchment sealing, and the design capacity of stormwater drainage systems.

Efficient drought risk management

A report of the Supreme Audit Office (NIK)² indicates that “water scarcity and the related phenomenon of agricultural drought have intensified in recent years”. “At the national level, 37.8% of agricultural and forest areas are severely threatened by the occurrence of agricultural drought, but in the Odra River basin such areas account for 52%“. In sum years, losses add up to billions of PLN, annually.

The principal national document that is a drought risk reduction action plan is the Water Scarcity Mitigation Programme (WSMP)³, developed for the period 2021-2027 with an outlook to the year 2030. The overriding goal of this programme is to increase water retention in Poland, while its specific objectives include the following: (1) to identify and

²Supreme Audit Office (NIK), Information on audit results. Water scarcity mitigation in agriculture (2020), NIK, KRR.430.006.2020, Ref. 192/2020/P/20/043/KRR.

³Ministry of Infrastructure, Water Scarcity Mitigation Program (WSMP), Warsaw, July 2021, <https://www.gov.pl/web/infrastruktura/obwieszczenie-z-5-lipca-2021-r> (access: 8 September 2021).

implement measures associated with the construction of an integrated natural and artificial water retention system; (2) to create conditions for sustainable use of water resources; and (3) to raise social awareness about the need to retain and save water. This document contains national-scale analyses and evaluations, also including an estimation of the current state of water retention with a breakdown into the following types: lake, wetland, forest, soil, and reservoir water storage. The implementation proposals for the next years have been expanded to include renaturization of rivers, the implementation and restoration of small-scale water retention, agricultural drainage systems, soil water storage, and fish ponds. A total of 5735 measures are analysed, divided into categories with the following priority scale: highest, high, moderate, and low.

The major drawbacks of the measures planned in the WSMP concern their non-compliance with the updated FRMPs and River Basin Management Plans (RBMPs), designated respectively as uFRMP and uRBMP. Moreover, in their vast majority these measures are of moderate or low priority.

For example, in the Little and Upper Vistula basin, 759 investments involving retention-related measures are planned for a total amount of nearly PLN 14 billion and they are designed to increase the water storage capacity by 931 million m³, but the uFRMPs and uRBMPs include only water reservoirs (mainly medium-sized). On the other hand, 480 riverside areas designated for renaturization with a total area of more than 5 million ha are not included in the uFRMPs and high priority is assigned only to one of them, while the other ones are assigned low or moderate priority.

Recommendations:

- ♦ The WSMP needs to be revised in order to eliminate ill-conceived measures and investments and to achieve synergy with other top-priority measures.
- ♦ It is suggested that an EU drought directive should be prepared. Importantly, due to the existence of the EU Flood Directive, mandatory flood risk reduction measures are conducted in all countries each year. The construction of a drought risk reduction system should also

be carried out systematically, even though there has been no drought for a long time.

To achieve synergy of flood and drought risk reduction measures, the following is recommended:

- ♦ To develop and implement long-term natural (flood and drought) risk management policy in Poland, synergy should be the basis for measures taken to mitigate the combined flood and drought risk, with cost optimization. Separate treatment of flood risk and drought risk, for example in planning, may lead to solutions that “do not know about each other” and can be in conflict with each other. A solution aimed at flood reduction may not be beneficial for drought risk reduction and vice versa. By seeking compromise, we will not solve any of these problems.
- ♦ To include the “National Surface Water Renaturalization Programme” in the River Basin Management Plans, i.e. the basic documents implementing the Water Framework Directive, which are under preparation.
- ♦ To introduce an efficient system for prioritization of drought and flood risk reduction measures, a mechanism for their selection, and conditions for accepting them for implementation in order to enhance the efficiency and cost effectiveness of solutions. Only measures with an acceptable cost/benefit ratio should be included in planning analyses.

Retention is good for everything, but... How to solve retention problems?

We need an approach that will include retention needs in balance areas taking into account the possibility of meeting such needs with regard to rainwater storage and runoff of multiple functional types. Such an approach requires a large-scale and multi-stage planning and implementation of retention development, based on monitoring the retention efficiency. This should be a long-term effort aimed at preparing retention

development plans, with time verifiable evaluation of their implementation. This activity should also provide the continuity of databases, analyses and evaluations in order to obtain effective and reliably verified effects of the implementation of these plans.

The efficiency of different types of flood retention should be considered in the context of its effect on reducing the volume of flood runoff. To reduce 10-year and lower flood risk, we can use forested areas and other created green areas as well as small-scale storage capacity or polders as integrated solutions. On the other hand, reduction of high flood risk (e.g. protection against a 100-year flood) requires restoration of river spaces (i.e. “room for the river”) and controlled reservoir flood storage capacity that is appropriately large. Reduction of drought effects predominantly requires restoration of natural, landscape and agricultural retention. To lower flood and drought risk, it is undoubtedly necessary to build storage capacity of different types – both natural and artificial. Landscape, river valley or soil retention should also be included in these plans. It is important to use the retention capacity of underground aquifers, but also their recharge.

Appropriate linkage of such retention measures must be adapted to actual hydrological, geological and environmental conditions as well as to existing and planned infrastructure in a catchment. This also requires their efficiency to be monitored within large-scale systems – local, supralocal and regional – and their adaptation to development plans. Single structures and measures, particularly small ones and unrelated to other measures, are generally insufficient and ineffective.

Recommendations:

To improve planning and implementation of water retention measures, plans for the development of multiple-type and large-scale storage capacity should be prepared for problem areas, including the determination of monitoring cross-sections to balance the effects and assess the phased implementation of these plans. Such plans must also be based on study documents that take into account hydrological, hy-

drogeological and environmental conditions. They should refer to infrastructure and land use, define development efforts, and determine the impact of climate change.

Education and potential building

It is necessary to raise awareness both among the population in risk-prone areas and investors so that they do not put financial optimization at the stage of implementation of investments over safety. There is a conflict between efforts of planners and designers to safely manage water within a catchment and discharge it safely and expectations of investors and residents, for whom profitability here and now and reduction in investment costs are important. There is a general lack of awareness of consequences that arise from today's investment savings. In the future, they may generate losses and additional costs will need to be incurred to reduce them.

The current water administration does not have sufficient potential that would allow them to respond to the current challenges. Effective solutions in water management, particularly in the area of risk reduction, require appropriate knowledge and skills.

The following is recommended:

- ♦ Education of personnel in many areas, including with respect to environmental aspects of water management, in order to enhance the competencies of water management personnel, the staff of Water Management Stations, designers, and works contractors.
- ♦ Depoliticization of water management and improvement of the administration's capacity to cooperate with other entities, primarily local government agencies, as well as with non-governmental organizations (NGOs) and expert and academic communities – the ability to cooperate will determine improvement in the quality of planning documents and also the possibility to flexibly and efficiently respond to needs and challenges associated with economic and social development, demography, population migration, or climate change.

SESSION II

Water management in urban and rural areas

Session moderator: Anna Januchta-Szostak

Panel members: Marek Degórski, Jerzy Hausner, Paweł Jarosiewicz, Kamil Jawgiel, Paweł Licznar, Tomasz Okruszko, Ksymena Rosiek, Iwona Wagner, Maciej Zalewski, Jan Żelazo,

Discussion participants: Piotr Nieznański, korespondencyjnie: Michał Kudłacz, Roman Konieczny

The effects of anthropogenically induced climate change and many years of neglect in Poland's water management affect differently urban areas, with their specific spatial and organisational structure, and rural areas, which are agriculturally used. The key challenges to water management, as diagnosed in the Water Alerts and the report entitled Water management – challenges to Poland which was prepared based on them (<https://oees.pl/dobrzewiedziec/>), result from quantitative problems associated with an excess of water (floods) and/or a scarcity of water (drought), qualitative problems (water pollution, quality of the environment, the state of ecosystems), and organisational ones related to planning, management and financing of water management, but also from the low level of environmental and climate awareness as well as of producer and consumer responsibility. It is not only rational use of Poland's scanty water resources that is of essential importance, but also the impact of water, spatial, forest and agricultural policy on the environment, on which the safety and health of people, the renewability of resources, and the economy's productivity depend.

Water for agriculture – agriculture for water

With the increasing temperature and the increasing frequency and intensity of extreme weather events, mitigation of drought effects and ensuring the renewability of water resources, necessary for agricultural irrigation

and food security, are becoming a key challenge in rural areas. At the same time, Poland's agricultural economy is a serious source of quantitative risks (fast surface runoff, uncontrolled water intake for irrigation purposes) and qualitative risks (pollution of surface and ground waters, degradation of ecosystems). According to the data of Statistics Poland (GUS), about 80 million m³ of water is used for irrigation, which is only about 0.8% of total water consumption, whereas globally agriculture is the largest consumer of water, consuming about 70% of freshwater. The volume of water intake for agriculture in Poland is probably significantly underestimated⁴.

Agricultural drainage systems are basic elements of infrastructure used for management and use of water resources in rural areas. In Poland we have more than 60,000 km of regulated and unregulated rivers, but also more than 250,000 km of ditches and canals, most of which are in bad technical condition and provide almost exclusively a drainage function, not an irrigation one. Correctly designed and operated, agricultural drainage systems can perform production related functions (drainage and irrigation) and non-production ones, for example they can increase water resources, protect against flooding by slowing down water runoff from a catchment, and support the vitality of aquatic and water-dependent ecosystems. The requirements of modern and efficient agriculture, environmental protection, and climate change adaptation indicate the absolute need to stop the rapidly progressing devastation and depreciation of existing water infrastructure, including agricultural drainage one.

Recommendations:

- ♦ Given the growing demand for water, intake of water for agricultural irrigation purposes requires increased control and regulation of groundwater intake as well as increased retention of rain and surface water.
- ♦ Changes in crop growing and livestock farming methods are necessary to maintain productivity, taking into account environmental protection requirements as well as the water and carbon footprint of agricultural production.

⁴These Statistics Poland data do not include irrigated areas smaller than 20 ha.

- ♦ It is necessary to prepare a strategy for water resources development and management in agriculture and rural areas that will incorporate, among others, the principles of construction and upgrade of agricultural drainage systems and small-scale water storage structures as well as the principles of their operation, maintenance and financing.
- ♦ Agricultural drainage facilities should be incorporated into catchment-level water management systems, which entails the need to implement tools and mechanisms designed to integrate water management within a river catchment. A stable multi-level financing system is necessary, including a fund allocated for land drainage activities which would be based on a plan for maintenance of agricultural drainage facilities.
- ♦ It would be advisable to systemically introduce financial compensation for farmers in the case of activities that generate production losses but also benefits for the environment and the state budget, e.g. in the form of reduced flood damage and protection of waters against pollution.

The need to reduce agricultural pollution and the role of ecosystems

Due to the progressive industrialization of agriculture and climate warming, the negative impacts of the agriculture sector on water resources in Poland will definitely increase, both in quantitative and qualitative terms. According to the State Environmental Monitoring results, more than 50% of rivers in Poland have the chemical status below good. Diffuse pollution of agricultural origin is the main source of nitrogen (45.2%) and the second-ranking source of phosphorus (33.9%), after point sources, in the pollution load carried by the rivers to the Baltic Sea from the territory of Poland. This contributes to water eutrophication and the failure to achieve the environmental objectives of the Water Framework Directive (WFD) and the HELCOM reduction targets. As a result of pollution, toxic algal blooms occur in lakes and in the coastal waters of the Baltic Sea. There is a lack of monitoring and systemic knowledge regarding organic

pollutants, e.g. pesticides⁵. There is no general awareness that the hydrological cycle is a factor that regulates the main ecological processes – the cycling of matter and the flow of energy through ecosystems. Their understanding is the basis for implementing innovative Nature-Based Solution (NBSs) and also hybrid solutions integrating hydraulic engineering methods with NBSs at the catchment level.

Recommendations:

- ♦ The European Union's agricultural policy must be linked to the achievement of the WFD objectives, which should result in making agricultural payments dependent on measures aimed at protecting water resources.
- ♦ Monitoring methods that enable analysis of a large amount of foreign substances in the environment, going beyond the list of priority substances, should be implemented.
- ♦ Pollution of the natural environment with emissions of nitrogen and phosphorus compounds and chemicals (among others, veterinary pharmaceuticals and pesticides) should be effectively reduced by enhancing the potential of agricultural landscape to recirculate nutrients and organic matter, environmental monitoring, and education. At the same time, more humanitarian and environmentally friendly livestock production technologies should be implemented and organic farming should be promoted.
- ♦ It is necessary to change the structure of agricultural landscape (departure from monoculture cropping in favour of diversity) and to increase the use of NBSs (including renaturalization measures), in order to regulate the hydrological cycle and improve water quality.

⁵These compounds can be characterized by direct toxicity to exposed organisms and can also lead to hormonal changes or DNA mutations with a longer period of exposure.

Challenges to cities

In recent years, Polish cities have experienced urban flash floods more and more frequently. Their cause is not only the increased frequency and intensity of torrential rains, but also excessive sealing of surfaces, a shortage of green spaces, and the principle of fast drainage of cities via stormwater drainage systems. This results in overloading of drainage systems, localized flooding, and violent and too frequent stormwater discharges that cause increased pollution of surface waters and prevent the achievement of the WFD objectives. The amount of sewage discharged into small urban rivers during torrential rainfall events exceeds their average flows many times. The progressive climate change and intensification of precipitation will definitely aggravate this problem in the future.

The spatial structure of cities, in particular a shortage of green spaces and open water, also enhances the severity of heat waves and droughts. Therefore, cities must on the one hand undertake mitigation measures aimed at reducing CO₂ emissions, while on the other hand urgent adaptation measures that will allow them to increase their resilience to weather extremes. The issue of rainwater management in cities and linking this issue to urban policy and spatial planning are becoming of key importance. Blue-green infrastructure and ecosystem services provided by it, which must be reflected in urban planning standards, the cost-benefit analysis of urban investments, and social values, play a special role in adaptation measures and multi-functional urban land management.

The localization of management should go hand in hand with its reasonable naturalization since this will help trigger the process of ecological regeneration. The embeddedness of management in its local cycle provides an opportunity to identify and respect its physical constraints before going beyond them will cause irreversible consequences destroying the natural and social environment.

A recommended direction of actions is to change stormwater runoff management – to depart from the principle of fast drainage (“from cloud to pipe”) in favour of developing a “sponge city” and decentralized rainwater runoff management based on the “source – path – receiver” approach that incorporates the following measures:

- ♦ “at the source” – to increase the capacity of retention, detention, soil infiltration and use of water at the place of precipitation across entire urban catchments in the area of buildings, private and public properties⁶, and road infrastructure, allowing for temporary flooding of low-lying areas⁷, including the requirement of hydraulic neutrality⁸ of new private and public investments;
- ♦ “on the path” – departure from urban drainage systems in favour of runoff and retention systems, modelling and upgrade of underground infrastructure networks and relieving these networks by connecting them to systems of open drainage ditches, canals, small watercourses, and water reservoirs, which will improve the flexibility of the system, the retention capacity, and the possibility to control the flow of water, based on stormwater runoff management plans;
- ♦ “in the receiver” – reduction in investments in areas at risk of local flooding and floods in favour of increased retention (space for water) and the possibility to pre-treat stormwater runoff (buffer parks), but also improvement of communication, biodiversity and recreation conditions; the need to develop standards for land development and management in areas at risk of flooding in combination with a flood insurance system. It is also recommended that the surroundings of stormwater overflows should be protected as critical infrastructure and that the immission approach should be applied, adjusted to the possibilities of maintaining the good status of a receiving body of water.

⁶It is necessary to urgently amend the Spatial Planning and Development Act and Building Law as well as the provisions in local strategic and planning documents.

⁷Short-term water stagnation should be incorporated into multi-functional land management as well as land and infrastructure development.

⁸An unchanged surface runoff rate before and after an investment.

The role of blue-green infrastructure (BGI) in urban policy

Urban blue-green infrastructure (BGI), understood as natural, semi-natural and artificial aquatic and terrestrial ecosystems, is an important element of water management in cities and their adaptation to climate change. The BGI can provide ecosystem services that include, among others, restoration of water cycling processes in urban landscape, thus mitigating floods and localized floodings, supporting the functioning of stormwater drainage systems, reducing drought and urban heat island effects, and curbing costs associated with the occurrence of the above-mentioned disturbances. Conditions for the functioning of BGI in cities are difficult due to intense anthropogenic pressure, which may contribute to reducing the ability of ecosystems to provide their services. The functional approach seems to be of key importance in improving the quality of BGI and supporting its role in urban water management. It is necessary to develop a coherent systemic approach to management of rainwater, green areas and water ecosystems in cities.

Recommendations:

- ♦ To create in urban planning documents provisions that, apart from the maintenance of a minimum proportion of biologically active areas, will also ensure better conditions for the functioning of natural systems and support rainwater management in cities, including the following: preservation of the continuity of the natural system, restoration of species diversity, and access to water by connecting green spaces to rainwater retention systems.
- ♦ To determine minimum standards for BGI application in specific functional and spatial zones of cities and to protect urban trees using a digital database, realistic charges for tree removal, and the principles of environmental compensation.
- ♦ To strengthen the functioning of aquatic ecosystems – receivers of rainwater from cities – through the following: recovery of space for ur-

ban rivers and their valleys and multi-functional space management, seeking to maintain the connection of the river with its valley by creating a buffer zone, and also application of solutions that enable efficient pre-treatment of rainwater, e.g. through renaturalization measures.

- ♦ To jointly treat blue-green infrastructure in cities and their surroundings in water management and planning activities, including efforts to ensure the continuity of green infrastructure at the regional scale, and to reduce adverse interactions between urban and non-urban areas, for example the following ones: transfer of pollutants downstream the river, intensification of flood hazards, increasing the risk of water deficits, and excessive exploitation of groundwater.

Improved organisation and financing of measures

The quantitative and qualitative challenges related to water management in cities require integration of resources (joint treatment of surface water, groundwater and rainwater resources) and functional integration, which entails the need to introduce organizational changes in urban planning and management as well as in financing, thus ensuring ecological efficiency, cost effectiveness, and social acceptability. One of the key problems in Polish cities is their sector-based approach to water management. The goals and priorities of different sectors frequently do not take into account the need of rational management of water and climate change adaptation.

The implementation of an integrated approach to urban water management encounters a number of difficulties arising from the following, among others: (i) a large number of entities⁹ involved in water management and their conflicts of interest; (ii) a lack of flow of information between these entities and inconsistent or incomplete data; and (iii) individual cost effectiveness calculations of these entities which ignore external costs and benefits essential for the synergy effect at the city scale. Furthermore, legal and economic constraints (tenders) as well as the lack of control and use of water unsuitable for drinking (rainwater, wastewater, and recovered water) impede assessment of long-term ecosystem

⁹The number of entities involved in water management or those that have important water-related data in a Polish city ranges between 10 and 20.

benefits. There is also a lack of general awareness that the maximization of short-term investment gains in individual plots may be associated with increased risk of flood damage at the scale of the entire city. Reduction of this risk (through the implementation of BGI) must be factored into the net economic effect of each investment.

Recommendations:

- ♦ To integrate spatial information systems and expand databases – the creation of a coherent information system that integrates resources of all institutions and an integrated database that can form the basis for spatial planning as well as economic analysis and decisions. Such a system should enable municipalities to keep a register of BGI and to charge and collect fees related to rainwater management.
- ♦ To integrate the objectives of different urban policies and sector-based activities, taking into consideration the need of climate change mitigation and adaptation as the basis for planning specific measures.
- ♦ To modify the existing system of charges for the loss of natural retention towards a system with incentive functions, not budget-increasing ones, and also to regulate appropriately and clearly the issue of charges for discharge of rainwater and snowmelt water into open or closed drainage systems.
- ♦ To create regulatory frameworks, norms and standards for reuse of water and adaptation of water quality to the needs¹⁰.
- ♦ To make changes in calculation of the cost effectiveness of an investment by taking into account ecosystem services provided by BGI and applying the principle of incorporating environmental risk into a credit assessment of an investment and into insurance schemes.

Climate and environmental education

The problems pertaining to the implementation of integrated water management in cities and rural areas, especially as regards diversification of rainwater runoff management and reduction of area-specific pollution,

¹⁰The need to develop rainwater management policy or programmes in cities with a population of more than 100,000, while subsequently in smaller cities, and quality standards for “grey” water or rainwater that can be used in residential and public buildings as well as for watering and soaking into soil.

have essentially two causes: (i) the lack of sufficient awareness of the importance of this problem among local government authorities and other decision makers as well as among planners, designers, and residents; and (ii) the imperfections of the Spatial Planning and Development Act. This predominantly concerns the protection and restoration of spatial order and the implementation of the principles of sustainable development, including economical water management and replenishment of water resources. According to the latest document of the UNESCO International Hydrological Programme (IHP IX 2022-2029), a key challenge to water management is to increase the availability and quality of water resources, simultaneously enhancing biodiversity, benefits for the society, and the capacity to adapt to climate change and other anthropogenic pressures. Integration of these objectives is possible through appreciation (and valuation) of ecosystem services and the implementation of Nature-Based Solutions (NBSs).

Therefore, apart from introducing essential legislative amendments and economic tools supporting sustainable water management, lifelong learning in this respect is necessary.

The following is recommended:

- ♦ To incorporate water and climate problems into the curricula of university courses related to spatial planning and management, architecture, and urban planning as well as agriculture and forestry.
- ♦ Continuing education of planners and designers operating in the areas related to urban and agricultural policy.
- ♦ Climate and ecological education in general and continuing education, courses and training for decision makers as well as enhancing environmentally friendly social perception of the achievement of the objectives associated with proper water management.

Water policy in Poland

Session moderator: Janusz Zaleski

Panel members: Jarosław Dolny, Stanisław Gawłowski, Izabela Godyń, Tadeusz Jarmuziewicz, Gabriela Lenartowicz, Piotr Nieznański, Małgorzata Tracz, Janusz Zaleski, Witold Ziomek.

Despite sending invitations, representatives of the ministry competent for water management as of the date of the debate and also representatives of the State Water Holding Polish Waters did not take part in the discussion.

Conducting water policy in Poland is becoming an important task of the state and public authorities due to scanty national water resources, the still unsatisfactory status of waters, and the increasing impact of climate change on water related risks. The adoption of the new Water Law by the Sejm, the Polish Parliament, in 2017 was a radical change of the institutional water management system and management rules that deprived local governments of their competencies in this area and which additionally shifted the decision-making powers within the government administration towards the central power vested in the National Water Management Authority (KZGW). This reform was not prepared and implemented in a proper manner, leading to organisational chaos, a collapse in the process of making administrative decisions, and a disastrous financial situation of the monopolist, the State Water Holding Polish Waters, patterned on the structure and operation of the State Forests National Forest Holding. Auditors of the Supreme Audit Office (NIK) negatively assessed this situation and they had to discontinue their audit due to the audited institution's failure to prepare necessary documents.

The location of water management within the government structure – as close to climate issues as possible

The location of water management within the government structure draws from the historical solutions when water management was treated as an infrastructural segment and an area of implementation of large hydraulic projects. During the period after the 1989 transformation, it was part of the Ministry of Environment, which was in some sense associated with the catastrophic state of the quality of waters after the period of the socialist economy characterized by overexploitation of resources, but at the same time this reduced the socio-economic functions of water management and forced a separate strengthening of the water and sewage management sector in the area of municipal economy. When we assess the water management section in recent years, the mere fact of assignment of this section to the Ministry of Maritime Economy and Inland Navigation in the state budget was an important step backwards in terms of this sector's needs. Its subsequent assignment to the Ministry of Infrastructure is the continued subordination of water management to the priorities of one user – inland navigation – and shows the preference of infrastructural solutions related to this sector. In effect, investments entirely associated with navigation (barrages) appear even in the Flood Risk Management Plans, though from the point of view of flood protection they do not provide an added value. The managerial positions at the State Water Holding Polish Waters at the central level and at regional levels are taken up by representatives of the navigation lobby, even though – in spite of the passage of time – the economic profitability of the development of high class inland navigation on the Odra and Vistula rivers has not been demonstrated.

Recommendation:

Observing the deepening water related problems and those associated with climate change mitigation and adaptation, the location of the water

management section at the ministry dealing with climate change issues should be recommended. Energy related problems have already been included in this relatively new ministry in the government structure and it is natural that water management should also be located at this ministry.

The institutional system of water management – decentralization and deconcentration

Poland is a large country at the EU scale in terms of both its area and population. For this reason, it is particularly important to observe the principle of subsidiarity, that is, the assignment of public tasks to the lowest possible level of public administration. This is reflected in a provision contained in the Constitution of the Republic of Poland which stipulates that the territorial system of the Republic of Poland ensures the decentralization of public power. Water Law¹¹ of 2017 and the established institutional structure of water management distort the principle of decentralization of public tasks since local government authorities were deprived of their administrative competencies. These powers were transferred to the State Water Holding Polish Waters and hence to a strictly hierarchical and centralized entity, where they are additionally concentrated at the level of its centre - the National Water Management Authority (KZGW). The justification given is that there is a need for catchment-based water management, which is based on an erroneous opinion that decentralization with the participation of local government will not meet the requirements of the Water Framework Directive.

It is recommended that there should be a return to the decentralization of public tasks in this area, simultaneously maintaining the catchment-based nature of water governance, by again including local government agencies (at the county and voivodeship level) in water management governance. Furthermore, a number of competencies within the governmental structure of the State Water Holding Polish Waters should be deconcentrated from the central level to lower management levels in the water regions and at the respective Catchment Boards.

¹¹The Act of 20 July 2017 – Water Law (consolidated text Dz.U. (Journal of Laws) of 2021 item 624, as amended).

A separate problem is how to resolve conflict situations regarding the use of resources. This is nothing exceptional. As a matter of fact, conflict situations and clashes between different points of view occur in many areas of economic activity. Democratic governance systems involve institutionalization of such conflict situations, that is, the establishment of institutions that are assigned with the responsibility for a particular point of view with regard to the use of a specific resource. This is accompanied by the creation of agreement-making and consultation mechanisms that are designed to lead to working out a compromise solution between authorised institutions, the best one from the social point of view. It is complemented by a dispute resolution mechanism if a compromise cannot be reached. This applies both to essential issues concerning the objectives and tasks of water management and the necessary integration of solutions in the area of catchment-based and urban management in the complex spatial system of water and sewage management in developing urbanised areas. In the case of the State Water Holding Polish Waters, most conflicts regarding water are internalised inside this institution and hence, depending on the position taken by decision makers, they become applicable to the country's entire water management. Such an approach hinders the integration of water management activities carried out based on the basic planning documents. In effect, inland navigation is the currently dominant area and all conflict situations are resolved in its favour. This also means that changes in the Polish Waters management may lead to changes in strategic and operational decisions that are made and thus destabilize the functioning of the entire water management governance system. It is necessary to institutionalise conflicts for access and use of water resources by separating the responsibilities for inland navigation from water management, which is focused on the protection of the quantity and quality of waters, flood protection, and drought mitigation, particularly in view of the conflict for the use of waters that we face.

Recommendations:

- ♦ The leading role in institutionalization of potential conflicts as regards the protection of the quantity and quality of waters and environmental values of the aquatic environment should be given to special environmental protection administration subordinate to the minister competent for environmental protection.
- ♦ Similar solutions should be applied with respect to other potential conflicts associated with the use of water resources. Trying to reach such solutions in stages, inland navigation matters should first be transferred to the Central Maritime Office and this area should be included in the name of this authority. The ultimate solution for the institutional system requires its tasks and competencies to be defined more precisely (in such a way that conflicts for the use of water resources are resolved through dialogue and efforts to seek compromise by relevant institutions representing the interests of particular groups of users).

The need of a two-instance system – separation of the empire and the dominion

Water Law of 2017 essentially liquidated the classically understood two-instance system of administrative decisions in the area of water management, which is required by both the Polish Constitution and EU laws. One legal entity was established, the State Water Holding Polish Waters, which combines in itself several administrative authorities dealing with individual matters by issuing administrative decisions, but in many cases the first instance authority (the Director of the Catchment Board, the Director of the Regional Water Management Authority (RZGW)) is a subordinate of the second instance authority (the RZGW Director or the Polish Waters President, respectively). Therefore, we cannot speak about independence of decision-making between these authorities since instructions issued by the superior may directly impact individual cases and their resolution. The administration bodies located within the structures of the State Water Holding Polish Waters do not have sufficient in-

dependence because they are hierarchical and subordinate to the Polish Waters President. In more general terms, the State Water Holding Polish Waters both performs ownership functions with respect to public waters (it is responsible for the sphere of the dominion) and has the powers of public authority (the sphere of the empire). The combination of these two functions does not seem to be justified, for instance as regards the rights of parties to proceedings and the compliance with the principles of impartiality and equal treatment as provided for in the Code of Administrative Procedure. When processing administrative cases (e.g. water law permits), the respective authority will on a priority basis protect its own interests and hence private and local government entities will be in a worse situation than the water owner.

It is recommended that the spheres of the empire and dominion should be separated, e.g. based on the draft Water Law of 2015 as the starting point. A solution can be the establishment of two basin management authorities, respectively for the Vistula and the Odra rivers, which would perform ownership functions with regard to public waters. The functions of administrative authorities should be vested with the County Starosta (County Chief Executive Officer) and the director of a new water management authority. Such a solution would also ensure a two-instance system, in accordance with the provisions of the Polish Constitution.

Strategic and planning documents in water management – coordination and compliance with EU directives

Water management in Poland does not have an updated development strategy – accepted by the public opinion – which would appropriately optimise the use of water resources. The necessary integrated approach to water management cannot be found in the strategic documents setting out the country's development in the medium and long term, either. This is a requisite condition for proper institutional decentralisation and for reducing current and future conflicts between water users.

The second required direction of action is to properly include water management problems and challenges in the long-term national development strategy that is currently being updated and in the next update of the medium-term national development strategy. It is important for these strategic development documents to incorporate provisions regarding an integrated water management governance strategy that requires joint treatment of surface water and groundwater resources, the quantity and quality of waters as well as the possibility of water recycling, care about the quality of the environment, and enhancement of its resilience to stress caused by development and extreme events.

In consequence, procedures for the preparation of water management planning documents are an important issue requiring improvement. The phase of development of methodology for preparing planning documents is not separated from the phase of their implementation using this methodology. Before its implementation, the methodology itself is not discussed with the expert community or stakeholders. As a result, it is questioned by stakeholders and professional communities upon presentation of results of application of this methodology. It took place during the creation of the flood hazard and risk maps. Even more so that these methodologies do not ensure the continuity of analysis and evaluation and hence hinder or prevent comparison of effects of the implementation of activities in successive planning and implementation periods. In effect, the current approach impedes the achievement of the continuity of successive editions of the planning documents and of consensus with regard to the harmonisation of strategic water management documents with plans of public and private stakeholders.

Recommendations:

- ♦ It is necessary to urgently undertake work on the preparation of a national water management strategy based on a participative system, i.e. with the participation of expert and academic communities, water users, and NGOs, using methods for preparation of strategic documents, that is, without commissioning the preparation of a draft document outside.

- ♦ Greater integration of spatial planning with water management planning is recommended, which should gradually take place as a process based on solutions prepared jointly with the community of spatial planners and the administration responsible for the spatial management section.
- ♦ The phase of development of methodology for preparing planning documents should be separated from the phase of their implementation using this methodology. Before its implementation, the methodology itself should be discussed with the expert community and stakeholders. It is also important that successive methodologies develop the planning approach and scope, ensuring the continuity of analysis in order to guarantee comparability of evaluation of effects of the implementation of activities in successive planning and implementation periods.

Financing of water management

The reform of water management, introduced by the Water Law Act of 2017, was also aimed at streamlining financing of water management. Its assumption was to transfer the burden of financing the activities of the “water authorities” from the central budget to funds obtained from fees for water services. These fees were also supposed to become the strongest incentive forcing behaviour such as economical use of water and rational management of rainwater among water users. Due to the assumptions made, the catalogue of water uses subject to a fee was expanded and the Water Law Act proposed very high fees that would provide funds for the operation of the State Water Holding Polish Waters and its investments, and which would be a strong instrument of impact on users. Such a solution – as every drastic reform of taxes or other public levies – encountered great resistance and ultimately the rates of fees were either frozen (fees for water intake for water supply and sewage disposal purposes) or substantially reduced.

The proposed model of water management financing is right in principle, but its implementation is a serious weakness that does not solve the problem of many years of underfinancing of water management. Over the period 2016-2019, the amount of financing of investments in water management as well as in water supply and sewage management significantly dropped, which is undoubtedly associated with both the preparation and implementation of Water Law of 2017.

It is recommended that a long-term process of achieving the target rates for water users should be developed and this process should take into account the society's affluence as well as the profitability and competitiveness of water-consuming economic sectors; to this end, supplemental budget financing derived from charges for emissions needs to be used and such financing should be allocated in at least 50% for climate change adaptation. Obviously, there is a need to link the recommended institutional changes with the recommended process of achieving the target rates of fees for water users, against the background of the concept of water management maintenance and development in the light of the current and future challenges.

General proposals

To implement the specific recommendations formulated based on the discussions held during the three thematic sessions, it is proposed that specific actions should be urgently taken.

At the EU level, the following efforts should be made:

- ♦ To develop an EU drought directive that will impose a mandatory requirement of systematic actions aimed at reducing the causes and effects of drought and will also establish – jointly with the Flood Directive – a complementary approach to water storage;
- ♦ To link the EU agricultural policy to the achievement of the WFD objectives, which should result in making agricultural payments dependent on measures designed to protect water resources.

As far as national strategic actions are concerned, it is necessary to develop a long-term water management strategy based on a participative system, i.e. with the participation of expert and academic communities, water users, and NGOs, using methods for preparation of strategic documents, that is, without outsourcing the preparation of a draft document. This strategy should include the following:

- ♦ A coherent flood and drought risk strategy, primarily based on an increase in effective retention capacity, balanced at the local and regional scale;
- ♦ Water resources development and management in agriculture, in principle oriented towards the protection of soils, aquatic ecosystems and groundwater resources;
- ♦ Coherence of sector-based urban policies with regard to mitigation of climate change and reduction of its effects, oriented towards quantitative and qualitative protection of water resources in catchment-based systems.

As regards national planning documents, the following changes are necessary:

- ♦ Revision of the approach to water management planning – the phase of development of methodology for preparing planning documents should be separated from the phase of their implementation using this methodology in such a way that the participation of the expert community and stakeholders should be ensured during the methodology development phase. Evaluation of the functional and economic effectiveness of investments should be performed at a level that allows them to be accepted for implementation or rejected.
- ♦ The integration of spatial planning with water management planning should be enhanced at all management levels. This should take place gradually as a process based on solutions prepared jointly with the community of spatial planners and the administration responsible for the spatial management section. Such a procedure will lead to long-awaited legislative amendments based on documented experience;
- ♦ It is necessary to prepare plans for the development of multiple-type water storage capacity in large-scale catchment systems, based on study documents that take into account the current conditions and development efforts as well as the impact of climate change.

Efficient management and effective financing of water management activities require the following:

- ♦ Decentralisation and deconcentration of the implementation of water management activities in accordance with the constitutional principle of subsidiarity and therefore proposals for institutional and competence changes should be prepared, a wide discussion and public consultation ought to be conducted, in particular with local government representatives, and an amendment to the Water Law Act in this respect should be prepared.
- ♦ A two-instance administrative system needs to be ensured and the sphere of the empire should be separated from the sphere of the do-

minion in water management governance, e.g. by establishing basin management authorities, respectively for the Vistula and the Odra rivers, which would perform ownership functions with respect to public waters (also outside their basin areas). The functions of administrative authorities could be performed by the director of a new water management authority and the County Starosta (County Chief Executive Officer).

- ♦ It is necessary to develop a long-term process of achieving the target rates for water users and this process should take into account the society's affluence as well as the profitability and competitiveness of water-consuming economic sectors; to this end, supplemental budget financing derived from charges for emissions needs to be used and such financing should be allocated in at least 50% for climate change adaptation.

Enhancement of competence potential in water management requires updating the state of knowledge and skills, primarily through the following:

- ♦ Conducting strategic and regional research and studies, at the same time using the scientific and academic community in cooperation with the administration and consultancy firms, which will enable verification and enhancement of knowledge of all parties based on actual conditions in the process of seeking effective solutions;
- ♦ Continuous improvement of the quality of specialist personnel that deal with water management according to a well-thought-out system of lifelong learning, including review of the curricula of higher education institutions.

Unfortunately, in our country there is no such public (state-run, but independent of political influences) strategic development think-tank that would be systematically engaged in diagnosing main challenges and in developing strategies to address them. This also applies to water management, which is a key challenge to Poland. Thus, we have no institution where those who mainly know “what” and those who mainly know

“how” could cooperate for the benefit of the country. The organisation of the Water Roundtable debate shows that there is no lack of experts that are ready to undertake such public task. But as long as on the part of the government decision makers there is neither readiness nor will to cooperate with them, they are left with typical civic and expert forms of activity. To put it simply, they can propose and appeal. But their appeals generally remain unanswered and hence this huge expert potential of knowledge, experience and activity is not used well for the good of people and the country.

Therefore, we deem it appropriate to propose – and we address this proposal to the National Centre for Research and Development – that work should be undertaken on the preparation of a strategic development programme “Water management as a development challenge to Poland”. We think that this presented programme document can be a starting point for such work. Its launch should also set up a platform for systematic dialogue between experts and decision makers in order to link and make more coherent “what” and “how”.

