Tamás Pálvölgyi – Gyula Reich

Global, European and Hungarian Water Policies

The global water crisis is spreading worldwide, driven mainly by climate change and several human activities that have altered the global water cycle. Addressing community water interests is becoming increasingly important and a focus area for cross-sectoral public policy planning. To lay the ground for the water policy pillar of the EU Presidency, we first review the history of the emergence of water as a public policy in the UN, EU and Hungarian dimensions and the current strategic situation of the issue. We will examine the general drivers, challenges and opportunities for water policies and further analyse the barriers and bottlenecks to implementation. What are the foreign policy and diplomatic dimensions of water management in Hungary? In six points, we summarise the proposed priorities for the international engagement of Hungarian water diplomacy.

Introduction: The need for water policies

Water is the basis of life and the determinant of all ecosystems. Through the water cycle, every "drop of water" that humans take out of the cycle returns to it, mostly modified, but in a different way. The main reason for the looming global water crisis is climate change, and many human activities have modified and are still modifying this cycle.

Water and its natural and socio-economic interrelationships are fragmented:[1] spanning space and time, it affects all other sectors, connecting states, municipalities, people and ecosystems. A further, rarely considered water specificity is that the extremely long lifespan of its facilities, which can last for millennia, alters the natural environment over large areas and cannot be fully restored to its original state if dismantled.

All members of society have some form of water management and interest in water relations, which makes water an inherently conflictual medium.[2] Socio-economic actors have a legitimate need to be aware of the water relations in their area (sphere of influence) and to have some understanding of its stability.

All of these characteristics make water a public good, a public utility and a public interest. Promoting the community's welfare in water is becoming increasingly important and, therefore, requires long-term planning based on policy.

In a "bird's eye view" approach, water policy is defined as the strategic planning, management and action that sets the framework for water management, taking into account the needs and opportunities of a particular region, community or economic activity concerning water. To ensure that the result of these often conflicting interests is in the public interest, 'water management' as a sector must play a central planning,

[1] OECD 2015.
[2] Somlyódy 2008: 462–473.

https://doi.org/10.36250/01206_22

organising, regulating and implementing role. This role must be coordinated with social and economic policies and other policies so that sustainable water management is (also) reflected in the policies of different sectors.[3]

Historical development of water policy

The emergence of global water policy under the auspices of the UN

In the interrelationship between food, energy and water, water has become one of the most important global issues since the mid-20th century. Our planet's freshwater supply is constant, but the decline is dramatic per capita. Over the last forty years, the global average of 13,000 cubic meters per capita per year has fallen to 5,000. Population trends and climate change threaten a global water crisis. This poses an extraordinary challenge to the relationship between water and humanity, but this realisation has slowly unfolded.

The Club of Rome's 1972 global development model, "The Limits to Growth" did not yet address water as a limited resource. The issue of water as a global dilemma was first raised at the UN Conference in Mar del Plata (1973). Dozens of different organisations are now working on global water management. The cooperation and networks between them are hardly transparent.

Several significant international water agreements can be concluded at the UN, including the Convention on the Protection and Use of Transboundary Watercourses and International Lakes.[4] The operational management is carried out by the UNECE's Integrated Water Resources Management (IWRM) Working Group of the UNECE, where Hungary is very actively involved. Aquatic ecosystems have emerged as a cardinal recognition in water policies, supported by the Convention on Wetlands of International Importance, particularly as waterbird habitats.[5] Hungary was one of the co-chairs of the Working Group on the Sustainable Development Goals (SDGs) adopted by the UN General Assembly in 2015, thus making an invaluable contribution to the development of the goals for the subsequent development period and the universally valid UN SDGs. In this context, the three Budapest Water Summits (2013, 2016, 2019) initiated by János Áder, then President of Hungary, played an essential role in including water management in the SDGs.

Water is the sixth of the 17 elements of the UN Sustainable Development Goals. The water-related goals are at the core of the other 16; none can be met without meeting the water targets, and the goals must be achieved through integrated water management. To date, the UN has failed to integrate climate and water policies. The 2015 Paris Climate Agreement barely addressed the adaptation actions needed for water issues.

[3] Reich 2011: 289–330.
[4] Helsinki Convention 1992.
[5] Ramsar Convention 1971.

However, at the last UN Global Climate Change Conference (COP27 Sharm el Sheikh), the integration of climate and water policies was already addressed, and it is expected that this process will be further deepened at COP28 in Dubai.[6]

The new approach to water policies deserves attention.[7] Highly reputable organisations such as the Global Water Partnership (Strategy for a Water Secure World 2014–2020), the OECD (Better Policies for Better Lives 2013) and the World Economic Forum – WEF (Global Risk Report 2016) have published analyses of the world's water problems through the concept of water security.

The latest development in global water policy is the UN Water Conference 2023, the first such event in 46 years. Csaba Kőrösi (President of the UN General Assembly) played a significant role in the preparation and historic outcome of the conference. One of the most important lines of action is the integration of climate and water policies and the creation of a global water information and alert system by merging the related databases. An investment of USD 255 billion is planned to implement the action program over the next five years.

Hungarian scientists, diplomats and politicians have played and continue to play a significant role on the global water policy stage, such as János Áder, János Bogárdi, Csaba Kőrösi, Károly Szesztay, András Szöllősi-Nagy, Charles Vörösmarty and many others.

The development of water policy in the European Union

The need for a single policy has also gradually emerged in the EU. Throughout history, water issues have been involved in most major policy events and ideas in Europe and the Danube basin. For example, the issue of declaring the Danube an international waterway can be traced back to the Congress of Vienna in 1814–1815 and was realised in the Belgrade Convention of 1948 with the establishment of the Danube Commission. The treaties that ended the European wars and subsequent events also have many water management implications. For example, the Treaty of Trianon's division of the Carpathian Basin into a single hydrographical formation with borders was followed almost immediately by the conclusion of agreements on border waters. The European Union has been dealing with water issues since its creation based on two realisations:

- the last century and a half has caused severe damage to Europe's waters, especially aquatic life, and there is a need to halt and restore the degradation
- floods across Europe are causing severe damage; if done collectively, flood protection can only be effective on a river basin approach

[6] Reich 2023: 14–16.
[7] Ijjas et al. 2017: 423–462.

Water Framework Directive

In June 1995, the Council of Europe and the Environment Committee of the European Parliament initiated a review of the European Communities' water policy, leading to the EU Water Framework Directive[8] (2000/60/EC) by 2000. The Water Framework Directive (WFD) aims to achieve and maintain good ecological and chemical status or potential of surface waters and good chemical and quantitative status or potential of groundwater. It also sets the following general objectives:

- preventing the deterioration of aquatic and wetland habitats, protecting them and improving their condition
- promoting sustainable water use by protecting exploitable water resources in the long term
- improving water quality by reducing pollution and phasing out hazardous substances
- progressively reducing groundwater pollution and preventing further pollution
- mitigate the negative impacts of floods and droughts

The deadline for meeting the requirements was 2015, which could be extended until 2021 and 2027 if justified. A River Basin Management Plan (RBMP) must be prepared as the primary implementation tool and reviewed every six years. It is of cardinal importance for Hungary that it has made cooperation in river basins a legal obligation, as 95% of our waters originate beyond our borders, and our exposure is extreme.[9]

Other EU water policy regulatory documents

Specific directives, such as groundwater, drinking water, bathing water, nitrates, urban wastewater treatment, environmental quality standards and flood protection directives, play a particular role in developing water policy.

The Floods Directive (FRD, 2007/60/EC) aims to set out a framework for activities to assess and manage flood risks to reduce the adverse impacts on human health, the environment, cultural heritage and economic activity. The separate emergence of the WFD reflects the evolution of EU water policy and a change in approach, namely the recognition that economic and social objectives of water damage prevention should not be rigidly subordinated to water conditions but should be pursued by them. Under the WFD, Member States should conduct a preliminary flood risk assessment and prepare flood hazard maps, flood risk maps and flood risk management plans. A procedure will be developed for the analysis to be used for the assessment of transnational impact measures applicable to international river basins. It is worth mentioning that Hungarian experts have played a leading role in developing the *Guide to Good Practice in Flood Protection,* which is the basis of the Floods Directive, with their experience in flood protection in Hungary.

[8] Government Decree 221/2004 (VII.21.).
[9] Ijjas 2019.

Regional cooperation

An important starting point for establishing the WFD was the protection of the world's oceans,[10] thus linking it to global water policy. The problem of micro-plastics demonstrates its timeliness, the vast floating islands of waste and the degradation of aquatic communities. One of the critical concepts of the WFD is 'river basin', which is the term used to describe the estuary, e.g. the Danube estuary, a regionally cooperative river basin plan. In the EU, there are several other regional cooperation activities within the framework of international river basin commissions of (diplomatic) rank: the International Commission for the Protection of the Rhine (ICPR), the International Sava Commission (ISRBC), the International Commission for the Protection of the Oder (ICPO), and the Danube River Basin Commission (ICPDR), the largest and most international river basin.

The ICPDR[11] summarises VGTs for the Danube river basin as a whole. An essential strategic document for Hungary and the Danube River Basin countries is the Climate Change Adaptation Strategy, prepared under the coordination of ICPDR, which guides water-dependent sectors in integrating water-related aspects into their climate adaptation strategies. The Strategy is aligned with the new EU Strategy for Adapting to the Impacts of Climate Change.[12]

At several high-level forums, it was said that the cooperation of river basin countries coordinated by the ICPDR is a model for the world in integrated water management. Hungary has been one of the most active participants in this cooperation.

The development of water policy in Hungary

Historical perspective of the national water policy in Hungary

Our hydro-geographical and climatic conditions determine our waters. They are characterised by a pair of "significant advantages – versus severe vulnerability", rooted in the unparalleled natural conditions of the Carpathian Basin and its division by political borders. Our country has one of the continent's largest per capita water resources, while our surface water resources from rainfall are the smallest. Our surface water network is sparse compared to our needs. It is well observed that socially deprived, poverty-stricken areas tend to coincide with areas where access to water is more complicated. We have high-quality and abundant groundwater for drinking, medicinal and recreational purposes. We have a large area of valuable wetlands, but the ecological status of our waters (especially surface waters) is still below the expected "good status".

[10] European Commission 2020.
[11] Danube River Basin Management Plan Update 2021.
[12] ICPDR 2021.

Due to our basin and climatic conditions, the percentage of areas at risk of flooding is 24%, the highest in Europe. Almost half of our arable land is inland waterlogged, which is not only due to our endowments but also to poor land use.[13]

The beginnings of water regulation – or water management – began to appear in the early 19th century. These seeds are decomposing. The first of these seeds appeared in the development concept of István Széchenyi's Tisza Valley, which, for the first time, defined the role and tasks of water management in a system based on political, cultural, economic and natural factors. Count István Széchenyi (1846): "By the Tisza Valley, I mean not only the bed of the Tisza and the area where the floodwaters of the rushing Tisza spread but also the beds and outlets of all the rivers and waters that flow into the Tisza."[14]

Jenő Kvassay, the founder, leader and scientist of the Hungarian civil water system, developed practical proposals for water planning, irrigation, water power utilisation, river regulation and waterway development for 10–20 years, which were set out in the administrative framework of the Water Law Act of 1885. He is the first to mention water management as a policy "expressis verbis" in the form of our Water Economy Policy, published in 1913, which is probably a world first!

Elemér Sajó, his successor in office, faced the dilemma that the Treaty of Trianon had fragmented the previously unified river basins and that the plans had to be re-aligned accordingly. He published a draft framework document entitled *Memorandum on the Increased Use of Our Waters and the Establishment of a New Water Policy* (Budapest, 1931). This was followed by three more specific and complex National Water Management Master Plans (1954, 1965, 1984).[15]

Domestic water policy has been significantly influenced – "set" in a European direction – by the support that preceded the regime change and then our accession. For example, the Phare Programme has provided a significant volume of investment in water facilities, and the EU has also supported the adoption of the acquis communautaire.

After the regime change, several strategic documents were adopted, including the first one, the Water Damage Prevention Strategy in 1992, which put the concept of flood and inland water protection on a new footing. The lack of a coherent, integrated policy, however, only became acute in the early 2000s and was partly a response to the disintegration of the water institutions.[16] An outstanding achievement is the comprehensive work edited by László Somlyódy entitled *Magyarország vízgazdálkodása: helyzetkép és stratégiai feladatok. Köztestületi Stratégiai Programok* [Situation and Strategic Tasks of Water Management in Hungary 2011],[17] which was produced as part of the Public Strategic Programmes of the Hungarian Academy of Sciences and became the origin of all further long-term planning, including the National Water Strategy.

[13] Reich 1997.
[14] Széchenyi 1846.
[15] Orlóci 2009: 1–4.
[16] Somlyódy 2002.
[17] Somlyódy 2011.

Water policy during the 2011 Hungarian EU Presidency

One of the leading themes of the 2011 Hungarian EU Presidency was water policy, the main result of which was the endorsement by the Heads of State and Government in June 2011 of the launch of the European Union's second macro-regional development concept, the Danube Region Strategy (DRS).[18] For the Hungarian side, the principal negotiator of the DRS was Etelka Barsiné Pataky, Government Commissioner. Her personal achievement was that the increasingly urgent issue of drought management was given due weight in the DRS and EU water policy and that Hungary became co-coordinator of both priorities of the Strategy, which set water management objectives. Many water experts supported this work.

The Danube region (essentially the Danube river basin) comprises 14 countries and is home to over 100 million people, one-fifth of the EU's population. Although the countries differ in economic strength, the region's countries are closely interconnected and have further potential for integration and growth. Their policies are interdependent.[19] The DRS identifies four main pillars of intervention. In water management, Hungary has a coordination role:

- with Slovakia in two priority areas: water quality restoration and preservation
- with Romania in environmental risk management, focusing on water damage prevention

An essential consequence of the 2011 Hungarian EU Presidency was the launch in 2014 of the Danube Transnational Programme (DTP), based in Budapest, with a financial framework of around 245 million euros, and its new name for the EU budget period 2021–2027, the Danube Region Programme (DRP). It should be mentioned here that the DRS also supported the establishment of the National Tisza Office in Szolnok.

The current state of water policy

UN water policy

Although the UN has a long history of water policy, no UN agency, fund or program deals exclusively with water issues. In fact, more than 30 UN agencies run water and sanitation programs, as these issues cut across all the main UN focal areas. The overarching implementation framework for UN water policy is UN Water, which is the UN's single integrated water coordination mechanism with the overriding goal of sustainable water and sanitation management. Its specific areas of action are:

[18] *Danube Region Strategy* s. a.; Gazdag 2011: 72–85.
[19] European Commission 2016.

a) *Support to UN policymaking processes:* over the years, UN Water has contributed to the development of global policy frameworks on disasters, climate change, sustainable development and other issues, such as the 2030 Agenda for Sustainable Development, the development of the SDG 6 Global Acceleration Framework, the launch of the Decade of Action for Water campaign, and the organisation of the UN World Water Conference 2023.

b) *Monitoring and reporting:* UN Water is a monitoring centre that provides coherent and reliable data and information on key water trends and management issues throughout the water cycle. Building on the data collection efforts on the water cycle within and outside the UN system, UN Water has established the Integrated Monitoring Initiative for SDG6 (IMI SDG6) as the central data mechanism for all water-related issues. The main areas of activity are:

- supporting countries in collecting and reporting data on all global indicators of SDG6
- supporting policy and economic decision-makers at all levels in using SDG6 data
- producing the UN World Water Report

c) *Encouraging action:* UN Water coordinates the UN's global thematic campaigns on freshwater and sanitation (World Water Day and World Toilet Day campaigns).

Table 1: Major UN and international organisations engaged in water management issues

UN organisations	
UNESCO	The Intergovernmental Hydrological Programme (IHP) was established in 1975. Hungarian experts have been very active in its establishment and operation. Hungary is a member of the 2021–2025 Governing Council.
FAO (World Food Organization)	The role of irrigation and water management in food production, with a large number of Hungarian experts participating in FAO projects around the world.
WMO (World Meteorological Organization)	Its main activities are coordinating practical and scientific research in meteorology and atmospheric physics at the global level and water issues related to the Earth's water cycle.
WHO (World Health Organization)	Healthy water supply and sanitation (2 billion people in the world do not drink healthy water).
UNEP (United Nations Environment Programme)	Coordination of mainly international projects and research along the environmental dimension of water.

International professional organisations	
World Water Council (WWC)	Its main goal is to integrate global efforts on water. Nine high-impact World Water Forums were organised.
Global Water Partnership (GWP)	A key advocate of integrated water management, with significant Hungarian input.
European Water Association (EWA)	Shaping European water policy, with significant Hungarian input.
World Conservation Union (IUCN)	Conservation of aquatic wildlife.
International Council for Irrigation and Water Development (ICID)	It has done a lot to ensure that the Common Agricultural Policy takes account of the new Member States' specificities, with significant Hungarian participation.
International Network of Basin Organizations (INBO)	International network of river basin organisations targeting the development of integrated water management – with significant Hungarian contribution.

Source: Compiled by the authors

Current challenges for EU water policy

First challenge: Assessing and updating the impact of the Water Framework Directive to inform future EU water policy

The final deadline for achieving good status under the WFD is 2027, which requires a thorough analysis of the activities and results performed so far, drawing conclusions and setting new directions accordingly. In doing so, it is necessary to highlight the problem that the Water Framework Directive and river basin management planning have been rooted in the misconception that the umbrella for all plans is "EU water policy itself". The Water Framework Directive regulates the part of planning concerned with ensuring and maintaining good water status, leaving the rest of the planning to the Member States. In other words, the EU regulates one part of integrated river basin management planning, while Member States regulate the other part – the planning of water management measures to achieve the economic and social objectives set out in EU sectoral policies.

Indirectly, the EU is also supporting the implementation of water management measures by providing substantial support for the development of the necessary improvements to achieve the objectives of sectoral policies (i.e. Climate Change Adaptation Strategy, Common Agricultural Policy, Regional Development Policy, Danube Strategy, etc.).

Second challenge: Integrated and sustainable water management

The WFD defines only the water protection requirements and the status improvement measures for integrated water management development. It does not address specific water management developments and activities or explore the links with the economic

and social spheres. There are currently no integrated water management plans across Europe that consider both socio-economic needs and the opportunities provided by ecosystem services, covering all sectors and factors. There are no policies, directives or standards to address EU-level challenges. The latest river basin management plans and flood risk management plans seek to integrate with each other and with strategies and plans of different sectors. Still, integration is not effective enough and, in many cases, is not implemented in practice.

The Water Framework Directive can be essential in granting and considering integrated water management planning exemptions. Fully integrated water management planning and integrated river basin management planning can only be considered together if both levels are regulated. The Water Framework Directive, related EU Directives and Member State legislation apply to river basin management planning and day-to-day water management activities.

Third challenge: The relationship between EU and global water policy

The first "victim" of climate change is the Earth's water cycle, which calls for global actions. Progress towards the Paris Agreement's climate targets is slow and is no longer sufficient to minimise the impacts of climate change on water, so more emphasis must be placed on adaptation. Consequently, the most critical challenge for EU water policy today is to support the strengthening of global water policy and create the conditions for its implementation in a united and leading way.

Fourth Challenge: Climate and water policy priority during the Hungarian EU Presidency

We propose to prepare for COP29 in November 2024 as a priority for the 2024 Hungarian EU Presidency. The strengthening of climate adaptation policies, especially in water-related thematic areas, will also be emphasised in the policies of the V4 countries. The fact that the Eastern European region is hosting COP29 adds an additional diplomatic dimension.

The status of Hungarian water policy and responses to the challenges

National Water Strategy[20]

To avoid a global water crisis and preserve water for future generations, the Government adopted the National Water Strategy[21] (Kvassay Jenő Plan) (NVS–KJT) in 2017 after

[20] National Water Strategy (Jenő Kvassay Plan) 2017.
[21] Government Decree 1110/2017 (III.7.).

several years of preparation and social dialogue. The NVS–KJT is the framework strategy for Hungarian water management until 2030 and a medium-term action plan until 2020. It identifies seven systemic task groups:

1. increase water retention and make better use of our waters
2. a shift from emergency-oriented water damage management to prevention-oriented water management
3. progressively improve the status of waters and achieve good status, maintaining the natural condition of watercourses
4. maintaining a quality water utility service that operates at a tolerable consumer load and developing a system of stormwater management
5. improving the relationship between society and water
6. renewing water planning and management
7. the reform of the economic and regulatory framework for water management

The biggest challenge for the future of water management cuts across all seven task groups: how to be preventive and achieve resilient solutions. Its mission is integrated water management, based on science, that regulates water demand and discharge, influences land use, and is based on the "installation" approach of centuries.

In adopting the NVS–KJT, the Government required the development of programs of significant importance. Such programs include the stormwater management program, water level regulation of Lake Balaton, the development of karst water management in the Transdanubian Central Highlands, and last but not least, a status assessment of water utilities to determine the reconstruction tasks and to develop the conditions and financing. To develop the knowledge base of water management, it ordered the establishment of a research network in cooperation with the Hungarian Academy of Sciences.

The implementation of the Strategy is lagging, and a complex review is essential to complement it with responses to new challenges. Water security could be a key focus for further development of the NVS–KJT.[22] Another critical condition is developing an integrated institutional framework for integrated water management. The focus areas for development are:

- moving towards integrated water management at the national, municipal and regional levels
- exploring further opportunities for water retention, the means and conditions for achieving water retention in the landscape and soil
- stopping the subsidence (desertification) of the water table in the grasslands
- reservoir storage to compensate for regional groundwater level declines
- the use of water (e.g. tourism, land use) in the context of climate change
- inland water hazard and risk management, differentiated water damage management

The further development of the Strategy should be based on developing a water security approach to planning and the capacity of society and the economy to do so.

[22] Ijjas et al. 2017: 423–462.

Implementation instruments for domestic water policy

River Basin Management Planning: The aim of the 2021 River Basin Management Plan of Hungary[23] (hereinafter: VGT3) is to plan the basic and additional measures necessary to ensure good water status and to maintain good status. VGT3 is neither an implementation plan nor a sectoral development program, but a strategic plan to identify the status of waters and provide a basis for achieving good status close to the ideal. The VGT3 is divided into four sub-basin areas (Danube, Tisza, Drava, Balaton) and 42 planning units (smaller river basins). Ecological, chemical and quantitative classifications will be established within the planning units for water bodies (886), standing water bodies and groundwater bodies (185). During the preparation of the VGT3, "significant water management issues" were identified and submitted for public consultation. A total of 31 packages of measures to achieve good status are summarized in VGT3.

Flood risk management planning: The total property risk of floodplains protected by embankments exceeds HUF 159 billion/year, while the full property risk of small watercourses (e.g. flash floods) is about HUF 11.3 billion/year nationally. The largest share of the total property risk is found in the Tisza Valley: 1.2 million people live in the area at risk. Partial flooding is expected at 129 sites nationwide, totaling about 10,000 km^2 of Natura 2000 areas. Nearly 10,000 potential sources of pollution are at risk from flooding.

The structure of Hungary's Flood Risk Management Plan 2021[24] (FRMP2) and the units of river basin management planning under the WFD are aligned. In contrast to the previous guaranteed safety assigned to a hydrological probability, the change in approach under the WFD is that when using floodplains, society and the economy must also adapt to the area's estimated risk level. This is based on a risk assessment of the areas at risk of flooding. FRMP2 proposes corresponding improvements in embankment development, water retention and extensive water body management. Water retention is an objective that arises in the study of floodplains and inland areas, hillsides and settlements; therefore, it proposes both inland water retention and stormwater management.

National Water Supply Strategy: The water supply system's urgent need for reconstruction is illustrated by the fact that the sector spent more than twice as much on troubleshooting as on maintenance in 2018. The percentage of worn-out pipelines in the drinking water network has been above 50% for years. The sector's current key challenge is creating the technical, financial and human conditions for safe operation. The reconstruction needs of the water utility systems are estimated at an average of HUF 103 billion per year at current prices over the next 15 years. In connection with the National Water Strategy, the *Measures Necessary to Meet the Enabling Conditions of the National Water Utility Strategy 2021*[25] was prepared with the following general priorities:

[23] Government Decree 1242/2022 (IV.28.); Hungary's River Basin Management Plan 2021; Flood Risk Management Plan.
[24] Government Decree 1480/2022 (X.13.); Hungary's Flood Risk Management Plan 2021.
[25] Government Decree 1828/2021 (XI.30).

- a shift to the use of regional aquifers
- the elimination of oversized agglomerations
- modernisation, standardisation and digitisation of process control systems
- increasing the energy efficiency of water utility systems
- implementing the principles of circular economy (including using sewage sludge and developing industrial water systems)
- review of the economic conditions, assets, ownership, public management and institutional arrangements of the water utility service

The "weak link" in domestic water policy implementation is municipal water management (including stormwater management and water utility services), which, as a coherent group of activities, is not operational at the level of institutions, regulation, financing or coordinated measures. This is one of the most critical challenges facing water management in Hungary, and the Integrated Municipal Water Management Plan could provide a basis for addressing it.

General drivers, challenges and opportunities for water policies

Fundamental human and social needs are the primary drivers of water policies. Key megatrends such as urbanisation, consumption and production patterns, climate change and degradation of ecosystem services are also important determinants of water policymaking.

Primary driver of water policies: Basic livelihood needs[26]

Drinking water supply: Ensuring access to safe drinking water for all is the most essential human need. Drinking water must be free of fecal matter and priority chemical contaminants. Better drinking water sources include piped water, protected dug wells, protected springs, rainwater and packaged or transported water.

Food supply (agriculture): Demand for food is overgrowing. Agriculture is the largest consumer of the world's freshwater resources. Pressure on the relationship is caused by a growing world population, rapid urbanisation, changing diets and economic growth. As water becomes increasingly scarce and stressed, its ability to support progress on many Sustainable Development Goals – particularly poverty, hunger, sustainability and the environment – is diminished.

Health: In low-income countries, huge numbers of people – the vast majority – lack access to safely treated water and sanitation and the opportunity to wash their hands. The health and socio-economic benefits of safely treated water can only be fully realised

[26] Below we look at the general global drivers of water policies. Their relevance varies for individual countries and regions.

with safely treated sanitation and good hygiene practices. Without water, sanitation and hygiene (WASH), the well-being, dignity and opportunities of people, especially women and girls, are severely compromised. Investing in WASH generates positive returns through reduced health burdens and increased productivity, removes barriers to social participation for marginalised groups, and creates long-term jobs.

Disaster-proof homes: Most disasters are water-related. Floods, landslides, storms, heat waves, wildfires, extreme colds, droughts and water-borne diseases are becoming more frequent and intense, mainly due to climate change. The effects of disasters are exacerbated by urbanisation and the degradation of the natural environment. The impacts of disasters include loss of life and water and sanitation infrastructure damage. Outbreaks of communicable diseases are common following disasters, caused by the spread of sewage, the collapse of water and sanitation services and the reduction or lack of good hygiene practices. The increasing economic costs and casualties of disasters force governments and humanitarian organisations to pay greater attention to preparedness, prevention and addressing the root causes of vulnerability.

Urbanisation

In the coming decades, urban areas are expected to 'absorb' the world's total population growth and provide the space for rural-to-urban migration.[27] Urban centers are concentrations of deprivation, and slums pose a broader health risk. Urban areas are often more vulnerable to natural hazards such as flooding, rising sea levels, landslides, etc.[28] Rapid urbanisation covers large areas, driving run-off too quickly into stormwater drainage channels, often overloading the system and leading to catastrophic flooding of streets and underpasses. Urbanisation leads to an increase in wastewater flows from households, services and industrial economic activities. Treatment can be at the source (e.g. at the household or industrial site) or through centralised treatment plants.

- *Public health and safety in urban areas should be a high priority.* Urban water and sanitation interventions, including safe wastewater treatment, positively impact public and environmental health. Protection and preparedness against floods and flooding are also essential responses to the challenges of urbanisation.
- *Urban water policies should also accelerate the circular economy.* Climate targets and service delivery commitments can only be met if governments adopt technology that provides sustainable water and sanitation services and wastewater treatment for all urban residents. The New Urban Agenda, adopted by world leaders in 2016, is a roadmap for building cities that can serve as engines of prosperity and centers of cultural and social well-being while protecting the environment.

[27] Kármán-Tamus–Pálvölgyi 2022: 324–341.
[28] Buzási et al. 2021.

Climate change

Climate change is primarily a water crisis with a wide range of impacts: worsening floods, rising sea levels, shrinking ice sheets, forest fires and droughts. Water and climate change are inextricably linked. Extreme weather events are making water scarcer, more unpredictable and more polluted. These impacts threaten sustainable development, biodiversity and people's access to water and sanitation throughout the water cycle. Floods and rising sea levels can contaminate land and water resources and damage water supply and sanitation infrastructure. Droughts and forest fires destabilise communities and trigger famine, civil unrest and migration in many areas. Vegetation and forest destruction exacerbate soil erosion and reduce groundwater recharge, increasing water scarcity and food insecurity.

Sustainable water management helps society adapt to climate change by increasing resilience, protecting health and saving lives.[29] It also mitigates climate change by protecting ecosystems and reducing carbon emissions from water transport and treatment. They are climate-proof, sustainable, affordable and scalable water solutions:

- improving carbon sequestration by vegetation through semi-natural solutions
- protecting natural buffers
- rainwater harvesting
- the introduction of water-conscious agriculture
- reuse of wastewater

Degradation of ecosystem services

Freshwater ecosystems, such as wetlands, rivers, mangroves and aquifers, are critical to the global water cycle – supplying, purifying and protecting freshwater resources. Inadequate water management and climate change adversely affect many ecosystems, undermining their ability to provide freshwater ecosystem services. Riparian vegetated ecosystems mitigate the effects of floods and droughts and protect soils from erosion. Wetlands regulate water flow, and aquifers can act as buffers during droughts. The biodiversity of freshwater ecosystems is under threat, with freshwater species dying out faster than terrestrial or marine species. Surface water areas are changing rapidly, with flooding and increased rainfall in some areas increasing the water surface. In other areas, lakes, wetlands and floodplains are drying up due to reduced precipitation and/or unsustainable management.

Nature-based solutions are essential for the climate adaptation of freshwater ecosystems. Protecting, restoring, enhancing and sometimes creating new wetlands and riparian vegetation can protect life and livelihoods from extreme weather events. Ecosystem services can contribute to wastewater management by providing wetlands as an alternative or complement to traditional water treatment systems.

[29] Pálvölgyi–Kovács 2023: 135–149.

Challenges and opportunities for implementing water policies

Transition to sustainability

Sustainable Development Goal 6 is to ensure that by 2030, everyone has access to sustainable water and sanitation management. SDG6 cannot be achieved through business as usual. The Global Acceleration Framework, launched in 2020, mobilises stakeholders around five overarching and interdependent 'accelerators':

- *Funding:* optimal funding is essential to back up national plans with resources.
- *Data and information:* data and information are used to target resources and measure progress.
- *Capacity building:* a better-skilled workforce will improve service levels and increase job creation and job retention in the water sector.
- *Innovation:* new, smart practices and technologies will improve the management of water and wastewater resources and service delivery.
- *Governance:* SDG 6 will become everyone's business by working across borders and sectors.

Circular water management

The amount of wastewater generated and the resulting environmental pressures are increasing worldwide. Industry and agriculture are often major water polluters. The increased use of fertilizers and pesticides pollutes groundwater and surface water. Circular, sustainable patterns of production and consumption mean reducing pressures on ecosystems and improving the treatment and reuse of wastewater as a source of water, energy and nutrients. The positive impacts on water quality and supply through increased safe wastewater reuse also represent a step forward in public health, environmental sustainability and economic development, creating new business opportunities and more green jobs. Wastewater is a valuable source of water and nutrients for plants, contributing to water and food security and improving livelihoods. Wastewater can also be used in industrial symbiosis.

Integrated water management

The anthropogenic pressures on water resources are increasing unsustainably, while the impacts of climate change are intensifying in the aquatic environment. Unfortunately, the world cannot achieve the 2030 Sustainable Water and Sanitation Goal (SDG 6). Water demand is increasing to feed a growing population, meet growing energy needs, serve expanding urban areas and meet industrial demands. These challenges are exacerbated by climate change, which increases the variability of water flows, causing more frequent and extreme floods and droughts. Improving water use and management is urgently needed to sustain our development.

Integrated Water Resources Management (IWRM) is an approach that helps balance the competing water needs of society and the economy without compromising the sustainability of vital ecosystems. This is achieved through coordinated policy and regulatory frameworks, management measures and financing. It will consider the different users and uses of water and aim to promote positive social, economic and environmental impacts at all levels, including, where appropriate, at the transboundary level. Coordination across sectors and borders is essential. Effective coordination of ecosystem protection and restoration means that plans must be integrated across sectors and governments.

Human rights and equity issues

Inadequate water and sanitation are serious causes of death: access to water and sanitation is a fundamental human right. Billions of people worldwide lack access to safely treated water, further increasing inequality. Disseminating hygiene knowledge and implementing sanitation facilities can be seen as life-saving, highly cost-effective health interventions.

Most disasters are water-related, and climate change is increasing their frequency and severity. Underdeveloped communities are more vulnerable to the impacts of disasters, which increases inequalities and undermines sustainable development. Adaptation of water supply and sanitation infrastructure is vital to make societies and the natural environment resilient to increasing disasters.

Women, girls, older people and people with disabilities are the most vulnerable groups in society. In some countries, especially developing countries, communities without safely managed water sources are usually far from home, and women and girls typically bear the brunt of the time and energy spent on water collection.

Foreign policy and diplomatic dimensions of water management in Hungary

Hungary has been an active participant in shaping global and European water policies for decades. Our commitment makes it possible, and our diplomatic and foreign economic interests make it necessary for us to continue participating in these processes. Our country is interested in the future development of water policy in many respects. Water is also strategically important from a foreign policy perspective, particularly for sustainable development, poverty reduction, food and nutrition security, human development, climate change mitigation, environmental protection and the conservation of biodiversity and ecosystems, as well as for humanitarian action, peace and stability.

Water plays a crucial role in maintaining international peace and security, and international diplomacy should seek to ensure that conflicts over water supply do not become a new security threat to the world. The world has 280 rivers and 600 aquifers that cross national borders, with 40% of the world's population living in such areas. Localised water crises can, therefore, easily become sources of conflict that lead to the eruption of larger-scale tensions.

Hungary has prioritised water diplomacy, and its performance within the UN framework is clearly recognised, especially in transboundary water cooperation and water security. The starting point for Hungarian water diplomacy is that water is fundamental to environmental, social, cultural and economic systems at global, regional and local levels, while at the same time, human activities are putting increasing pressure on the quality and quantity of water resources worldwide. The impacts of climate change are mainly felt in the water sector.

Proposed priorities for the international engagement of Hungarian water diplomacy

1. Water issues should be addressed as integral to conflict prevention, conflict resolution, stabilisation and migration prevention. When analysing conflict in fragile states and conflict-affected areas, it is important to consider water risks. Priority should be given to regions/countries affected by water migration in expanding our water-industry exports.
2. Cooperation on water issues is also an opportunity to take measures to promote peace. Such cooperation should ensure complementarity between humanitarian, development and peace operations and prevent the emergence of humanitarian crises related to water and sanitation. Training, knowledge transfer and awareness-raising can play a crucial role in this area, where Hungary has considerable experience and capacity.
3. Strengthen the visibility and integration of water security in global and EU strategies and policies. In this context, water security should be addressed in conjunction with food and energy security and improving social well-being and ecosystem services. Integration of water and climate policies at international, national and local levels should also be promoted. Water-related measures should be more strongly integrated into national climate strategies and plans, and greater emphasis should be placed on transboundary and regional cooperation on the water–climate nexus.
4. Bearing in mind that the implementation of Sustainable Development Goal 6 (SDG6) is still seriously lagging, the water dimension and dialogue in the external policies of the EU and its Member States, as well as in the activities and institutional capacities of the UN, should be strengthened. Support the establishment of an integrated water management organisation within the UN framework.
5. Actively shape EU water policy post-2027 by revising the Water Framework Directive. Advocate for the EU to support the development of country and regional integrated water strategies, the need to streamline the planning system (WFD, RIS).
6. We urge the countries of the Carpathian Basin and the V4 to take united action on water issues.

References

Buzási, Attila – Pálvölgyi, Tamás – Szalmáné Csete, Mária (2021): Assessment of Climate Change Performance of Urban Development Projects – Case of Budapest, Hungary. *CITIES: The International Journal of Urban Policy and Planning,* 114. Online: https://doi.org/10.1016/j.cities.2021.103215

Gazdag, Ferenc (2011): Mérlegen a 2011-es magyar EU-elnökség. *Nemzet és Biztonság – Biztonságpolitikai Szemle,* 4(10), 72–85. Online: www.nemzetesbiztonsag.hu/cikkek/gazdag_ferenc-merlegen_a_2011_es_magyar_eu_elnokseg.pdf

Ijjas, István – Somlyódy, László – Józsa, János (2017): Vízbiztonság Európában, a Duna vízgyűjtőjén és Magyarországon. In Finszter, Géza – Sabjanics, István (eds.): *Biztonsági kihívások a 21. században.* Budapest: Dialóg Campus. 423–462.

Ijjas, István (2019): *Integrált vízgazdálkodás. A hidroinformatika születése – európai és globális integráció.* Budapest: Typotex Kiadó.

Kármán-Tamus, Éva – Pálvölgyi, Tamás (2022): A fenntartható energiagazdálkodás szociális dimenziói. *Gazdálkodás,* 66(4), 324–341. Online: https://doi.org/10.53079/GAZDALKODAS.66.4.t.pp_324-341

OECD (2015): *Principles on Water Governance.* Online: www.oecd.org/cfe/regionaldevelopment/OECD-Principles-on-Water-Governance-en.pdf

Orlóci, István (2009): A kerettervek jelentősége a magyar vízügyek fejlesztésében. *Hidrológiai Közlöny,* 89(3), 1–4.

Pálvölgyi, Tamás – Kovács, Lajos (2023): Local Authorities at the Forefront of Climate Policy. *Social Horizons – The Journal for Social Sciences,* 3(5), 135–149. Online: https://doi.org/10.5937/drushor2305135P

Reich, Gyula (1997): *A vízügyi igazgatóságok helye és szerepe a területi közigazgatásban. Magyar Közigazgatási Intézet: „Érvek és ellenérvek". Adalékok a területi államigazgatás reformjához.* Budapest: Magyar Közigazgatási Intézet.

Reich, Gyula (2011): A hazai vízgazdálkodás intézményrendszere. MTA Köztestületi Stratégiai Programok. In Somlyódy, László (ed.): *Magyarország vízgazdálkodása helyzetkép és stratégiai feladatok.* Budapest: Magyar Tudományos Akadémia. 289–330.

Reich, Gyula (2023): Globális összefogás a vízért. Interjú Kőrösi Csabával az ENSZ közgyűlés elnökével. *Mérnök Újság,* May 2023, 14–16.

Somlyódy, László (2002): *A hazai vízgazdálkodás stratégiai kérdései. Magyarország az ezredfordulón.* Budapest: Magyar Tudományos Akadémia.

Somlyódy, László (2008): Töprengések a vízről – Lépéskényszerben. *Magyar Tudomány,* 169(4), 462–473. Online: www.epa.hu/00600/00691/00052/pdf/EPA00691_magyar_tudomany_2008-04_462-473.pdf

Somlyódy, László ed. (2011): *Magyarország vízgazdálkodása: helyzetkép és stratégiai feladatok. Köztestületi Stratégiai Programok.* Budapest: Magyar Tudományos Akadémia. Online: www.gwpmo.hu/sources/root/upload/viz_net.pdf

Széchenyi István (1846): *Eszmetöredékek, különösen a Tisza-völgy rendezését illetőleg.* Pesten, Trattner és Károlyi betűivel.

Primary sources

Government Decree 1110/2017 (III.7.) Adopting the National Water Strategy and the Action Plan for its Implementation.

Government Decree 1242/2022 (IV.28.) on Hungary's 2021 River Basin Management Plan.

Government Decree 1480/2022 (X.13.) on Hungary's Flood Risk Management Plan 2021.

Government Decree 1828/2021 (XI.30.) on the Measures Necessary to Fulfil the Qualifying Conditions of the National Water Utility Public Service Strategy.

Government Decree 221/2004 (VII.21.) on Certain Rules of Watershed Management.

Danube Region Strategy (s. a.). Online: https://dunaregiostrategia.kormany.hu/

Danube River Basin Management Plan Update 2021 (3rd DRBMP). Online: www.icpdr.org/tasks-topics/tasks/river-basin-management/danube-river-basin-management-plan-2021

Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy. OJ L 327, 22.12.2000, 1–73.

Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. OJ L 288, 6.11.2007, 27–34.

European Commission (2016): *Danube Strategy: A Success Story.* Luxembourg: Publications Office of the European Union. Online: https://ec.europa.eu/regional_policy/information-sources/publications/brochures/2016/danube-region-strategy-success-stories_hu

European Commission (2020): *Report from the Commission to the European Parliament and the Council on the Implementation of the Marine Strategy Framework Directive* (Directive 2008/56/EC). COM(2020) 259 final. Online: https://eur-lex.europa.eu/legal-content/HU/TXT/HTML/?uri=CELEX:52020DC0259

Helsinki Convention (1992): Government Decree No 130/2000 (11 July) on the Proclamation of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, signed in Helsinki on 17 March 1992.

Hungary' River Basin Management Plan 2021 (VGT3). Online: https://vizeink.hu/vizgyujto-gazdalkodasi-terv-2019-2021/vgt3-elfogadott/

Hungary's Flood Risk Management Plan 2021 (FRMP2). Online: https://cdn.kormany.hu/uploads/document/f/f4/f4d/f4d7c010cc9b7f2cbba8cf8ad85ed8ccdaa60519.pdf

ICPDR (2021): *Climate Change Adaptation Strategy.* 2019. Online: www.icpdr.org

National Water Strategy (Jenő Kvassay Plan) 2017. Online: www.vizugy.hu/vizstrategia/documents/997966DE-9F6F-4624-91C5-3336153778D9/Nemzeti-Vizstrategia.pdf

Ramsar Convention (1971): Act XLII of 1993 Consolidating the Convention on Wetlands of International Importance especially as Waterfowl Habitat, adopted at Ramsar on 2 February 1971, and its amendments adopted between 3 December 1982 and 3 May 1987.