

National implications of recent revisions to EU water legislation and of external pressures on water resources for DRB countries

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Purpose of this document

This document presents analysis of responses provided by the Danube River Basin countries stakeholders to an in-depth assessment on the national implications of the changes in the existing water-related EU policies. In addition, stakeholders' perception of the most pressing external challenges to water resources is also presented.

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1 Introduction

The purpose of this document is to present an analysis of responses to the in-depth assessment of national implications of the recent European Union (EU) policy challenges and external pressures that may impact water resources in the DRB countries. The assessment took place in the second half of 2025 in the frame of the Tethys project. All involved project partners consulted their national responsible bodies and compiled responses, which were then jointly evaluated.

The assessment is of a qualitative, descriptive nature and aims to draw a picture of what the national concerns, stand-points and needs are. Where similar problems exist and what is specific in certain DBR countries.

The changes in legislation and the external challenges identified in the frame of the Tethys project, which formed the background material for this assessment, are described in the report “Detailed summary of policies and external challenges considered in the assessment”¹. The survey template can be found in Annex 6.1 and the complete responses of all participating in the survey countries are included in Annexes 6.2-6.6.

It should be noted that not all countries were in position to respond to every single question. Some general remarks are given here:

- Austria provided responses only to the changes in the Urban Waste Water Treatment Directive,
- Serbia provided a separate document, in which they explained their situation and provided relevant information. This document can be found in Annex 6.6.
- All other participating countries, namely: Bulgaria, Croatia, Hungary, Montenegro, Republika Srpska, Romania, Slovakia, Slovenia and Ukraine tried to respond all questions they were able to receive input for. If no response was received from them, it is noted in the Annexes 6.2-6.6 as “No response provided”.

2 Summary

EU water legislation has recently undergone extensive revisions, resulting both from regular policy review cycles and from ongoing technical and scientific progress². Improved understanding of impacts of hazardous substances (HS) on the environment and human health as well as technological progress – particularly enhanced possibilities for HS identification, quantification,

¹ Available online at: <https://interreg-danube.eu/projects/tethys/news/report-on-report-on-eu-policy-changes-and-external-challenges-to-future-water-pollution-and-quality-control-available-to-read>.

² For details see Tethys project report on EU policy changes and external challenges to future water pollution and quality control, “Deliverable 3.1.1: Detailed summary of policies and external challenges considered in the assessment”, available online at: <https://interreg-danube.eu/projects/tethys/library?page=2>.

and treatment – have contributed to these revisions. Danube countries face numerous challenges in implementing these increasingly demanding requirements. A survey carried out with representatives from most Danube countries has revealed considerable differences in preparedness, infrastructure quality, monitoring systems, analytical capacities, and institutional coordination. Selected findings related to key water-policy areas are summarized below.

The overall conclusion is that while most countries recognize the environmental importance of the revised directives, many remain only partially prepared for implementation. Successful implementation of the revised legislation will require:

- large-scale financial investment,
- modernization of laboratories and monitoring systems,
- harmonized methodologies,
- improved technical guidance,
- capacity building and staff training,
- stronger institutional coordination.

Without substantial support, many countries may struggle to comply with the revised legislative requirements.

Water Framework Directive (WFD), Groundwater Directive (GWD), and Environmental Quality Standards Directive (EQSD)

Technical and analytical challenges: The revised policies introduce stricter environmental standards and significantly expand monitoring obligations. Most respondents identified analytical complexity and resource limitations as the most significant implementation barriers. Many newly proposed EQS values require extremely low detection limits that existing laboratory equipment and analytical methods cannot currently achieve. The absence of harmonized analytical methods across the EU creates difficulties in comparing monitoring results and undermines confidence in data quality and consistency. Consequently, respondents emphasized the need for major investments in laboratory modernization, advanced instrumentation, and methodological development.

Monitoring capacity and preparedness: Monitoring readiness varies significantly among countries. Countries such as Slovenia and Romania report relatively advanced monitoring systems with integrated datasets, well-developed analytical frameworks and stronger laboratory infrastructure. In contrast, countries including Bulgaria, Montenegro, and Republika Srpska report limited laboratory capacity, insufficient analytical tools and overall weak institutional readiness.

Resource and institutional constraints: Human and financial resources are widely considered to be already under pressure. Insufficient laboratory capacity and limited technical expertise have raised concerns regarding institutional overload and staff burnout. Insufficient communication between policymakers and technical experts has also been identified as a key problem.

Urban Waste Water Treatment Directive (UWWTD)

Substantial differences exist between countries in terms of wastewater infrastructure development, treatment coverage, and UWWTD implementation readiness. Several key aspects are highlighted below.

Existing infrastructure and compliance with old UWWTD: While Austria and Slovakia report no major compliance constraints with the old UWWTD, other countries continue to face significant structural deficits, especially regarding sewerage coverage, treatment infrastructure and stormwater management. Reliance on individual wastewater systems is particularly high in Montenegro, Croatia and Slovenia.

Treatment requirements: Significant regional disparities exist regarding secondary and tertiary treatment coverage. Austria, Slovenia, and Slovakia report the highest secondary treatment coverage, while Bulgaria, Romania, Croatia, Montenegro, and Republika Srpska report substantially lower levels. The revised directive is expected to require a substantial modernization wave, with Croatia, Romania, Republika Srpska and Ukraine estimating upgrade needs in 57%, 92%, 100%, and 100% of their facilities, respectively. No country currently reports operational quaternary treatment in large urban WWTPs.

Energy neutrality: The revised UWWTD introduces ambitious energy neutrality objectives. Austria demonstrates the most advanced progress in this regard. Other countries report growing but limited renewable energy integration and thus significant future investment needs.

Stormwater overflows: One of the weakest implementation areas identified relates to stormwater overflows and urban runoff monitoring. Only selective or pilot monitoring activities currently exist in the analysed countries.

Overall, across countries, aging infrastructure and financing gaps emerge as dominant recurring challenges. The implementation of quaternary treatment represents one of the largest future investment challenges under the revised UWWTD, as well as stormwater overflow management.

Drinking Water Directive (DWD)

Implementation of the revised DWD remains uneven across Danube countries. Hungary, Romania, Slovenia, and Croatia report relatively advanced implementation progress and higher levels of compliance, while in Slovakia and Bulgaria legal transposition has advanced more rapidly

than practical implementation and operational compliance. Montenegro is still in an early stage of transposition, while Ukraine faces exceptional implementation difficulties due to wartime conditions.

Water Safety Plans (WSP): The development of WSPs is still at an early stage in most countries. Most countries report that WSPs are still under preparation at the watershed abstraction-point level, while at water supply level, Hungary reports full implementation, Romania – 75%, whereas other countries still being less advanced in this process.

Newly introduced drinking water parameters: The monitoring of newly introduced parameters such as PFAS, bisphenol A, disinfection by-products, and watch-list substances remains at an early stage in most countries that are currently preparing for future mandatory monitoring, conducting pilot studies or preliminary surveys and upgrading analytical capacities.

National databases and data management: Most surveyed countries possess national drinking water databases; however, their maturity and functionality differ substantially. Croatia, Hungary, and Slovenia report relatively advanced systems. Slovakia has a functioning system but requires modernization and expansion. Other countries indicate various constraints in this regard.

National Plans for upgrading drinking water treatment infrastructure: Only a limited number of countries report comprehensive national programmes for upgrading drinking water treatment plants, e.g. Croatia and Romania, while Montenegro, Slovakia, Slovenia, and Ukraine report no comprehensive national upgrade programmes currently in place.

Risk Assessment and Risk Management: Risk-based management approaches remain operationally complex and resource intensive. Respondents identify especially lack of clear methodologies, insufficient and fragmented data inventories, difficulties in integrating and interpreting multiple information sources, insufficient expertise and challenges in coordination among involved parties.

Main Bottlenecks and recommendations

The most important bottlenecks highlighted in the survey include:

- insufficient funding,
- outdated or insufficiently developed infrastructure,
- insufficient laboratory capacity, weak availability of standards and accredited entities,
- shortage of qualified staff.

Recommendations at national level emphasize the importance of:

- stronger institutional coordination,
- increased investments in monitoring and infrastructure,

- improved databases and digital systems,
- staff training and capacity building.

Recommendations at EU Level focus primarily on:

- more realistic implementation deadlines,
- availability of technical guidance and support,
- simplifying reporting procedures,
- sharing of best practices.

External drivers and future pressures affecting water resources management

Besides challenges linked to legislative changes, there are numerous external factors that authorities responsible for water resources management must consider in their activities. The respondents of the survey identified climate change as the dominant external driver affecting future water management, expected to place substantial additional pressure on both drinking water and wastewater infrastructure. Consistently increasing pressures (partially interrelated and/or overlapping) are associated with:

- Extreme weather events like droughts and floods,
- Changing precipitation patterns,
- Water quality deterioration, due to the above factors and additional climate- and non-climate related processes.

Beyond climate change, respondents highlighted several additional pressures:

- Demographic changes, population aging and changes linked to urbanization, all of which contribute to changes in the patterns of HS emission to water (e.g. of higher pharmaceuticals consumption to mention just one),
- Technological transformation, which can both – positively and negatively – influence water resources management and HS pollution,
- Economic transformation,
- Digitalization,
- Geopolitical instability.

Countries indicated certain tools that may support future planning and adaptation efforts, like:

- Demographic projections,
- Climate adaptation plans,
- Economic development forecasts.

- Low-carbon development strategies,

It is considered important that future actions, including drafting future River Basin Management Plans and water management strategies put strong focus on:

- Climate adaptation,
- Pollution prevention,
- Infrastructure modernization,
- Resilience of water systems,
- Financial sustainability.

Last but not least, financial limitations are repeatedly identified as one of the most critical barriers to future preparedness.

3 National implications of recent EU legislative changes in the field of water quality and pollution control

This chapter presents results of analysis of policy-related responses to each of the question asked in the in-depth assessment.

3.1 Water Framework Directive, Groundwater Directive and Environmental Quality Standards Directive

Overall challenges and needs linked to the implementation of the revised legislation

3.1.1 Expected implementation challenges

Question 1 Which of the above-mentioned (and described more in detail in the “Supplementary document”³) potential changes in the listed directives do you expect to cause particular difficulties and potential bottlenecks in practical implementation in your country/region?

There is strong consensus across surveyed countries that technical aspects and resource limitations are the primary bottlenecks in the implementation of the WFD and its daughter directives. Expansion of scope of compounds to be monitored and the related consequences for the MS are perceived as a major concern.

Responses provided can be assigned to following main categories of challenges:

- 1. Analytical and technical complexity** – mentioned by most respondents.

³ Available at the project website:

This category covers the following:

- Stricter EQS values and lower detection limits, widely seen as technically difficult or even currently unachievable.
- Introduction of new substances (e.g. PFAS, pharmaceuticals, antimicrobial resistance (AMR) indicators) that requires new analytical methods and advanced equipment, acquisition of both being time and financial resources consuming.
- Lack of standardized methods contradicts assuring striving towards comparability and high quality of results across countries. It also lowers the trust in the results obtained.
- Monitoring more compounds increases sampling complexity and data processing demands.

2. *Resource constraints* - mentioned nearly by all respondents.

This encompasses:

- Insufficient financial resources
- Lack of trained personnel
- Limited laboratory capacity

3. *Legislative and administrative challenges*

- Transposition into national law is seen as complex and time-consuming, and so difficult to be met with the proposed tight deadlines.

3.1.2 Expected consequences

Question 2 What can be the expected consequences of those difficulties and bottlenecks?

Consequences identified are of regulatory (non-compliance) and operational (capacity strain) nature. To certain extent they were already mentioned in responses to the previous question. In general, they can be subdivided into the following categories:

1. *Risk of non-compliance*

Many countries envisage:

- Delays or failure in meeting WFD obligations
- Potential infringement procedures and fines to follow them

2. *Monitoring gaps*

Possible outcomes include:

- Incomplete chemical status assessments to be available
- Data gaps in River Basin Management Plans

3. *Financial and institutional pressure*

This encompasses especially increase in costs for:

- Laboratory equipment, IT related expenses
- Monitoring programs
- Implementation measures
- Training of laboratory, and not only, staff, and so to linked increased risk of institutional overload and staff burnout

4. *Management-related challenges*

- Stricter EQS may mean that for certain water bodies and groundwater it will be very difficult to achieve good status, therefore additional measures are needed increasing the financial burden for MS
- Poor analytical capacity may lead to unreliable or incomplete results giving a false information on the actual status. This goes hand by hand with risk of selecting wrong management measures, and thus a missed opportunity with relevant costs.

3.1.3 Institutional Needs

Question 3 What are the specific needs in this respect of the institutions responsible for the related law implementation?

The input provided with different level of detail covers generally the same issues raised by respondents that can be clustered into five main categories of needs, which to a certain extend interlink or overlap.

1. Financial resources

- Almost all countries emphasize strong need of increased and stable funding, in particular for:
 - Laboratory equipment and infrastructure
 - Monitoring programs
 - Staff
 - Sometimes also for outsourcing specialized activities

2. Human capacity and expertise

A common major shared concern is lack of qualified personnel. Among the key needs:

- Recruitment of new staff
- Training and upskilling existing experts

3. Methodologies, standards and scientific support

Several countries stress the need for:

- Standardized analytical methods
- Harmonized monitoring procedures
- Access to EU-level guidance (e.g., JRC support)

4. Laboratory capacity & technical infrastructure

Many countries highlight gaps in:

- Laboratory equipment
- Analytical capabilities
- Accreditation and validation systems and laboratories
- Lack of standardized indicators
- Need of creation of conditions (legal mechanism and organization) for shared use of resources (e.g., laboratories)

5. Institutional cooperation

Better inter-institutional cooperation and information sharing systems are seen necessary.

3.1.4 Additional Challenges

Question 4 Are there other challenges and difficulties, not mentioned above, nor described in the “Supplementary document”, which, based on their knowledge and expertise in the field, the experts expect to encounter as a consequence of the proposed changes in the legislation?

Challenges that go beyond technical and resources-related issues include mainly governance and complexity, as detailed below.

1. Governance and coordination issues

- Weak coordination between authorities complicates implementation
- Expected tension between the increasing workload (sample, frequency) and the available laboratory capacity

2. Methodological and legislative complexity

- High number of amendments causes difficulties understanding the requirements of the revised directives
- Insufficient expert capacity can lead to diverse interpretation by different responsible bodies/in different countries
- As legislation is not usually prepared by experts directly involved in their implementation, this can lead to omissions, inconsistencies, and incompatibility with existing documents, and sometimes to distortions.
- Some proposals have consequences difficult to predict because the procedures and guidelines will be published later

3. Risk of misaligned priorities

- Focus on new pollutants may reduce attention to existing ones

4. Undesired impacts

- The application of modern treatment techniques and technologies can generate waste that must be disposed of (pollution, energy consumption, increased costs) or have other undesired environmental impacts.

Regarding the monitoring of priority hazardous substances and river basin specific pollutants

3.1.5 Monitoring programme planning

Question 5 What is the procedure for planning monitoring programmes in your country/region? Do you already have plans for sampling frequencies and monitoring cycles?

Most countries demonstrate alignment with the WFD, but differences remain in institutional complexity, monitoring cycles, and technical details. High level of alignment is mentioned by the EU respondent countries regarding:

- 6-year planning cycles
- integration with RBMPs
- defined monitoring objectives

Most countries apply:

- Multiannual strategic plans
- and annual operational updates

Only some countries (Bulgaria, Romania) mention the frequency. In this case - monthly sampling with risk-based adjustments.

Some more details of the responses given can be found in the below table.

Table 1 Monitoring programme planning

Country	Planning authority	Planning structure	Monitoring cycle	Sampling frequency	Other Features
Bulgaria	Basin Directorates + Executive Environment Agency + National Institute of Meteorology and Hydrology	Multi-level (RBMP + implementation)	Linked to RBMP	once per cycle of the RBMP with freq. 12/year for priority substances	Multi-agency system
Croatia	Croatian Waters	Multi-annual (RBMP, e.g. 2025–2027) + annual plans	Linked to RBMP	Not specified	
Hungary	Not specified	6-year framework + annual breakdown	6-year WFD cycle	Not specified	
Montenegro	Government	Annual programme	Annual (aligned with WFD)	Not specified	
Republika Srpska	Vode Srpske + Ministry of Agriculture, Forestry and Water Management	Annual programme	No plan for monitoring cycles	Defined in Monitoring Programme	
Romania	Not specified	WFD-based	6-year cycle	At least monthly for one year during the RBMP cycle and at least monthly every year, in biota at least once every year	Adjustments to the frequencies are possible based on technical knowledge and expert judgement
Slovakia	Not specified	6-year plan + annual updates	6-year cycle, updates on annual basis	Not specified	
Slovenia	Slovenian Environment Agency	Multi-annual (now 2022-2027)	6-year cycle	Not specified	

Country	Planning authority	Planning structure	Monitoring cycle	Sampling frequency	Other Features
Ukraine	Ministry of Economy, Environment and Agriculture	National programme	Not specified	Included but not specified here	

3.1.6 Selection of monitoring approach

Question 6 Please explain how the monitoring sites for priority (hazardous) substances are selected in your country/region?

- Using the surveillance monitoring network, and measuring all compounds?*
- Or maybe starting with investigative/operative monitoring programs to screen the most vulnerable water bodies?*

Most respondents indicate application of a hybrid approach with surveillance monitoring complemented by investigative/operational based on the anthropogenic pressures assessment and especially applied for vulnerable water bodies. All priority substances are monitored e.g. in Bulgaria, Croatia and Slovakia. Romania and Republika Srpska indicate that the monitoring is limited to the compounds for which anthropogenic pressures are identified.

More details are shown in the below table.

Table 2 Monitoring approach

Country	Main Approach	Use of Surveillance Monitoring	Use of Risk / Pressure-Based Monitoring	Monitor all PS	Notes
Bulgaria	Hybrid (surveillance + risk-based)	Yes (national network)	Yes (vulnerable water bodies, pressures)	Yes (all priority substances, with grouping exception)	No formal methodology, flexible to add points if risk is identified
Croatia	Hybrid	Yes (all substances at surveillance sites)	Yes (operational monitoring based on pressures)	Yes (at surveillance sites)	
Hungary	Hybrid (surveillance-based)	Yes (core system)	Yes for targeted programmes, (e.g. pesticides)	Not specified	Thematic operational programmes complement surveillance
Montenegro	Surveillance-based	Yes	Not specified	Not specified	

Country	Main Approach	Use of Surveillance Monitoring	Use of Risk / Pressure-Based Monitoring	Monitor all PS	Notes
Republika Srpska	Hybrid	Limited to substances identified in screening	Yes (only where pressures identified)	No	Monitoring triggered by anthropogenic pressures
Romania	Hybrid	Yes (where pressures identified)	Yes (where pressures identified)	No	Monitoring triggered by anthropogenic pressures
Slovakia	Hybrid	Yes	Yes	Yes (all compounds)	
Slovenia	Hybrid	Yes (baseline + trends)	Yes	Not specified	
Ukraine	Hybrid	Yes (basis for selection)	Yes (risk, protected areas, water use)	Not specified	

3.1.7 Availability of tools, instruments and resources

Question 7 Do relevant institutions or responsible bodies in your country/region have available the tools, instruments and resources to identify sources and emission pathways for priority (hazardous) substances and river basin specific pollutants? If yes, please explain what they are.

The responses indicate significant variation in national institutional capacities (i.e. the tools, instruments and resources) to identify sources and emission pathways of priority HS and river basin specific pollutants, with differences mainly driven by availability of analytical tools, data quality, and institutional integration.

The overall capacity, as specified by the respondents, can be assigned to three following levels:

- **Advanced systems:** Slovenia and Romania demonstrate strong capabilities, using integrated datasets, modelling tools, and structured analytical frameworks aligned with the WFD.
- **Moderate (partial) capacity systems:** Croatia, and Republika Srpska have partial systems, often combining monitoring, registers, and regulatory approaches but lacking full integration.
- **Limited capacity systems:** Bulgaria lacks tools (digital models) and experiences gaps in reliable data. Montenegro lacks in-house tools but relies on external laboratories. Slovakia also highlights lack of both – tools and resources.

Looking more into detail, we can see that regarding:

- **Tools and models:** Only few countries use specific tools and models (e.g. Romania used MONERIS model to define significant diffuse pressures, Slovenia has extensive datasets).

- **Data availability:** Data gaps, especially for wastewater and diffuse pollution, are a major constraint (e.g. in Bulgaria, Croatia).

The most common challenges indicated are:

- Insufficient data and weak data integration
- Lack of dedicated analytical tools
- Difficulty identifying pathways for new PS
- Insufficient technical capacity

3.1.8 Monitoring capacity

Question 8 Is the necessary capacity available for monitoring in your country/region?

In general, the monitoring capacity is considered insufficient for meeting the new requirements by most respondents. Clear differences across countries can be observed, primarily in terms of technical capability, human resources, and readiness for future requirements under the revised WFD.

Sufficient or strong capacity is considered available only in:

- Slovenia.
- and Romania, which, however, emphasizes the need for continued investment.

Moderate capacity (functional but constrained) is available in Croatia, Slovakia, Ukraine. They highlight limitations especially regarding:

- New pollutants measurements
- Applying stricter EQS
- Advanced analytical methods

Insufficient capacity is available in Bulgaria, Montenegro, and Republika Srpska. All they report significant gaps, including:

- Lack of qualified staff
- Limited laboratory capacity
- Inability to fully meet directive requirements

3.1.9 Potential EQS exceedances

Question 9 Are you already aware of potential exceedances of new (proposed) Environmental Quality Standard (EQS) values? Have targeted surveys been carried out to evaluate such a risk?

The responses show early stage of implementation across most countries and uneven levels of awareness and preparedness regarding potential exceedances of newly proposed EQSs under the WFD. While some countries have begun preliminary analyses or screening, most have not conducted such surveys yet, which indicates an overall early stage implementation.

Proactive engagement can be demonstrated in:

- Slovakia, which carries out assessment of new RBSPs that are being selected based on combination of experiences with the current list of RBSPs, non-targeted and targeted screening, quantitative analysis and comparison to PNECs. The prioritization is ongoing under the frame of NORMAN prioritization scheme.
- Croatia that conducted initial analyses, but only for existing substances with stricter EQS
- Bulgaria that has measurement of the Watch List substances, allowing potential assessment, but no formal analysis has been carried out so far.

Among other countries, which expressed awareness but have not yet begun with any targeted surveys are:

- Romania
- Republika Srpska
- Montenegro
- Ukraine

Hungary and Slovenia state no awareness of potential exceedances.

3.1.10 Selection of River Basin Specific Pollutants

Question 10 River basin specific pollutants shall be identified on the basis of the assessment of pressures and impacts on surface water bodies. How is planned to carry out this assessment, i.e. how will new river basin specific pollutants be selected?

The responses show varying levels of development and vary in detail level on how they plan to identify River Basin Specific Pollutants (RBSPs) under the Water Framework Directive. Some countries refer to pressure and impact assessments, like Croatia, that will cover sources of pollution (industry, agriculture, sewage, traffic), as well as on review of data from existing monitoring of water status and waste water monitoring. The later will also be carried out in Romania. In Slovenia this activity will be outsourced to an expert. In Ukraine target and non-target screening of potential candidates is planned. No plan is available at the moment in Republika Srpska that goes beyond already identified compounds. Slovakia highlights lack of guidance, especially for deriving EQS.

3.1.11 Challenges in deriving EQS

Question 11 Does your organisation or responsible body have ideas regarding new river basin specific pollutants for which, however, it will be difficult to deliver EQS values?

The responses indicate that most countries are at an early or transitional stage in identifying new RBSPs and addressing the challenges of deriving EQSs. Some countries report ongoing work (e.g. Croatia, Bulgaria, Ukraine) in their countries. Certain respondents (e.g. Slovakia) consider this task as a difficult one and point out that easy to understand guidance is missing. Other highlight data limitations (Romania) or lack of capacity (Croatia, Montenegro) as the main bottlenecks.

As a result, EQS development for new RBSPs seems to be a relevant challenge in the implementation of the WFD.

3.1.12 Challenges in checking the compliance with new EQS values

Question 12 Does your organisation or responsible body foresee any specific challenges in having necessary knowledge, resources or in being generally effective in checking the compliance with the new (proposed) EQS values?

Most countries, with the exception of Slovakia, highlight multiple and interrelated constraints with this regard. Checking compliance with the new EQS values is constrained mainly by analytical feasibility and resource limitations. Slovakia does not foresee major challenges, noting that the main issue lies in data handling and validation, not methodology. Other respondents mention the following points:

- Analytical limitations (detection limits below EQS, lack of standardized methods)
- Insufficient laboratory capacity and equipment
- Limited expert staff
- Financial constraints

3.1.13 Spatial scale of monitoring

Question 13 What are the spatial scales for assigning and monitoring the national river basin specific pollutants, i.e. local (few water bodies), regional (e.g. sub-units) or national level?

The responses collected in below table show that selection of the spatial scales in assigning and monitoring RBSPs, reflecting different levels of system complexity.

Table 3 Spatial scale chosen for assigning and monitoring RBSPs

Country	Local Level	Regional (Sub-basin) Level	National Level	Notes
Bulgaria		Yes (river basin)	Yes	Two-tier system
Croatia	Yes	Yes	Yes	Multi-level (integrated) approach
Hungary			Yes	Centralized
Montenegro				The scale not clearly specified but to be applied for water bodies exposed to pressures
Republika Srpska			Yes	Centralized
Romania			Yes	Centralized
Slovakia	Either	Or	—	Not decided yet
Ukraine			Yes	Centralized

Most comprehensive approach is presented by Croatia, i.e., a multi-scale system: local–regional–national. Two-tier approach is indicated by Bulgaria (river basin, national), while national only scale is mentioned by Hungary, Romania, Ukraine, Republika Srpska. The decision is yet to be taken in Slovakia.

3.1.14 Availability of accredited laboratory methods

Question 14 Are there already accredited laboratory methods in place to measure the compounds planned (according to the latest proposal) to be monitored?

Analytical readiness is one of the weakest areas overall. Some countries already work on this task, as e.g., Slovenia, which is in the process of development or even for some compounds, like PFAS, has accredited methods already in place. Nevertheless, most countries need to begin with this process and face quite substantial difficulties. Main challenge is not accreditation itself, but the absence or early stage of development of analytical methods for new substances. As a result, most countries do not feel yet well prepared to monitor newly proposed pollutants, highlighting a critical gap between regulatory developments and technical implementation.

Regarding the control of industrial emissions

3.1.15 Plans to Reduce Industrial Emissions

Question 15 Are there plans to reduce emissions by introducing stricter industrial emission thresholds and/or imposing appropriate penalties for exceeding them?

The responses show varying levels of implementation of stricter industrial emission thresholds and imposing penalties for exceeding them. Among the countries, which aims to reduce emissions from industrial sources is Croatia that plans:

- the application of stricter standards from revised BREF documents through the prescription of BAT-AEL values in plant operating permits,
- the prescription of stricter conditions in water management acts (especially in water management permits), in accordance with the objectives of preserving and improving the state of water,
- more frequent implementation of inspections and sanctions in case of exceeding permitted emissions, including administrative measures, fines and the possibility of temporary suspension of plant operation.

Romania also plan to apply stricter limits, monitoring, and enforcement mechanisms (e.g. fines, permit conditions, operational restrictions). Other EU countries have legal provisions or general approaches but provide less detail on their practical implementation. For instance, Montenegro

and Republika Srpska indicate intentions to introduce stricter measures, but do not provide concrete plans yet.

Summarizing, most countries acknowledge the need for stricter emission control and enforcement, but few have operational systems in place, while others are currently at the stage of framework development or planning measures.

3.1.16 Adaptation to BREF Documents

Question 16 Are you aware how the industrial facilities in your country/region deal with adapting the reviewed BREF documents? Are there any particular difficulties encountered with this regard?

The responses show uneven progress in adapting industrial facilities to revised BREF documents under the Industrial Emissions Directive (IED), with differences mainly in implementation maturity and capacity.

Croatia and Bulgaria indicate that this process is ongoing, procedures are in place linking BREF updates to permit revisions and plant upgrades. Croatia highlights as key challenges high costs, technical limitations, and administrative burden along this process.

Ukraine adopted recently the relevant legislation, with full implementation expected by 2029. Republika Srpska points out certain difficulties in adapting to BREF documents but plans to improve the situation. Slovakia reports that this task would be solved during implementation of the revised directives after their adoption.

3.1.17 Use of BAT-AEL values

Question 17 Are the Best Available Techniques – Associated Emission Levels (BAT-AEL) values used for controlling emissions from concerned facilities?

The responses show uneven implementation of BAT-AEL values for controlling industrial emissions.

Croatia and Slovenia have clear and established process of using BAT-AEL, as they are mandatory in environmental (IED) permits and can be used as benchmarks for:

- compliance
- inspections
- enforcement actions

Slovakia, Romania and Bulgaria use them partially, as detailed below:

- Slovakia applies BAT-AEL values only for some installations
- Romania indicates that emission control is handled by environmental authorities, but does not explicitly confirm the use of BAT-AEL values
- Bulgaria refers to responsible institutions but provides no detail on BAT-AEL application, suggesting unclear or indirect use

In those countries the institutional frameworks are in place, but there is certain lack of information on the BAT-AEL implementation.

Finally, non-EU countries, Republika Srpska and Montenegro, do not use these instruments. Whereas Ukraine has recently adopted legislation aligned with the IED, with a transition period until 2029.

3.2 Revised Urban Waste Water Treatment Directive

3.2.1 Problems with existing (old) UWWTD requirements & Development Plans for WWTP facilities

Question 1 In general, what are the potential problems related to the existing (Note: the survey was carried out in April 2025) requirements for wastewater treatment plants (WWTPs) (i.e. according to the old UWWTD)? Does the MS have plans for WWTP facilities development? Tethys project through scenario assessment could be of help to identify the effects of the planned developments.

Across most countries, aging infrastructure requiring extensive upgrades and financing gaps are the main recurring issues. The main points highlighted by single countries are given below:

- Austria reports full compliance with the old UWWTD and identifies challenges mainly in sewer rehabilitation, overflow management, and plant upgrades.
- Slovakia does not report any major compliance gaps but highlights need of improved communication between government bodies and UWWTPs owners/operators and issues in planning of construction of new infrastructure or upgrade of the existing ones.
- Hungary is still finalizing implementing the directive provisions, which are met in 90% of facilities. But they stress financial burdens under the recast Directive. Temporary difficulties link mainly to periodic hydraulic overload and the cold winter conditions influencing process efficiency.
- Croatia, as the youngest EU member state, faces delays in implementation, both with regards to upgrade of the outdated, sometime oversized facilities and construction of new public drainage systems for the collection and treatment of urban wastewater.
- Romania reports insufficient sewage systems availability, especially in smaller agglomerations and due to limited funding.
- Republika Srpska and Ukraine face significant structural deficits, including outdated facilities and limited long-term investment strategies.
- Montenegro identifies the main problems in insufficient coverage of population by sewerage systems, uneven development across municipalities, and inadequate levels of treatment.

3.2.2 Share of wastewater load addressed through individual and other appropriate systems

Question 2 What is the share of wastewater load addressed through individual and appropriate systems (e.g. cesspools, septic tanks)?

Most partners lack systematic inventories and are only able to provide estimations. The situations vary a lot among countries. The available data and estimates indicate significant rural decentralization of wastewater load collection in several countries.

- Austria and Romania report low reliance on individual systems (0,6% and below 2%, respectively).
- Hungary estimates that approximately 10% of load to be addressed through individual systems.
- In case of Slovakia the number is similar for agglomerations above 2000 p.e.
- Croatia estimates that around 27% load in agglomerations >2,000 p.e. is collected by individual systems. 40% of the population overall uses individual solutions for collecting and treating wastewater.
- Slovenia expects that 30–40% of the population will never be connected to WWTPs.
- In Montenegro this share is 47.1%.

3.2.3 Waste water load from agglomerations of 1 000–1 999?

Question 3 What is the waste water load (p.e.) from agglomerations of 1 000 p.e. – 1 999?

Reporting consistency for this agglomeration category varies substantially across analyzed countries.

- Austria and Croatia provide detailed data (approx. 195,000 p.e. in both cases) from those agglomerations.
- Romania reports nearly 2.9 million p.e.
- Slovakia reports around 758,000 p.e..
- Montenegro estimates that approximately 53% of the eligible load is connected to collection systems, 36.7% receives secondary treatment, and 28.1% receives tertiary (more stringent) treatment.
- Data for other countries are either under compilation/revision (Hungary) or are not available (Bulgaria, Ukraine, Republika Srpska).

3.2.4 Storm water overflows

Question 4 Is there an overview on storm water overflows (location, emitted loads)? Do storm water overflows represents more than 2 % of the annual collected urban wastewater load?

The responses show a systemic lack of storm water overflows recording across all analysed countries.

- Austria reports that only partial provincial data is available and estimates thousands of overflows but lacks regular load quantification.
- Hungary acknowledges significant loads in certain combined systems but lacks nationwide recording.

- Croatia, Montenegro, Slovakia, Slovenia, Bulgaria, and Ukraine report no comprehensive overviews available.
- Romania reports that overflows represent less than 2% of load but data available is incomplete.

3.2.5 Collection systems for agglomeration of 1 000–1 999 p.e.

Question 5 What percentage of agglomerations with at least 1 000 p.e. and below 2 000 p.e. are already equipped with collecting systems and all sources of urban wastewater are connected to those systems, or individual systems for the collection, storage and when applicable, treatment of urban wastewater?

The responses provided to this question vary significantly:

- The highest coverage is currently in place in Austria and Slovakia, 100% and 52.8%, respectively.
- Croatia reports at least partial systems availability in 39% of agglomerations. Wastewater collection for agglomerations of this category is predominantly carried out through individual systems.
- Romania reports 26%.
- Bulgaria, Hungary, Montenegro and Slovenia do not provide statistical data regarding this issue.
- Similarly, Republika Srpska and Ukraine who highlight limited infra structure availability in this size class.

3.2.6 Secondary treatment for agglomeration of 1 000–1 999 p.e.

Question 6 What percentage of agglomerations with at least 1 000 p.e. and below 2 000 p.e. are already equipped with secondary treatment?

Regarding availability of secondary treatment in agglomerations with at least 1 000 p.e. and below 2 000 p.e.:

- Austria, Slovenia and Slovakia report the highest coverage, 100%, 100% and 56.9%, respectively.
- Croatia and Romania report approximately 17%, but Croatia indicates that connection rate is still not high. Construction of new plants is envisaged.
- In Hungary precise data on the share is not available, but it is stated that typically wastewater treatment plants are equipped with secondary treatment.
- Montenegro, Ukraine, Republika Srpska and Bulgaria report no statistical data on this aspect.

3.2.7 Collection systems for agglomerations of $\geq 2,000$ p.e.

Question 7 What percentage of agglomerations with at least 2 000 p.e. are equipped with collecting systems and all sources of urban wastewater are connected to those systems, or individual systems for the collection, storage and when applicable, treatment of urban wastewater?

Regarding share of agglomerations with at least 2 000 p.e. equipped with collecting systems and all sources of urban wastewater are connected to those systems, or individual systems for the collection, storage and when applicable, treatment of urban wastewater, partners report very diverging data.

- Austria reports 100% coverage.
- Slovakia and Croatia reports 93% and 77% of partial or full systems, respectively.
- Romania reports 67%.
- Republika Srpska reports collection systems exist, but connection rates vary widely (10–90%).
- Montenegro estimates 41% but highlights that the coverage varies significantly across country.
- Ukraine and Slovenia lack comprehensive data.
- Respective data in Hungary is still under compilation.
- Bulgaria does not provide a precise response.

3.2.8 Secondary treatment for agglomerations of $\geq 2,000$ p.e.

Question 8 What percentage of agglomerations with at least 2 000 p.e. are already equipped with secondary treatment?

Regarding availability of secondary treatment in agglomerations with at least 2 000 p.e. significant regional disparities persist.

- Austria, Slovenia and Slovakia report the highest coverage, 100%, 100% and 91.6%, respectively.
- Bulgaria reports 34.1%.
- Romania – 30% and Croatia – 25%.
- Montenegro – less than 25%.
- Republika Srpska reports only two compliant plants.
- Data is not available for Ukraine.

3.2.9 Tertiary treatment in accordance with the old UWWTD for agglomerations of 10,000–149,999 p.e.

Question 9 What percentage of agglomerations with a load of 10 000 – 149 999 p.e. lack tertiary treatment in accordance with the requirements set out in old UWWTD (Directive 91/271/EEC)?

Significant differences regarding availability of tertiary treatment meeting the old directive requirements exist among responding countries.

- Austria reports full compliance (0% lacking).
- Slovakia reports that 5.3% of respective agglomerations lacks it.
- In the case of Hungary, it is stated that the largest wastewater treatment plants already have tertiary treatment, but “4% of them were inadequate in terms of COD, 8% in terms of BOD5 and 12% in terms of suspended solids. Furthermore, it is estimated that “44% of wastewater treatment plants between 10000 -150 000 P.E. require intervention (reconstruction or construction of a new wastewater treatment plant).
- Romania and Bulgaria report this value to be around 15–16%.
- Croatia reports 67% of agglomerations lacking tertiary treatment.
- In Montenegro this value is between 80 and 85%.
- Republika Srpska and Ukraine lack tertiary treatment entirely.
- No data is provided on this aspect for Slovenia.

3.2.10 Tertiary treatment in accordance with the recast UWWTD for agglomerations of 10,000–149,999 p.e.

Question 10 What percentage of agglomerations with a load of 10 000 – 149 999 p.e. needs to be equipped with technologies that meet the relevant requirements of tertiary treatment referred to in the recast UWWTD?

Responses to this question indicate a major modernization wave in several countries is necessary.

- Austria estimates this value to be 6% as regards phosphorus removal and 19% as regards nitrogen removal.
- Croatia estimates that 57%, of plants need upgrades under stricter recast thresholds.
- In Romania this value is 92%.
- In Montenegro – 57%.
- Hungary does not provide exact numbers but also envisage need for modernization in many plants.
- Republika Srpska and Ukraine indicate 100% of facilities need upgrades.

3.2.11 Quaternary treatment in the urban WWTPs with at least 150 000 p.e.

Question 11 What percentage of the urban WWTPs with at least 150 000 p.e. are already equipped with quaternary treatment?

All responding countries face need for major future investment obligations in this area. None of them reports availability of operational quaternary treatment in any of the urban WWTPs with at least 150 000 p.e.

3.2.12 State-of-art of the use and own production of renewable energy by the urban WWTPs

Question 12 What is the current status of the use and own production of renewable energy by the urban WWTPs?

Energy neutrality by 2045 seems to be one of challenging aspects. Regarding the current status of the use and own production of renewable energy by the urban WWTPs the countries responds as follows:

- Austria reports approximately 70% electricity self-sufficiency in larger plants ($\geq 10,000$ p.e.).
- Slovakia operates 48 biogas facilities from the anaerobic stabilisation, 90% thereof used for production of heat and electricity.
- In Slovenia nine WWTPs have anaerobic digestion, while eight have CHP units covering between 30 and 60 % of their demand. One plant is so far self-sufficient.
- Hungary produces widely biogas in larger WWTPs and is expanding especially installation of solar installations to cover some energy consumption.
- Croatia reports limited but growing solar usage and biogas generation from sludge digestion to cover some internal energy demand.
- Montenegro informs that several UWWTPs are equipped with digesters enabling the production of biogas from the sludge. Nevertheless, due to limited capacity and technical characteristics of the plants, the current electricity production is negligible and generally does not cover even a part of the plant's energy consumption.
- Bulgaria and Republika Srpska do not report any statistic data but mention certain integration of methane utilization facilities and solar systems, respectively.
- Romania does not possess any official information in this respect.

3.2.13 Risk identification of micropollutants from urban WWTPs

Question 13 If the MS have begun already identifying some agglomerations where the concentration or the accumulation of micropollutants from urban WWTPs represents a risk

for the environment or human health as defined in Article 8? And which type of substances are related to it?

In few countries preparatory work to identify the agglomeration under risk (for the environment or human health) have begun, but the approaches differ.

- In Austria preliminary screening of the following compounds was carried out:
 - Priority substances as defined in the WFD and the EQSD (except the ubiquitous substances mercury and polybrominated diphenylethers),
 - River basin specific pollutants according to the WFD as defined for Austria in the Quality Target Ordinance/Chemical Condition of Surface Water (Qualitätszielverordnung Chemie Oberflächengewässer, BGBl. Nr. 96/2006 idgF).
 - For catchment areas of abstraction points for drinking water the chemical parameters (Annex I, part B) and indicator parameters (Annex I, part C) of the DWD were additionally considered
 - Potential future priority substances from the proposal for the recast of the WFD, the GWD and the EQSD.

Two assessments were carried out in Austria: 1) against the current quality standards, 2) against the proposed quality standards of the recast of the WFD, the GWD and the EQSD.

- In Hungary, the identification, focuses mainly on active pharmaceutical ingredients (e.g. diclofenac, carbamazepine), hormones (EE2), and certain heavymetals (e.g. zinc, cadmium).
- In Slovakia the focus is not based on particular compounds but on the risk to water bodies.
- In Croatia, such a screening is first planned and will be focused on microplastics, PFAS, pharmaceutical and cosmetic residues.
- In Ukraine the most problematic compounds identified in the preliminary screening are heavy metals and pesticide pollution.
- In Montenegro, Republika Srpska, Romania and Slovenia such work has not been yet begun.
- Bulgaria does not possess any information with this regard.

3.2.14 Data availability & capacity for Risk Assessment

Question 14 If the MS have:

- a) the necessary data,*
- b) methodological concepts,*
- c) adequate tools, and*
- d) institutional capacity and resources*

to implement such risk assessment?

The situation with this respect varies strongly among countries.

- Austria confirms availability of data, methods, tools, and institutional capacity.
- Slovakia and Hungary report partial readiness. In case of Slovakia the human resources are lacking, while in Hungary all four aspects are only partially met, with methodology and tools being under development.
- Also Romania is currently developing methodological concepts and works on strengthening the institutional capacity.
- Ukraine has some necessary data, uses established EEA methodology and possesses four fully equipped laboratories, but need to be supported with regards to institutional capacity by scientific institutions.
- Bulgaria, Montenegro and Republika Srpska report insufficient resources. In case of Montenegro it is however noted that these are expected to be developed and established in the coming period following the completion of the Implementation Plan for the new Urban Waste Water Directive, which is currently under preparation.
- For Slovenia there is no information available.

3.2.15 Monitoring at inlets and outlets

Question 15 Whether the requirement to carry out monitoring at the inlets and outlets of urban UWWTPs including the concentration and loads in the urban wastewater of the required elements can be met?

In general, the respondents mentioned that the existing legislation already regulates the obligation to take samples at the inlet and outlet, nevertheless the challenge is to expand the scope of the compounds to be analysed as per new proposal. Croatia, Hungary and Romania highlight specifically potential laboratory capacity constraints, as well as lack of standardized methods as main obstacles.

3.2.16 Monitoring of storm water overflows and of discharges of urban runoff

Question 16 Whether representative monitoring of storm water overflows into water bodies and of discharges of urban runoff from separate systems can be carried out to estimate the concentration and loads of the relevant pollutants?

Estimating representative load remains a significant challenge. According to the responses received, this has only been carried out in some research projects or in event-based sampling is e.g. as reported for two Hungarian cities. Austria considers only selective monitoring feasible. Most other countries report insufficient infrastructure and capacity at the moment.

3.2.17 Particular difficulties and potential bottlenecks

Question 17 Which of the described in the “Supplementary document” future changes to the directives do the experts expect to cause particular difficulties and potential bottlenecks regarding practical implementation of the directive in their respective MSs?

Nearly all of the changes in the UUWWTP are mentioned in responses to this question by at least one of the countries, but often by several ones. Quaternary treatment, EPR implementation, energy neutrality, stormwater monitoring, and tight timelines are among the key concerns.

The issue mentioned by most countries is the financial burden associated particularly with the need to implement tertiary and quaternary treatment. Austria, Hungary, Romania, and Ukraine explicitly emphasize high capital and operational costs of upgrading their WWTPs. Establishing new and expanding existing monitoring infrastructure and proper stormwater management systems are also considered very challenging.

An important implementation bottleneck is seen in the new monitoring requirements, in particular the significantly broadened scope of compounds to be measured. With this regard several countries report insufficient laboratory capacity and lack of standardized methodologies. Some implementation barriers arise also from the existing governance structure and insufficient regulatory coordination, like e.g. in Austria due to its federal governance structure, where responsibilities are divided between federal government (wastewater treatment legislation), provincial governments (sewer systems), and municipalities (local infrastructure management).

Several countries see the uncertainty with the implementation of the Extended Producer Responsibility (EPR) as very important.

Some highlight ambitious regulatory deadlines as difficult to be met.

Countries with less developed wastewater infrastructure, like Republika Srpska, Ukraine face much deeper challenges linked to need of constructing basic sewer and treatment infrastructure, at least in major parts of their countries.

Overall, all partners indicated multiple challenges they face, with a bit different focus, depending on the state-of-art of the system and infrastructure in place in their countries, and whether they are already EU members or candidate countries.

3.2.18 Institutional needs

Question 18 What are the specific needs in this respect in their institutions?

Responses show that implementation of the new requirements will require significant institutional transformation, regarding:

- Human capacity development,

- Analytical and monitoring infrastructure development, laboratory equipment upgrades (LC-MS/MS, GC-MS), as well as methodological guidelines,
- Sustainable financing mechanisms as a prerequisite to guarantee successful implementation of the new requirements in mentioned by nearly all countries. Financing mechanisms will in particular be important for countries with weaker existing infrastructure (e.g., Republika Srpska, Ukraine),
- Development of workable solutions for the EPR systems.

Last but not least, providing on time implementing acts announced in the Directive by the European Commission is seen vital, as well as ensuring that they are well aligned with other water directives.

3.2.19 Other challenging, not mentioned before

Question 19 What other challenges (not mentioned above, i.e. urban waste water reuse), do the experts foresee, based on their knowledge and expertise in the field?

Among issues not mentioned already in previous sections, water reuse, ensuring its quality but also enhancing acceptability is one of the challenges indicated. Also, sludge disposal, reuse and recovery of resources like phosphorus or nitrogen are mentioned.

3.2.20 Good examples

Question 20 Are there any good examples that experts/policy managers could share on how to tackle new obligations which Directive imposes (for example, effective technologies on quaternary treatment, management and monitoring of storm water overflows, risk assessment, reuse of treated wastewater, regulation and management of individual systems, EPR system etc.).

Three countries shared their best practices are reported by three countries:

Austria For the assessment, which pollutants mentioned in the WFD, are likely to be found in urban wastewater, three monitoring programs have been elaborated so far: [BMLUK, 2024](#), [BMLFUW, 2017](#), [Umweltbundesamt, 2009](#)

Recent study on stormwater overflows. [BMLUK, 2025](#)

The ÖWAV Code of Practice 19 defines the state of the art for the design of combined sewer systems in AT ([ÖWAV, 2007](#)).

The ÖWAV Code of Practice 35 defines the state of the art in AT for the discharge of storm water into surface waters ([ÖWAV, 2019](#))

Hungary Swiss-Hungarian Cooperation Program's on wastewater that will aid establishing quaternary treatment.

Quaternary treatment pilot: Budapest Central Wastewater Treatment Plant – testing of an activated carbon micropollutant removal unit within the framework of a pilot project.

Stormwater overflow monitoring: Debrecen – construction of an event-based sampling system for overflows (with precipitation intensity detection).

Romania Best practices from Switzerland, which legislation requires already 80% reduction in micropollutants since 2016; thus, they have invested in research and have accumulated experience in the field of the quaternary treatment.

4 Drinking Water Directive recast

4.1.1 Overall Implementation Status

Question 1 To what extent the DWD requirements have been implemented so far in your country?

Across DRB countries, implementation of the new DWD is uneven and still ongoing. The status of this process in different countries is given below:

- Romania reports “reasonable” implementation within deadlines.
- Slovenia reports reasonable progress achieved but still faces certain challenges, mainly concerning small-scale water supplies and the integration of water management practices.
- Croatia integrated DWD requirements into an already complex multi-actor system, but understanding the level of compliance is considered difficult as the responsibility is split among numerous actors.
- In Bulgaria the legal transposition is completed, but no compliance data is available to the project team.
- In Slovakia the implementation is reported as being underway, with no operator being fully compliant.
- Montenegro reports that the implementation is still ongoing as the national law is still in a draft form and many operational elements need to be still developed.
- In Ukraine, due to the war, the situation is difficult, and the State Sanitary Rules and Norms were adopted for the wartime.

Below questions look at the compliance with regard to several specific aspects.

4.1.1.1 Compliance levels of water supply systems (or operators)

Question 1a Please provide the percent (%) of water supply systems (or operators) that are compliant with the DWD requirements

There is wide variation in compliance reported by responding countries:

- Very high compliance is achieved by:
 - Hungary: ~over 99%
- Moderate compliance by:
 - Romania: ~75%
 - Slovenia: ~75%
- Likely no or no compliance:
 - Slovakia: 0% (full compliance expected by 2028).
 - Ukraine: likely none compliant.

Montenegro reports that no official data can be given, as available sector data remain incomplete and inconsistent across operators.

4.1.1.2 Availability of Water Safety Plans for the watershed at the abstraction point

Question 1 b Please provide the percent (%) of water supply systems (or operators) which have developed Water Safety Plans (WSPs) for the watershed at the abstraction point

WSPs for the watershed at the abstraction point are currently being developed (the legal requirement will only apply with a deadline of July 1, 2027), thus none of the respondents could report on the share of plans already available. Some indicated that none WSP were in place so far, but most of them stated that the plans were under development.

4.1.1.3 Availability Water Safety Plans at the level of water supply system

Question 1c Please provide the percent (%) of water supply systems (or operators) that have developed Water Safety Plans at the level of water supply system

The most advanced in development of WSP at the level of water supply system are:

- Hungary → 100% of water supply systems (or operators) have developed them.
- Romania → ~75%.
- Croatia → 15–50%. Providing a precise share is difficult as water and communal reform is currently underway and reduction in the number of water service providers from the current 128 to 41 is planned. 20 providers already have WSPs.
- WSPs under development or not yet developed are reported by Slovakia, Slovenia, Republika Srpska and Ukraine.

4.1.1.4 Monitoring of new parameters

Question 1d Please provide the percent (%) of operators that have started doing monitoring of the newly included water quality parameters (e.g. PFAS, bisphenol A, the disinfection by-products, etc.) including the parameters of the watch list

The responses indicate that monitoring of newly included water quality parameters (e.g. PFAS, bisphenol A, disinfection by-products) is generally at an early stage across the countries, with limited quantitative data available. Most countries are either:

- preparing for mandatory implementation, or
- conducting initial surveys or pilot monitoring,

rather than having fully operational monitoring.

- Slovenia estimates that that share is <10%.
- Croatia and Hungary plan full implementation starting from 2025 onwards.
- In Romania the same would follow in 2026, as the monitoring became mandatory then. But for none of these MS data is available.

- In Slovakia analytical methods for PFAS are in the process of being implemented in some water laboratories Montenegro reports that monitoring of the new parameter has not started yet.
- Ukraine plans to monitor PFAS with necessary equipment already being in place and staff training underway.

4.1.1.5 Existence of a data base at national level

Question 1e Is the existing data base at national level concerning DW quality, incl. the new parameters which is regularly updated. Who is the data owner?

The respondents input show that most countries have national drinking water databases, but they differ in level of development, inclusion of new parameters, and system completeness.

The national systems can be assigned to the following levels of development:

- Advanced and well-structured systems exist in Croatia, Hungary and Slovenia that regularly update databases including new parameters, have clear institutional roles and integrated data flows. Romania confirms fulfilling the EU requirements but does not provide any details.
- Functional but needing improvement database are available in Slovakia where established system exists but can be characterized as having a limited detail on new parameters and need for update.
- Incomplete or not yet adapted systems exist:
 - Ukraine that indicates their databases do not yet include new parameters and require regulatory alignment, as is not even achieved for the old DWD parameters.
 - Montenegro reports lack of a fully harmonised and operational national. Data available is fragmented and inconsistent across sources, there lacks a harmonized, centralized and digitalized national information system

Summarizing, while database systems are generally in place, only a few countries have fully updated and integrated systems including new parameters.

4.1.1.6 Assessment of non-compliance of water supply systems with the new DWD quality parameters

Question 1f Is there an assessment of the water supply systems which are not in compliance with the new DWD quality parameters?

The responses show that systematic assessments of non-compliance with new DWD quality parameters are largely incomplete or still ongoing, with most countries at an early evaluation stage.

- Croatia, Hungary have begun evaluating compliance. The first country reports so far general compliance with the new parameters from group B, but the assessment is still

ongoing. Hungary has parameter-specific assessments (e.g. chlorate, PFAS ongoing), identifying limited risks.

- Such assessments have not yet been carried out in Montenegro, Romania, Slovakia, Slovakia and Ukraine.

4.1.1.7 Availability of national plans/programmes for upgrading drinking water treatment plants

Question 1g Is there a national plan/programme for upgrading the existing drinking water treatment plants to reach compliance with the new DWD?

The responses provided indicate that only a limited number of countries has national plans to upgrade drinking water treatment plants in line with the new DWD, while others rely on partial measures or lack formal programmes.

- Established national programmes are available in Croatia and Romania, which have national investment or planning frameworks addressing water infrastructure upgrades. The Croatian document will, though, need further updates to reflect well new monitoring requirements.
- The response from Hungary focuses on specific technical upgrades (e.g. changes in disinfection processes) but does not specify whether a comprehensive national plan is already available.
- No national plans are in place in Montenegro, Slovakia, Slovenia, Ukraine

4.1.2 Main challenges in the DWD implementation

Question 2 Which of the above-mentioned requirements of the new DWD are difficult to be implemented in the country?

The responses received indicate that implementation of the new DWD is challenging across all countries, with difficulties covering technical, institutional, and financial dimensions.

- Hungary, Montenegro, Romania, Slovenia, Slovakia and Ukraine highlight system-wide difficulties, including:
 - expanded monitoring requirements (e.g. PFAS, microplastics)
 - lack of infrastructure and treatment technologies
 - limited laboratory and technical capacity
 - high implementation costs
 - fragmented water supply systems (especially in rural areas)
 - challenges with risk assessment and data availability
- Slovakia indicates that despite of institutional capacity limitations, gradual resolution to all challenges is expected.

4.1.2.1 Difficulties in carrying out Risk Assessment of catchment areas

Question 2a Are there difficulties in the development of risk management and risk assessment for the catchment areas at the abstraction point? Please, describe them.

The input provided indicates that risk assessment and risk management for catchment areas are very challenging in the context of implementing the new DWD, with most countries facing methodological, data, and coordination issues. Difficulties provided can be clustered as follows.

- Significant methodological and data needs
Romania, Croatia, Hungary and Montenegro highlight major difficulties related to:
 - lack of clear methodologies
 - insufficient or fragmented data for risk assessment
 - need to integrate multiple datasets and stakeholders
- Coordination and institutional issues
Montenegro and Hungary point out:
 - difficulties in interinstitutional coordination
 - unclear roles and responsibilities
 - challenges in involving stakeholders
- Other:
 - Slovenia mentions that systems for delineation and data integration are ongoing
 - Ukraine adds that existing assessments need to be expanded to include health risks

4.1.2.2 Risk management and risk assessment for the water supply system

Question 2b Are there difficulties in the development of risk management and risk assessment for the water supply system? Please, describe them.

The responses indicate that risk management for water supply systems is being implemented in many countries, but practical challenges remain significant, particularly related to capacity, data, and system complexity. Countries that report implementing the WSPs are Croatia and Hungary. Other respondents focus on specific challenges encountered. Slovakia mentions this process is ongoing and will be completed by 2024.

The challenges mentioned by most respondents focus mainly on data:

- need for advanced monitoring systems and large datasets
- difficulties in data integration across sources
- difficulties in data interpretation and risk identification

Further, knowledge gaps are mentioned:

- lack of system knowledge (e.g. hydraulics, leaks)
- uneven knowledge and expertise across operators

Finally, also institutional and capacity constraints are addressed.

- insufficient institutional coordination
- financial limitations

4.1.2.3 Difficulties in monitoring new parameters

Question 2c Are there difficulties in the monitoring of the newly included water quality parameters (e.g. PFAS, bisphenol A, the disinfection by-products, etc.) including the parameters of the watch list? Please, describe them.

Nearly all responses received show that monitoring newly introduced water quality parameters (e.g. PFAS, bisphenol A, disinfection by-products) is a technically challenging aspect, with widespread limitations across countries.

- Partial analytical capacity is reported by Croatia and Slovenia that have relatively advanced capabilities, but still face:
 - gaps for certain substances (e.g. TFA in Croatia)
 - challenges in achieving very low detection limits (Slovenia)
- Laboratory and technical constraints are reported by Hungary, Romania, Montenegro, Ukraine, which highlight issues like:
 - insufficient laboratory capacity and equipment
 - lack of standardized analytical methods
 - need for trained personnel
 - high financial costs

These aspects represent the most common and critical barriers.

- Slovakia anticipates outsourcing analyses due to limited internal capacity.

4.1.2.4 Compliance with enhanced drinking water quality requirements

Question 2d Are there difficulties in reaching compliance with the new enhanced requirements for DW quality? Please, describe them

The analysis of responses shows that compliance with enhanced DW quality requirements varies significantly, with challenges ranging from technical adjustments to broader systemic constraints.

- Limited or manageable difficulties are observed in Croatia and Slovenia that report generally good compliance, with only minor or localized issues (e.g. trace pollutants, specific metabolites).
- Slovakia reports no current difficulties expected but mentions that the implementation and monitoring of new parameters have not yet started.
- Technical and operational challenges are of concern in Hungary that highlights:
 - difficulties with specific parameters (e.g. chlorate)

- need for technological changes in disinfection systems
- requirement for significant investments (e.g. new wells, treatment upgrades)
- Broader systemic challenges are reported from Romania and Montenegro, which identify as main constraints:
 - limited financial resources
 - insufficient technical and human capacity
 - institutional fragmentation
 - need to integrate risk-based approaches across the supply chain

These countries report structural challenges to be faced that affect overall compliance ability.

- Ukraine is in particularly challenging situation due to incomplete legislative alignment and lack of funding, on the one hand, and operation under emergency conditions (war), on the other hand.

4.1.2.5 Difficulties in establishing and maintaining databases

Question 2e Are there difficulties in the establishment and maintenance of the required data bases? Please, describe them.

The responses indicate that establishing and maintaining national drinking water databases is a significant challenge in many responding countries except of for Croatia and Slovenia. They mention mainly technical, institutional, and resource constraints under the DWD.

Technical and resource constraints are mentioned by Hungary and Slovakia that highlight:

- difficulties in data collection (e.g. catchments, incidents)
- need for database upgrades
- lack of expert workforce

Structural and systemic challenges reflect more challenging system-level gaps to address are mentioned by Montenegro, Romania, Ukraine that report major issues, including:

- fragmented or inconsistent datasets
- lack of integrated IT systems (Romania, Montenegro)
- manual data handling (Romania)
- absence of centralized databases and responsible institutions (Ukraine)
- limited digitalization and data validation procedures (Romania, Montenegro)

4.1.2.6 Other aspects regarding the control of industrial emissions

Question 2f Other

Three responses from Hungary, Romania and Ukraine highlight additional, more specific challenges related to responsibilities, data access, and knowledge gaps in implementing the DWD.

- Hungary highlights responsibility gaps indicating that water suppliers are responsible for compliance at the tap, but have no control over internal (household) networks, which they point out creates a mismatch between responsibility and control.
- Romania emphasizing issues with data access points to lack of systematic access to raw water quality data from basin authorities and need for better data sharing between institutions.
- Ukraine reports especially insufficient understanding of new DWD requirements and lack of knowledge at both - institutional level and operator level.

4.1.3 Main bottlenecks

Question 3 What do you think are the bottlenecks in the implementation of the new requirements of the DWD?

Overall, the most important bottlenecks, identified in only two responses received to this general question from Montenegro and Romania, are:

- Lack of funding (infrastructure, labs, monitoring)
- Outdated infrastructure
- Insufficient laboratory capacity
- Shortage of qualified personnel
- Weak or missing databases, poor data integration and communication

According to this information it can be said that implementation seems to be less constrained by legislation and more by resources and capacity.

4.1.3.1 Legislative clarity

Question 3a The national legislation implementing the DWD is not sufficiently concise and comprehensive

While EU countries report no legislative issues, two non-EU countries Montenegro and Ukraine state that the national legislation implementing is not sufficiently concise and comprehensive. No further details are provided though.

4.1.3.2 Administrative organization

Question 3b Lack of appropriate administrative organization of the DWD implementation process, i.e. it is not clear who does (is responsible for) what.

Montenegro, Slovenia, Ukraine indicate that the administrative organization of the DWD implementation is not clear to them. Croatia, Hungary, Romania report no issues with point.

4.1.3.3 Lack of necessary data bases for risk assessment and management

Question 3c Lack of necessary data bases for development of risk assessment and risk management

Lack of databases is a major common bottleneck across most countries (Croatia, Hungary, Montenegro, Romania, Slovenia, Ukraine), except for Slovakia.

4.1.3.4 Database format issues

Question 3d The existing data bases are not in an appropriate format allowing electronic data processing

Overall, the problem seems to be poor data format and interoperability. Many countries (Croatia, Hungary, Montenegro, Slovakia, Slovenia, Ukraine) state that the existing in their countries databases are in a format not suitable for digital processing.

4.1.3.5 Communication between data owners

Question 3e Lack of (effective) communication among the different data owners

Weak coordination and data sharing is a recurring bottleneck. This issue is reported by Montenegro, Romania, Slovenia, Ukraine, while other respondents report no issues (Hungary, Slovakia) or uncertainty (Bulgaria, Croatia).

4.1.3.6 Laboratory equipment

Question 3f Lack of appropriate laboratory equipment to measure the new water quality parameters

Lack of modern laboratory equipment is a key technical barrier. This bottleneck is encountered in most countries, i.e. Hungary, Montenegro, Romania, Slovakia, Slovenia, Ukraine. Bulgaria and Croatia are uncertain about this point, while Slovakia admits that although this is an issue, number of analyses will be outsourced.

4.1.3.7 Budget for data bases

Question 3g Lack of budget for acquiring the necessary data bases

Available funding for data systems is considered insufficient in many countries. Financial constraints are reported by Montenegro, Romania, Slovakia, Ukraine, while no such issue is indicated by Hungary. Bulgaria and Croatia are uncertain about this point.

4.1.3.8 Budget for monitoring

Question 3h Lack of budget for buying the necessary laboratory monitoring for water quality

Monitoring costs are a relevant financial burden for a number of respondents, i.e. Hungary, Montenegro, Romania, Slovakia, Slovenia, Ukraine. Bulgaria and Croatia are uncertain about this point.

4.1.3.9 Budget for treatment upgrades

Question 3i Lack of budget to update the technological scheme of the DW treatment plants

Upgrading treatment plants is one of the most resource-intensive challenges. This problem is reported across most countries, i.e. Croatia, Hungary, Montenegro, Romania, Slovakia, Ukraine. Bulgaria and Slovenia are uncertain regarding this point.

4.1.3.10 Lack of qualified personnel

Question 3j Lack of qualified personnel for doing enhanced monitoring and DW treatment plant operation

Lack of adequate human resource capacity is a critical bottleneck across countries. It is mentioned by Croatia, Hungary, Montenegro, Romania, Slovakia, Ukraine. Bulgaria and Slovenia are uncertain on this point.

4.1.3.11 Other bottlenecks

Question 3k Other

Additional bottlenecks, mentioned by Romania and Slovakia, relate to technical complexity and institutional coordination.

- Romania indicates need for better institutional collaboration between the responsible authorities.
- Slovakia reports challenges related to complicated processes around analytical methods implementation (budget planning, purchasing processes, insufficient expertise/experiences of laboratory personnel, difficult accreditation of methods).

4.1.4 Recommendations for improved new DWD implementation

Question 4 What are your recommendations for improving the process of DWD implementation?

Montenegro, Romania, Slovakia and Ukraine provided input to this general question. The responses highlight institutional coordination and capacity building as key priorities.

- Ukraine, Montenegro and Slovakia emphasize need for:
 - central coordination mechanisms
 - defining clear roles and responsibilities
 - development of implementation roadmaps and financial strategies
 - strengthening institutional capacity

- Romania recommends learning from EU best practices, e.g. from German experience.

At national level

4.1.4.1 Recommendations for the legislative level

Question 4a At legislative level

Respondents focus on clarity, harmonization, and realistic implementation timelines.

- In Croatia and Hungary legislation is largely in place, but implementation clarity is lacking.
- Romanian and Montenegro respondents mention need for better harmonization and alignment with EU and assumption of responsibilities by relevant authorities. Similar response is provided also by Ukraine.
- Republika Srpska stress need for better coordination across institutions.

4.1.4.2 Recommendations for the administrative level

Question 4b At administrative level (national & regional)

Recommendations focus mainly on improved collaboration between involved actors, on enhancing technical capacity, funding, and training. In particular:

- Croatia, Hungary, Romania, Slovenia and Ukraine recommend improving mutual communication and coordination between different stakeholders.
- More training and knowledge development is also considered very important by several respondents.
- Slovakia indicates the relevance of upgrading databases and systems for collection of data,
- Montenegro mentions need of investments into development of monitoring infrastructure
- Ukraine calls for developing local strategies and community development plans

4.1.4.3 Recommendations for the operational level

Question 4c At operational level (water supply operator)

Recommendations focus mainly on capacity building, securing necessary resources and funds, and modernization.

- Hungary and Romania underline need for:
 - increased staff number and expertise
 - modern technologies
 - financial support
- More training and knowledge development, as well as upgrade of the necessary tools and infrastructure is also considered very important by many respondents (e.g. Croatia, Slovenia).

- The same applies for increased collaboration among different stakeholders.
- Republika Srpska highlights need to introduce Water Safety Plans (WSPs)

4.1.4.4 Other recommendations at the national level

Question 4d Other

Limited responses received highlight need of addressing social and financial aspects. Among the priorities mentioned are increasing funding, public awareness, and scientific advice. In particular:

- Hungary and Romania emphasize:
 - need for financial support
 - increasing consumer awareness
- Montenegro input stresses the need of reducing urban–rural disparities.
- Ukraine highlights need for:
 - scientific support for the DWD implementation
 - technology modernisation and sharing best practices

At EU level

4.1.4.5 Recommendations for the EU legislative level

Question 4e Legislation

General recommendations provided focus on deadlines for transposition and compliance and on harmonization.

- Hungary and Romania highlight the need to set:
 - more realistic deadlines
 - extended compliance periods
- Romania asks also for alignment of legislation for all water categories and for carrying out EU audits at regional/local level.

4.1.4.6 Recommendations for the EU reporting

Question 4f Reporting

Responses provided emphasize mainly need of simplification and increasing clarity, as well as assuring sufficient time for implementation.

- Croatia and Romania call for simplified and established reporting formats.
- Hungary, Slovakia and Slovenia - for setting clear reporting guidance and allowing sufficient transition time.
- Need of assuring technical assistance for reporting is mentioned by Ukraine.

4.1.4.7 Recommendations for the data bases maintenance

Question 4g Data bases maintenance

Romania in their response mentions EU audit missions at regional/local level in Romania.

4.1.4.8 Recommendations for EU publicity

Question 4h Publicity

Hungary comments that the successes achieved by Member States should be highlighted to a greater extent in reports. Ukraine considers publicity an important topic.

Question 4i Other

Romania and Ukraine address in their responses need to ensure sufficient fund, as well as of other resources necessary for the implementation of the DWD.

5 External challenges to water resources

5.1 Factors of highest relevance

Question 1 Which of the above-given developments do you consider of highest relevance for your country and why?

Most respondents converge on climate change and linked water resource availability as critical drivers for the future quality and quantity of water resources. Variability of precipitation, increased frequency of extreme weather events, and partially related water quality are of great concern. Some countries additionally highlight demographic change (Romania, Ukraine), technological challenges (Hungary, Montenegro), and economic transformations (Slovakia, Hungary, Montenegro) as important aspects.

5.2 Availability of studies for scenario development

Question 2 Are there any studies/publications available that could be shared with the project team on the future developments (i.e. demographic, economic, technological) trends in your country/region, that could be used as input information for scenario analysis?

Only few partners provided specific sources that can be used when scenario input data are searched for. They are listed in below table

Table 4 Studies and publications of relevance for scenario assessments

Country	Studies/Publications
Croatia	• Croatia Human Capital Review (World Bank, 2023) analyses key demographic trends: aging and decrease of population (by 2050, every third person would be older than 65), along with the impact of technology on the labour market (digitalization, automation, a higher share of knowledge-based industries). Source: worldbank.org. • The Strategy for Low-Carbon Development of the Republic of Croatia by 2030 (view to 2050) offers economic and technological scenarios: financing models, transition to renewable sources, ICT applications, smart cities and circular economy. Source: narodne-novine.nn.hr.
Hungary	• River Basin Management Plans
Montenegro	• Strategy for water management and other strategic action plans for economy
Republika Srpska	• All Bosnia and Herzegovina communications to the UNFCCC: National Communication submissions from Non-Annex I Parties UNFCCC-The latest, Fourth National Communication (FNC): Bosnia and Herzegovina. National Communication (NC). NC 4. UNFCCC provides both diagrams and scenarios for mitigation of climate change, as well as the adaptation measures.

- National Adaptation Plan, available at: Submitted NAPs from developing country Parties | NAP Central and also the National adaptation and low emissions development Strategy, available at: Long-term strategies portal | UNFCCC
 - First National Energy and Climate Plan- NECP available at the web site of the Energy Community.
 - By the end of 2025, the First BTR will be produced as well.
 - By the end of 2027, Fifth National Communication and the Second BTR, as well as the third National Determined Contribution- NDC 3.
- Romania
- National Institute of Statistics - Romania's population projection, [https://insse.ro/cms/sites/default/files/field/publicatii/proiectarea_p opulatiei_romaniei_in_profil_teritorial_la_orizontul_2060.pdf](https://insse.ro/cms/sites/default/files/field/publicatii/proiectarea_populatiei_romaniei_in_profil_teritorial_la_orizontul_2060.pdf)
 - National Commission for Strategy and Prognosis - short-term economic development <https://cnp.ro/?lang=en>
 - Romanian Government, National Strategy for Sustainable Development of Romania 2030, [https://sgg.gov.ro/1/wp-content/uploads/2018/10/SNDD-2030- -varianta-dup%C4%83-Comitet-interministerial-4-octombrie-2018.pdf](https://sgg.gov.ro/1/wp-content/uploads/2018/10/SNDD-2030--varianta-dup%C4%83-Comitet-interministerial-4-octombrie-2018.pdf)
 - Romanian Government, National Strategy for Non-Energy Mineral Resources, for the Period 2023-2035, <https://sgg.gov.ro/1/wp-content/uploads/2023/03/ANEXA-12.pdf>
- Ukraine
- Resolution No. 946 of the Cabinet of Ministers of Ukraine dated 6 August 2025 approved the economic development forecast for Ukraine for the next three years, which contains two possible scenarios.
 - Resolution of the Cabinet of Ministers of Ukraine No. 922-r dated 30 September 2024 "On the Approval of the Demographic Development Strategy of Ukraine for the Period up to 2040".

5.3 External Pressures on Water Quality

Question 3 Which other external aspects and pressures do the expert consider important to be considered while designing future strategies for effective dealing with risks to water quality and reducing of the water-borne pollution?

Beside the already mentioned challenges linked to the climate change, and related risks, financial restrictions are of main concern, as they will limit the possibility of reducing pollution at source, of applying climate change adaptation measures, of modernizing and upgrading the necessary wastewater infrastructure but also protecting the springs and pipelines. Among other factors, proximity of waste disposal sites was also mentioned, but also developments of new compounds of sometimes unknown properties and related risks. Last but not least, geopolitical developments, including war (Ukraine) are factors that are of importance for the concerned countries.

5.4 Programs & Preparedness

Question 4 Are there any national/regional programs of actions aimed to prepare for the future challenges related to combating water pollution and linked with the expected future

developments? Are there studies/publications available that could be shared with the project team.

In response to this question, Slovakia mentioned the Water Policy Concept, Hungary indicated the River Basin Plans, and Ukraine the Development strategies.

Summarising the responses provided in this survey part, it is evident that climate change is considered the dominant driver of future water challenges. Water systems are under increasing pressure from both natural and human factors and assuring sufficient funding to effectively address the identified risks is considered crucial.

6 Annexes

6.1 In-depth assessment template

6.2 All national responses to changes in Water Framework Directive, Groundwater Directive and Environmental Quality Standards Directive

6.3 All national responses to changes in revised Urban Waste Water Treatment Directive

6.4 All national responses to changes in revised Drinking Water Directive

6.5 All national responses regarding external challenges to water resources

6.6 Responses received from Serbia - Position paper regarding the in-depth assessment survey and information available on the situation in Serbia