Coalition Clean Baltic

THE GREATEST WATER MANAGEMENT CHALLENGES IN THE Baltic Sea Region

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Credit CCB, SNF, CEI

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LIST OF ABBREVIATIONS

BSAP - Baltic Sea Action Plan
BSR - Baltic Sea Region
CCB - Coalition Clean Baltic
EstWA - Estonian Water Association
EU LIFE - European Unions' Programme for Environment and Climate Action
EQS - Environmental Quality Standards
FAWR - Federal Agency of Water Resources
GDP - Gross Domestic Product
GES - Good Ecological Status/State
HELCOM - Helsinki Commission
HPP - Hydro Power Plant
ICPO - International Commission of Odra Protection against Pollution
IWRMS - Integrated Water Resources Use and Protection Schemes
MSFD - Marine Strategy Framework Directive
NGO - Non-Governmental Organisation
PAH - Polycyclic Aromatic Hydrocarbons
PBDEs - Polybrominated Diphenyl Ethers
RBMP - River Basin Management Plan
RES - Renewable Energy Sources
UAH - The Ukrainian Hryvnia
UN - United Nations
WFD - Water Framework Directive
WWF - World Wildlife Fund
WWTPs - Wastewater Treatment Plants

PREFACE

This new report “The Greatest Water Management Challenges in the Baltic Sea Region” is an interesting look at the possible challenges and threats to the Baltic Sea from the perspective of Baltic countries that are struggling with various investment and organizational problems, affecting the quality of Baltic waters and ecosystems dependent on surface and ground waters. Among them, we encounter the eternal dilemmas between environmental protection and development without taking into account its needs.

Problems also result from historical conditions in individual countries and incorrect or selective interpretations of applicable regulations. The lack of financing for remedial measures or its insufficient scope is acute. International cooperation is also not facilitated by political conditions.

The Baltic Sea is a unique reservoir of an enclosed nature. For the natural environment of **the Baltic Sea, maintaining solidarity in its catchment area is understood as considering the needs of all users through appropriate spatial planning.** This implies, taking into account natural conditions, the layout of the hydrographic network, the issue of afforestation, counteracting soil erosion, **keeping the flows necessary to maintain biological life, is of fundamental importance.** Publications such as this report, make it possible to inform the community and stakeholders about existing problems and serve to build solidarity.

It should be noted that most of the water management issues arise at the local level and are often resolved there. Therefore, decentralization in decision-making is important. Equipped with appropriate financial and legal resources, knowledge, and organization, local authorities can ensure appropriate sensitivity to the impacts resulting from specific pressures, transparency of the water management process, and participation of local communities in the planning and decision-making process.

The report states that many of the mechanisms under the EU Water Framework Directive do not work to their full extent. It is, therefore, **necessary to further strengthen the EU Water Policy for further integration of political, economic, and social activities in**

order to maintain a natural balance, to guarantee the safety of the Baltic Sea waters, and the ability to meet the basic needs of individual communities living in its catchment area.

Prof. dr hab. inż. Tomasz Walczykiewicz

Vice-Chairman of the IMGW-PIB Scientific Council,
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The authors undertook an assessment of the effectiveness of WFD implementation in the Baltic Sea countries. Although some countries are not members of the EU, they follow the model of the WFD and implement its provisions more or less successfully.

The study gives a picture of the ineffectiveness of WFD implementation. Countries preferably implement the planning element of the WFD recommendations, but take no or only symbolic action to improve the ecological status of waters. Real action is delayed. The practice of derogations (exceptions) has become a permanent practice for not taking real action. WFD tasks in each State are at the bottom of the priority list. It is already clear that none of the EU Member States will meet the WFD target and achieve good status or potential of waters by 2027. The lack of enforcement of progress towards the implementation of the WFD objectives is seen as a weakness of the European Commission.

Prof. Roman Żurek, Department of Ecological Researches, Poland

TABLE OF CONTENTS

I INTRODUCTION

In Europe, the Water Framework Directive (WFD) is one of the most important legislations in place to protect the aquatic environment and secure water quantity for human needs through a holistic and adaptive freshwater governance system. One significant WFD feature is that water should be managed according to hydrological boundaries, in large river basins districts (RBD). Water management according to the WFD includes characterization, setting of environmental quality standards, monitoring and development of programs of measures and management plans.

It is important that compliance with the WFD[1] is not fulfilled by extensive use of exemptions on a regular basis. As pointed out in a study based on analyzes of 120 policy documents from EU member states and institutions, **exemptions may constitute a significant obstacle to the achievement of the WFD's objective as they enable countries to lower their ambition and delay the achievement of good status,** thereby undermining the environmental goal of the WFD[1]. Thus, it is important that exemptions, when adopted, are well founded and justified, and obviously applied on a case-by-case basis. It is certain, which also results from the information contained in this report, **the Good Ecological Status of waters will not be achieved within the period required by the WFD - the year 2027**. Therefore further steps in the Baltic Sea Region that can improve the condition of the Baltic Sea must be pursued in every possible way: **nutrient reduction, progress in dam removal and renaturalisation of rivers, improvements in wastewater management, recovery plan for Ukraine's war damages related to water and sanitation** - these are just a few urgent examples. Also, the updated Urban Wastewater Treatment Directive will enlarge the scope and require additional treatment, resulting in improved water quality in EU member states.

[1] Boeuf, B. Fritsch, O. , Martin-Ortega, J. (2016). Undermining European Environmental Policy Goals? The EU Water Framework Directive and the Politics of Exemptions. Water 2016, 8, 388.

The report, research study we are handing over to You focuses on the challenges that individual countries face in terms of integrated water management, but also on the common features of the countries surrounding the Baltic Sea influencing inland water management. The aim of this analysis is to support and foster positive changes in integrated water management in the Baltic Sea Region.

Our report presents an assessment of the current water management situation in selected BSR countries and describes the status of natural retention, how efficient water management planning is and what action areas are particularly needed. It addresses the essence of restoration of natural retention as a remedy for current water management problems. This activity contributes to the significant target of the EU Biodiversity Strategy (under the European Green Deal) to restore 25,000 km of rivers in Europe to a free-flowing state.
This work utilizes the Source-to-Sea approach as well as highlights **the impact of inland waters on the Baltic Sea condition.**

How the analysis was shaped?

Each country analysis was designed to fit into the specific questions presented below:

1. An assessment of the current situation of water management in a particular country of the BSR - what are the main challenges?

2. An assessment of the country's water resources and discussion of planning approaches in water management.

3. Directions of proposed changes in water management, including consideration of surface water restoration needs and efforts being made to naturalize waters in the particular country.

4. Identification of key elements for achieving the desired change in the current water management scheme, indicating key issues that need to be changed in individual countries.

5. Directional actions of the European Union in the field of the restoration of aquatic ecosystems: e.g. what is the number of dams to remove in your country, do you have a database/assessment of barriers in your country?

6. EU and non-EU countries' water management within BSR, including transboundary issues - reflection on transboundary river issues in your country.

The analysis takes into account the countries whose CCB representatives were ready to prepare such data: Poland, Germany, Ukraine, Belarus, Estonia, Sweden, Denmark, and Russia. Therefore not all BSR countries are represented here. Some experts have opted for an extended analysis of their country, which is also part of the study and is delivered to you as a separate extended report. Poland is such a country.

Map 1 - Political map of the Baltic Sea Region (Source: www.d-maps.com).

For our more broad related research within the BSR, You can also dive into flood management risk in the BSR[2] as well as the ground for restoration and dam removal activities[3].

[2] https://ccb.se/publications/flood-risk-management-in-the-baltic-sea-region/.
[3] https://ccb.se/publications/river-barriers-to-remove-or-mitigate-in-the-baltic-sea-region.

II POLAND

Ilona Biedroń, Hektary Dla Natury Foundation

1 — Assessment of the current situation in the country. What are the main challenges of water management in Poland?

In Poland, the biggest water management problems relate mainly to the **poor quality of surface waters and their hydromorphological transformation**. As in other EU countries, problems with droughts and their consequences, and floods (mainly flash floods in recent years) are becoming more acute in Poland.

The biggest water quality problem in Poland is its **poor chemical status**. Above-normal amounts of toxic polycyclic aromatic hydrocarbons (PAH) and heavy metals are present in surface waters. Sources of these chemicals include fossil fuel burning, low emissions, transport and industrial emissions. **Poland is lagging far behind European trends in renewable energy sources (RES) development**, still relying on fossil fuels in transport, energy and heating, remaining a 'coal island' on the European map[4].

According to Eurostat data for 2021 Poland and the Czech Republic are currently the only countries in the EU with active coal mining, of which Poland's share is dominant at 96%. **Coal mining has a significant impact on the high salinity of Poland's main rivers**: the Oder and Vistula. **Poland's rivers and lakes are exposed to high levels of biogenic pollution from surface water run-off from agricultural land.** This is due to the shift from traditional extensive agriculture to monocultures of crops based on plant protection products and artificial fertilizers. As a result of agricultural transformation towards agricultural intensification, **rivers have lost their coastal buffer zones.** On top of this, **emissions from a large number of livestock farms** make the agricultural sector the main source of nutrient pollution of waters.

Hydromorphological changes of surface waters are one of the most significant problems of water management in Poland. **The scale of transformation of riverbeds affects more than 90% of Polish rivers and about 40% of Polish lakes**. This is the result of

[4] https://ember-climate.org/insights/research/european-electricity-review-2022/.

many years of activities that began intensively in Poland in the second half of the 20th century. In order to increase the area of agricultural land or to increase forestry, the mires were drained and a number of hydrotechnical and land reclamation works were undertaken to remove excess water deposited in river valleys. The aim of regulating rivers was also to protect against flooding and to try to "remove" water from usable land as quickly as possible.

Poland is characterized by the cyclical formation of a series of wet and dry years, caused by the dominance of different types of atmospheric circulation. Hence, the occurrence of both floods and droughts is a typical phenomenon in this country. However, there is a growing problem with the intensity and consequences of these phenomena[5].

Poland relies mainly on hydrotechnical solutions, which are still oriented towards "moving the floods away from people" - involving the regulation of rivers (including their dredging), the building of reservoirs, or fencing off valleys with flood dykes, which protect not only built-up areas but also agricultural areas from flooding. This makes river valleys heavily built up and particularly vulnerable to negative effects during floods.

Drought has been a continuous occurrence in Poland since 2015, concentrating most in central Poland. The most vulnerable to the effects of drought is agriculture, which relies heavily on the natural supply of precipitation to crops. Increasingly common ways of dealing with rainfall shortages in agriculture include **the extraction of groundwater or restore existing barriers for irrigations.** Such measures are often not environmentally invasive. Locally, they may solve the problem (but rather on a short-term scale) while simultaneously shifting the problem elsewhere in the catchment.

2 — An assessment of Poland’s water resources and discussion of planning approaches in water management

Poland's water resources are determined mainly by the amount of precipitation. Their average amount is 600 mm per year, which means that on average the country's territory receives about 180 billion m³ of water in the form of precipitation per year. Dividing this amount of water by the number of all inhabitants in Poland gives 4,500 m³ of water per person per year. Two-thirds of this water evaporates - about 120 billion m³ per year, which means that the total water resources at the mouths of the two main rivers - the

[5] https://naukaoklimacie.pl/aktualnosci/coraz-czestsze-susze-w-polsce-konsekwencja-zmiany-klimatu-i-dzialan-anty-adaptacyjnych-417/.

Vistula and the Oder - to the Baltic Sea can be estimated at 60 billion m³/year (about 1 600 m³/inhabitant). **This places Poland 24th (i.e. 4th from the end) on the list of 28 European Union countries in terms of renewable water resources**[6]**.** Poland's apparent poverty in terms of water resources compared to other European countries is due, among other things, to its beneficial lack of dependence on water inflow from abroad. The territory of the two main river basins of the Vistula River and the Oder River covers 85% of Poland's territory. Thus, taking into account only its own resources, Poland has a water supply of 1.4 thousand m³/capita similar to the Czech Republic, Italy or Germany[7].

Poland also has a significant groundwater resources[8]. Disposable groundwater resources in Poland amount to 33.7 million m³ per day. 70% of drinking water comes from these resources. However, these are resources that have quite different renewal characteristics. Due to the varying geological structure, **groundwater resources are renewed at different intervals and should therefore be treated with particular care as they are a valuable disposable resource for our country.**

3 — Challenges and directions of proposed changes in water management, including consideration of surface water restoration needs and efforts being made to naturalize waters in Poland.

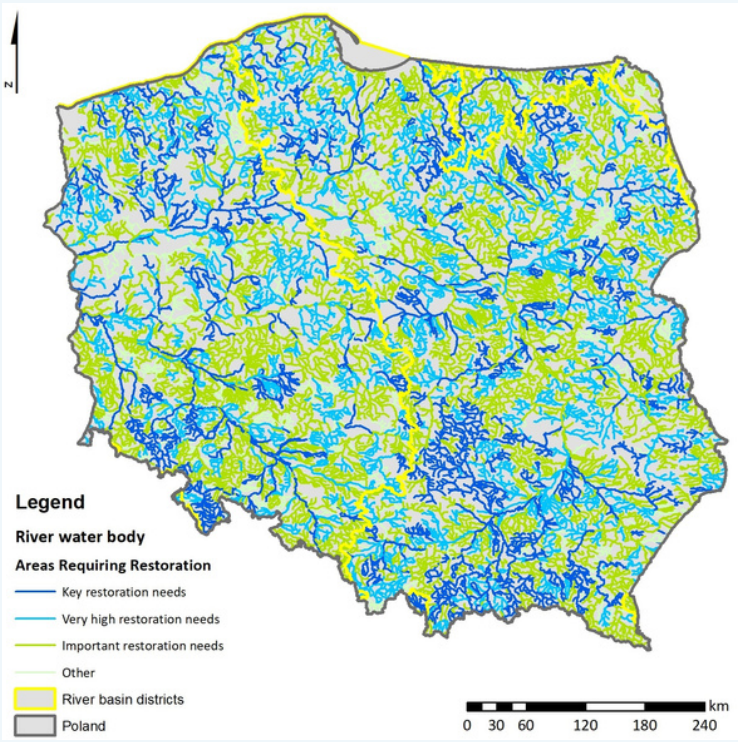
In Poland, a key challenge is the widespread introduction of good project planning practice in water management[9]. Good decision-making should be based on a thorough investigation and understanding of the sources of the problem we want to solve. **Local problems should be analysed at the catchment-scale** and we should look for solutions in actions that will reduce the cause of the problem in a long-term way. **Introducing a good principle in water management** based on 4 essential elements: (1) analysis and diagnosis of the problem and consideration of possible solutions, (2) analysis of legal and environmental restrictions, (3) verification of the cost-effectiveness of proposed interventions taking into account environmental costs and benefits should precede (4) final selection of the optimal solution.

[6] https://www.gov.pl/web/susza/najnowszy-raport-gus--polska-na-24-miejscu-w-unii-europejskiej-pod-wzgledem-odnawialnych-zasobow-wody-slodkiej.
[7] https://pie.net.pl/wp-content/uploads/2020/11/PIE-PolicyPaper4-20.pdf.
[8] https://www.pgi.gov.pl/psh/zadania-psh/8886-zadania-psh-zasoby-wod-podziemnych.html.
[9] https://www.gov.pl/web/klimat/katalog-dobrych-praktyk-w-zakresie-robot-hydrotechnicznych.

A necessary element of achieving sustainable water resources management is the restoration of the natural functioning mechanisms and services provided by aquatic ecosystems. The solutions should focus on restoring them to their natural state and restoring or creating their respective ecological functions. One of the key challenges in this field is to **reduce maintenance activities on rivers** and complement them with new additional activities (non-investment activities that will stimulate ecosystem regeneration) and technical remediation activities. A necessary element of achieving sustainable water resources management is the **restoration of the functions of all wetlands, especially peatlands**, especially in terms of carbon accumulation and water retention. This requires a massive and immediate cessation of drainage of such areas and attempts to restore their natural water conditions.

Poland has developed two planning documents that set high goals for wetland restoration - the 'National Programme for Surfaces' Water Restoration' and the 'Strategy for Wetland Protection in Poland for the Years 2022-2032'. Both of these documents have not yet been implemented and still have the status of projects.

The draft 'Strategy for Wetland Protection...' refers to the need to implement the 'National Programme for Surfaces' Water Restoration'. The Priority Areas designated in the Programme are places where the implementation of various restoration measures is planned. The initiation of restoration for Priority Areas is intended to be the beginning of the actions that are needed to be taken nationally. This need is illustrated in the map beside.



Map 2 - Areas requiring river restoration in Poland. Graphic prepared by Ilona Biedroń based on public data: State register of boundaries and areas of the territorial divisions of the country - administrative units (https://dane.gov.pl/) and National Program of Surface Waters Restoration from State Water Holding Polish Waters.

4 — Identification of key elements for achieving the desired change in current water management, indicating key issues that need to be changed in Poland.

Water management in Poland should move away from the measures used so far in terms of widely applied investment solutions and maintenance works that significantly affect aquatic and water-dependent ecosystems. In retrospect, these solutions are very expensive (taking into account the value of lost ecosystem services) and often focus on solving one problem. Thus, they result in negative consequences and a failure to achieve other objectives set for water management and nature conservation.

Water management based on hydraulic engineering investments has given rise to demands by NGOs[10], questioning the legitimacy of the role of the Minister responsible for water management by the Ministry of Infrastructure. These organizations are concerned about the emergence of further investments that are not conducive to achieving environmental objectives and the blocking of EU funds from the National Recovery Plan and the National Partnership Agreement. The NGOs also point out that it is important for water management to focus on managing water in a holistic way, where actions taken will be aimed at synergistically achieving a number of objectives. The position formulated at the beginning of 2021 in the second half of 2023 does not lose relevance.

It is crucial in changing this paradigm **to increase the awareness of society as a whole, to understand the processes of the water cycle in nature and the consequences of human actions on this cycle.** An informed public has a strong influence on decision-makers' decision-making. For there is still a belief in Polish society that rivers need to be dredged and embanked to protect against flooding. Education should start with early childhood education by revising textbooks and supplementing them with this basic and practical knowledge that water must be respected - because it is the source of our life. An example of how to raise awareness of rivers among the general public is the “Zdrowa rzeka” (Healthy River) podcast[11], which won the hearts of listeners in Poland in 2022.

Educational programmes should also extend to decision-makers - water administration, local government and government, which will translate into taking better-informed decisions for updating current plans, developing ecosystem-based strategies and

[10] http://www.ratujmyrzeki.pl/245-potrzebne-moratorium-na-grodzenie-i-regulacje-rzek-przy-realizacji-wszelkich-zamierzen-finansowanych-z-pieniedzy-publicznych.
[11] https://zdrowarzeka.pl.

amending the law. **Particularly important is the education of the water administration itself,** which, after the 2019 reform, faces the need to acquire knowledge and experience that fits into the ideology of sustainable development. A good symptom, but not enough, is the presence of the topic of river restoration at universities (e.g. Wrocław University of Life Sciences, Warsaw University of Life Sciences, University of Warmia and Mazury in Olsztyn). By far the greatest activity in the protection of waters and wetlands is carried out by NGOs (including a number of entities associated with the Save the Rivers Coalition). The water administration should open up to cooperation with existing practical programmes that complement official institutional knowledge and provide the latest 'up to date' knowledge in the wake of new regulations at the EU level, global trends and benefiting from international and intersectoral exchange of experience - such an example is the River University[12], which operates internationally.

5 — Directional actions of the European Union in the field of the restoration of aquatic ecosystems

The scale of restoration needs in Poland concerns more than 90% of river water bodies and almost 40% of lake water bodies. Restoration is also required for 85% of degraded peatlands (by drainage). Taking up such a challenge is connected with an **urgent need to start implementing restoration programmes** and the necessity to support them with a number of instrumental measures, including measures for the promotion of knowledge on restoration, or instruments allowing the purchase of land or financial compensation for accepting the restoration of natural river processes or the irrigation of mires.

The State Water Holding Polish Waters - as the administrator of surface waters, including rivers, **does not have complete and reliable data on hydromorphological transformations of waters.** The developed databases on hydromorphological pressures allow certain diagnoses but require supplementation and verification. Currently, the most complete database of damming facilities is the one created within the framework of the "Most valuable rivers and streams in Poland" initiative implemented since 2014 by the WWF Poland Foundation and the Poznań University of Life Sciences. There are more than 36,000 objects in this database.

A similar situation applies to databases on the degradation of other wetlands. There is a **lack of good, verified data on the state of wetlands (including peatlands) and the**

[12] https://www.ccb.se/river-university.

pressures that affect their degradation. The development of such a database is one of the basic activities defined in the "Draft Strategy for the Protection of Wetlands in Poland for the Years 2022-2032".

6 — EU and non-EU countries' water management within BSR, including transboundary issues - reflection on transboundary river issues in Poland.

Ministry of Infrastructures officially informs that Poland is actively cooperating on transboundary waters with five neighbouring countries, i.e. Ukraine, Germany, Slovakia, the Czech Republic and Lithuania, within the framework of bilateral commissions and the International Commission for the Protection of the Oder River against Pollution (ICPO). Meetings of all the above commissions were held in 2022.

Cooperation on the basis of the agreement signed in 2020 with Belarus, due to the deterioration of bilateral relations, is currently not taking place. Within the framework of transboundary waters with Russia, cooperation does not take place. The agreement concluded in 1964 is still in force on a succession basis, but there is no willingness on the part of Russia to cooperate.

Detailed information on Poland's cooperation with neighbouring countries on transboundary waters, together with protocols summarising the annual periods of cooperation, is available on the website of the Ministry of Infrastructure (www.gov.pl/web/infrastruktura/wspolpraca-miedzynarodowa).

Picture 1 - Łada river, credit Ilona Biedroń.

III GERMANY

Joint work of Bund für Umwelt und Naturschutz - BUND e.V., Friends of the Earth Germany

1 — Assessment of the situation of water management in Germany - what are the main challenges?

Concerning the German Baltic Sea Region, **overfertilisation due to agriculture** is the main problem, high nitrate concentration in groundwater in particular. The phosphate concentration is especially high in coastal areas and river mouths whereas the nitrate concentration is especially high in water bodies in agricultural areas. Water bodies with forest or grassland predominating in their basins contain considerably less nitrate. In 2018, the nitrogen surplus on arable land in the northeast of Germany reached 65 kg/ha[13]. Up to 10% of the nutrients in coastal waters originate from rainfall, but the **main source of the nutrient input in the coastal seas are rivers**. It is to be expected that the nutrient input does not remain in the coastal waters, but mainly flows out into the open sea[14].

The resulting **eutrophication is a big problem**, especially during the summer months, when microalgae continue to grow due to the high amount of nutrients in the water. This leads to lower sunlight exposure for macroalgae, which are important to the fish population[15].

Picture 2 - Large nutrient inputs from intensive farming in BSR flow down the rivers to the sea causing significant problems with rivers' and Baltic Sea conditions. (Source: fotolia and credit: Olha_Rohulya).

[13] Deutsche Presse-Agentur (2022): Streit um Düngeverordnung "regional existierendes Problem". In: ZEIT online. To be found at: https://www.zeit.de/news/2022-01/25/streit-um-duengeverordnung-gewaesserbelastung-ist-real.
[14] Ministerium für Energiewende, Landwirtschaft, Umwelt, Natur und Digitalisierung Schleswig-Holstein (2021): Festlegung der Bewirtschaftungsziele zur Reduzierung der Nährstoffbelastung in den Küstengewässern. To be found at: https://www.schleswig-holstein.de/mm/downloads/Fachinhalte/Wasserrahmenrichtlinie/E09_2021_Erlaeuterung_Naehrstoffe_Kuesten.pdf
[15] BUND Landesverband Mecklenburg-Vorpommern (2019): BIO-Modellregion Warnow. To be found at: https://www.bund-mecklenburg-vorpommern.de/fileadmin/mv/PDF/Warnowstudie2019_web_kl-1.pdf.

In terms of WFD goals, the federal states in Germany indicate that they will **need more time to achieve the targets of the WFD**. They are planning to postpone the implementation of respective measures until 2045, e.g. measures against pollution from diffuse sources from agricultural use, point sources, municipal wastewater and diffuse atmospheric inputs.

2 — An assessment of the Germany's water resources and discussion of planning approaches in water management

In 2016, it was targeted that nitrogen carried out into the Baltic Sea through the rivers in the Baltic Sea catchment has to be reduced by 8600t (44%) until 2021. This means that **the nitrogen concentration in the Baltic Sea river mouths should not be higher than 2.6 mg/l**[16]**.** This cap on nutrient input was determined by means of a hydrodynamic ecological model taking into account the requirements of the Baltic Sea Action Plan (BSAP) [5]. The mean nitrogen concentration of the respective rivers was 2.8 mg/l in 2020. The concentration has continuously been sinking over the last years, however, the target concentration has not been reached yet[17]. **The total amount of nutrients (especially nitrogen) in the Baltic Sea coastal area has to be reduced by more than 50% in order to reach the Good Ecological Status**[5].

The improvement in wastewater treatment has played an important role in the reduction of the nitrogen concentrations[18]**.** If the limit of 2.6 mg/l for the nitrogen concentration is reached, the requirements of the HELCOM Baltic Sea Action Plan, the Water Framework Directive (WFD, 2000/60/EG) and the Marine Strategy Framework Directive (MSFD, 2008/56/EG) can be met[7]. **Concrete management plans to reduce the nutrient input**, using the example of the Schlei and Trave, two Baltic Sea tributaries, indicate:

- expected effect of the planned measures until 2027: 10% reduction in nitrogen, 5% reduction in phosphor;
- remaining necessary reduction which has yet to be planned after 2027: 25% reduction in nitrogen, 28% reduction in phosphor[8].

[16] Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz (2011): Konzepte zur Minderung der diffusen Nährstoffeinträge aus der Landwirtschaft in die Oberflächengewässer und in das Grundwasser. To be found at: http://www.wrrl-mv-landwirtschaft.de/sites/default/files/downloads/Konz_diff_N%C3%A4hrstoffe_neu_standard-1.pdf.
[17] Umweltbundesamt (2022b): Indikator: Eutrophierung von Nord- und Ostsee durch Stickstoff. To be found at: https://www.umweltbundesamt.de/daten/umweltindikatoren/indikator-eutrophierung-der-meere#die-wichtigsten-fakten.
[18] Bundesministerium für Ernährung und Landwirtschaft (2022a): Düngung. To be found at: https://www.bmel.de/DE/themen/landwirtschaft/pflanzenbau/ackerbau/duengung.html.

As of 1st May 2020, **a renewed Fertiliser Regulation is valid.** For example, exceptions from the ban on nitrogen fertilisation, soil additives, culture substrates and phytosanitary products on frozen ground have been revoked. Also since 2020, a standardisation guides the labelling of areas suffering from eutrophication/nitrate input (valid as of 11th November 2020)[10]. By 2028, all federal states will have the same rules and guidelines regarding the classification of the respective areas. **Data from the agricultural industry are no longer considered for the classification.** In addition, the federal states have to make sure that all monitoring points are located within a eutrophic/nutrient-polluted area. Transitional periods should give the federal states enough time to install more monitoring points[19].

The federal states have reassessed their concerned areas and adapted their Fertilisation Regulations[20]. The renewed Fertiliser Regulation is expected to have a medium-term effect on the reduction of the nutrient input, since agriculture is the biggest contributor to the issue[9]. In some places, however, phosphor input from Baltic Sea tributary basins has to be reduced by more than 50%[5]. After the renegotiations between Germany and the European Commission, it has been decided that **more nitrate measuring points will be established in order to tighten the nitrate monitoring network**[11].

3 — Challenges and directions of proposed changes in water management, including consideration of surface water restoration needs and efforts being made to naturalise waters in Germany

In Germany, each Federal State is mostly in charge of financially supporting water management and surface water restoration. Accordingly, different programmes and approaches exist with varying objectives and degrees of success.

One example is the project Aktion Fluss (eng. Campaign River) in Thüringen (eng. Thuringia). The project's objectives include the improvement of the quality of rivers in Thuringia, as well as the optimisation of flooding protection. Many measures have already been carried out to reach this goal. One of them was the construction of a sewage treatment plant to fulfil the purification requirements concerning phosphorus and

[19] Bundesministerium für Ernährung und Landwirtschaft (2022b): Bundesrat stimmt neuen Regeln für nitratbelastete und eutrophierte Gebiete zu. Chapter 5. To be found at: https://www.bmel.de/SharedDocs/Pressemitteilungen/DE/2022/97-avv.html
[20] Koordinierte Flussgebietseinheit Oder (2021): Umweltbericht und Zusammenfassende Erklärung zum Maßnahmenprogramm für den deutschen Teil der IFGE Oder 2021-2027. To be found at: https://kfge-oder.de/kfge-oder/de/service/ver%C3%B6ffentlichungen.

nitrogen[21]. An ongoing measure is the establishment of the ecological continuity of the Zorge River[22].

Another Federal State engaged in the restoration of aquatic ecosystems is Hessen (eng. Hesse). Their project is called “100 Wilde Bächer für Hessen” (“100 wild streams for Hesse”). Within this project, municipalities receive support to reach their goal of renaturating 100 streams.
In the Southwestern part of Germany, in Rheinland-Pfalz (Rhineland-Palatinate) there are also measures being taken by the program Aktion Blau Plus (Blue Action Plus). In the last 20 years, Aktion Blau Plus implemented 1.339 restoration projects encompassing more than 899 km of surface water.
Approaches to implementation also exist at the federal level. The German Federal Government already initiated important projects through the Blue Belt Programme (German: Blaues Band Deutschland) or the Federal Biological Diversity Programme also called chance.natur (German: Bundesförderung Naturschutz), which also **aims at the restoration of surface water and health of aquatic ecosystems.**

4 & 6 — Identification of key elements for achieving the desired change in current water management, indicating key issues that need to be changed in Germany. & EU and non-EU countries' water management within BSR, including transboundary issues - reflection on transboundary river issues in your country

Key reasons for the high input of diffuse nutrients (especially nitrate) in the water are agricultural practices. **Advisory service for the farmers** based on current scientific research is therefore important in order to reduce the amount of high input[7]. Especially in areas with groundwater in bad chemical condition and inland lake catchment areas, the target of the advisory service is mainly to replace mineral fertiliser with fertiliser gained through agricultural or forestry practices. **The renewed Fertiliser Regulation is the most important instrument for nutrient reduction**. Furthermore, **an improvement in the filter capacities of sewage treatment plants is necessary**. Other measures, especially to reduce diffuse nutrient input through the rivers, are:

- reduction of nutrient loss through fertilisation and soil cultivation (incorporated in the renewed Fertilisation Regulation)

[21] https://aktion-fluss.de/wp-content/uploads/Steckbrief_Abwasser_Crawinkel.pdf.
[22] https://aktion-fluss.de/wp-content/uploads/Steckbrief_Krimderode.pdf.

- implementation of permanent broad riparian buffer strips
- natural construction of the watercourse, thus strengthening the self-cleaning properties of rivers
- moorland rewetting
- improvement of sewage treatment plants
- in special cases: advanced treatment of rainwater and sewage water

The implementation of all these measures faces severe obstacles. The main obstacle, besides the **lack of personnel to implement the Water Framework Directive** or the Nitrates Directive, is the **chronic underfunding of the agencies** needed to implement it. Accordingly, the issue must be given more weight in the budgetary competition between different departments within the states - this requires the corresponding political prioritisation. **To achieve the necessary political prioritisation, the public interest is crucial.** However, existing public relations efforts are not sufficient to create the needed public interest.

Another key element is land availability. More land must be available to protect the water body from nutrient inputs via river buffer zones and intact floodplains. On the Odra river, land tenure must be reorganised for this purpose if land use does not adapt to environmental requirements. In practice, this means a consistent land consolidation procedure (Flurbereinigungsverfahren) and the purchase of land by the federal states. **A coordinated approach of the different states (Germany, Poland and the Czech Republic) is essential for the reduction of nutrient loads in the Odra river** – therefore, an individual consideration of the states is only of limited use. It is important that the responsible ministries as well as the lower authorities of the Odra river basin cooperate with each other, especially with regard to the Strategy for Nutrient Reduction in the Waters of the International Odra River Basin District of the International Commission for the Protection of the Odra (ICPO) of 2022 and its consequent implementation[23].

One of the main problems in the implementation of regulatory measures is the position of agriculture as the main contributor of nutrient input. Farmers in Mecklenburg-Western Pomerania (North-East Germany) are even suing the Fertiliser Regulation, although it is already a weakened version of the federal Fertiliser Regulation

[23] Koordinierte Flussgebietseinheit Oder (2021): Umweltbericht und Zusammenfassende Erklärung zum Maßnahmenprogramm für den deutschen Teil der IFGE Oder 2021-2027. To be found at: https://kfge-oder.de/kfge-oder/de/service/ver%C3%B6ffentlichungen.

according to the minister of state[4]. Furthermore, the respective areas are dominated by intense land use, which makes a measurable short-term improvement of the water conditions difficult.

According to the authorities, a nationwide Good Ecological State will not be achieved until 2050 at the earliest – it was initially called for 2027. To be successful it was proposed **to implement a "water council"** to achieve better communication between the stakeholders. Other sectors and ministries, which are involved in water protection (e.g. agriculture and traffic) should be involved more actively.

All challenges will increase through climate change, worsening the eutrophic state. A related problem is **the increasing infiltration of the groundwater.** The water levels are decreasing and rivers cannot balance it again after droughts. During low water levels the concentration of contaminants in the water increases and the capability of dilution decreases. The state of the "groundwater dependent ecosystems" should serve as an indicator of the state of the groundwater. **The discharge of rainwater into combined sewer systems should decrease.**

The use of water should be financially compensated and the demands should include an increase in the contribution as well as a reintroduction of the regulations in those federal states where they were abolished. The financial coverage of the drinking water is not enough. Last but not least, **the WFD should include the ecological status of wetlands, springs and upper streams as well as zooplankton**, as this is helpful to tackle algal blooms.

5 — Directional actions of the European Union in the field of the restoration of aquatic ecosystems

Adhering to the Nitrates Directive is especially important regarding the regulation of diffuse nutrient inputs. In Germany, the Nitrates Directive is implemented through the Fertiliser Regulation. In 2016, Germany was sued by the European Commission for not complying with the Nitrates Directive[7]. In 2021, the EU Commissioner for Environment criticised Germany's renewed Fertiliser Regulation regarding the classification of the eutrophicated/nutrient polluted areas[10]: In comparison to 2019, considerably fewer and smaller areas have been classified as polluted by nitrate in 2021[11]. Afterwards, there have been renegotiations between the European Commission, the German state, and the German federal states. The federal states had to re-evaluate their respective areas until 30th November 2022[10].

IV UKRAINE

Adrian and Petro Hrytsyshyn, The Western Centre of the Ukrainian Branch of the World Laboratory

1 — An assessment of the current situation of water management in Ukraine - what are the main challenges?

The territory of Ukraine is divided by the main European watershed and, accordingly, belongs to the basins of the Black and Baltic seas. The Water Code of Ukraine establishes 9 regions of river basins[24]. All the indicated river basins, except for the Vistula river basin area, belong to the Black Sea basin, and the last one to the Baltic Sea basin. Of the indicated river basins, seven, except for the Southern Bug and the Crimea, have **transboundary significance**. The annual average potential resources of the river runoff are estimated at 209.8 km³ of which local runoff on the territory of Ukraine is 52.4 km³. Due to the uneven distribution of water resources throughout the country, a large part of Ukraine belongs to the regions (mainly southern and eastern) with a **low level of water availability**. To improve the distribution of surface freshwater resources across the country, 1103 reservoirs were built with total volume of 53.5 km³, 49500 ponds, 7 large canals and 17 irrigation systems[25].

In 2020, 9.6 km³ of water was taken from natural water bodies (90% from the surface and 10% from underground sources). Over the last decade, Ukraine has seen a **reduction** (by 1.5 times) **in the use of water resources** (from 14.8 km³ in 2010 to 9.6 km³ in 2019) **and discharge of return water** (from 7.8 km³ in 2010 to 5.2 km³ in 2020), which is due to a decline in commodity production, a decrease in water use due to an increase in water supply tariffs, and a slight reduction in its losses. In 2020, 60% of freshwater was used for production needs, 21.4% for irrigation needs, and 17.3% for drinking and sanitary and hygienic needs. **Water losses during transportation reached 1.2 km³, which was 12% of the total volume of water taken.**

[24] https://buvrzbts.davr.gov.ua.
[25] Strategy for the development of water policy of Ukraine for 2020-2050. Ministry of Environmental Protection and Natural Resources of Ukraine.

Vistula basin (Basin Council of Western Bug and Syan)

Map 3 - River basin and basin councils of Ukraine (https://mepr.gov.ua/).

Russia's military actions on the territory of Ukraine, ongoing since 2014, provoked huge environmental problems. First of all, this causes a **significant deterioration of the state of water resources** what creates problems for rivers and water bodies, worsens the state of groundwater, especially in the central and eastern territory of Ukraine. This became a challenge for the activities of the State Agency for Water Management because Ukraine still has to do a big homework, including solving environmental problems on the way to fulfilling the conditions for EU membership. During hostilities, it is impossible to determine the percentage of deterioration. The magnitude of this deterioration will be determined after Ukraine's victory. **As of 2022, the main war damage to water resources has been caused to ¾ of the territory of Ukraine.**

Common problems for river basins of Ukraine over the past 20 years are **the growing negative impact on the natural ecosystems of rivers and groundwater.** Among the reasons for such influence are the dangerous **contamination of waters with microplastics**, destruction of dams and wastewater sedimentation tanks caused by the current war. In case of destruction, it's dangerous for water bodies in the context of the high probability of accidents and the infiltration of pollution through the bottom and walls of dams, tailings, clarifiers and sludge accumulators of the mining industry. In addition to the constant contamination of surface and groundwater by infiltration through the bottom and walls of dams, the adverse effects of climate change cause the formation of intense atmospheric precipitation, which creates a potential danger of overflow and breach of industrial reservoir dams, which can lead to significant chemical and/or radionuclide contamination. Objects of increased danger are reservoirs of industrial purpose (tailing ponds, settling ponds and sludge storage tanks) located in the area of the Joint Forces Operation.

The results of international research[26] show a wide range of wars' damage, including flooding of large areas due to dam breaches, pollution from untreated wastewater spills, dumped ammunition, an increase in mine water levels, and a significant decline in the quantity and quality of water for drinking and agricultural purposes. Also, a recent UN report indicates that the number of people in need of access to safe water across Ukraine increased from 6 to 16 million between April and December 2022.

"The east of the country is home to large industrial plants for metal processing, mining and chemical production, which have also been affected. The rising level of polluted mine waters poses a particular risk in that part of Ukraine. (...) Although many mines ceased operations in recent decades, the mine waters still have to be constantly pumped so that they do not rise and overflow to geologically connected mines. Several power outages and direct damage have brought this process to a halt. In the first three months of the conflict alone, six mines were flooded completely and two temporarily. Mine waters with high concentrations of sulphates, chlorides, and heavy metals can then discharge into groundwater and surface waters[28]."

Since 2013, there has been **a decrease in the total capacity of city water treatment facilities**, and the **share of polluted and insufficiently treated wastewater in relation to the total volume of return water drainage in 2020 was 10%**.

[26] War in Ukraine threatens freshwater resources and water infrastructure | IGB (igb-berlin.de).
[27] https://ips.ligazakon.net/document/kr221134.
[28] Rebuilding Ukraine: Principles and policies | CEPR Rebuilding Ukraine: Principles and policies, Yuriy Gorodnichenko, Ilona Sologoub, Beatrice Weder di Mauro; 7 Dec 2022.

The register of such enterprises, including information on the condition of water supply and drainage facilities, as well as the availability and condition of treatment facilities, is not maintained by anyone. The given information indicates **the inadequacy of control (state and public) over the processes of centralized water supply and drainage.**

According to the Antimonopoly Committee of Ukraine, in 2019, out of 2371 economic entities in the field of centralized water supply and/or centralized water drainage, 50% were engaged in activities related to centralized water supply and centralized water drainage. And only about 1000 of them, according to Ukrvodokanalekologiya, had urban wastewater treatment facilities, of which only half carry out proper treatment. The rest **(16%) are discharged into municipal wastewater without any treatment**.

Compounds of nitrogen, phosphorus, heavy metals, persistent organic substances, oil products and other pollutants are the main components of stationary and diffuse pollution of surface and underground waters. It must be taken into account **the vast majority of existing urban sewage treatment plants** have two levels of purification and are characterized by low efficiency in removing compounds of nitrogen, phosphorus, heavy metals and persistent organic pollutants. They **require an increase in treatment capacity, complete reconstruction or significant repair**[27].

In addition to the purposeful aggressive actions of Russia, the main cause of anthropogenic load on reservoirs is **the improper practice of state water and ecological governance in river basins**, which is primarily manifested in:

- inadequate legal, financial, organizational and technical capacity to clean urban wastewater, especially from nitrogen and phosphorus compounds, as well as heavy metals;
- lack of legal, institutional and methodological approaches to the assessment of diffuse pollution of surface and underground water bodies and its control;
- uncontrolled and technologically unregulated, unjustifiably excessive use of mineral and organic fertilizers as well as toxic chemicals of various orientations by agricultural producers, long-term violation of environmental legislation by enterprises of the mining industry, as well as improper handling, storage of by-products of animal origin contributes to **chemical and/or radioactive pollution of surface and underground water bodies in Ukraine**. The assessment of the anthropogenic impact on the state of water shows that **30% of surface water bodies are at risk of diffuse pollution**. Control over diffuse pollution from agricultural activities is not carried out;
- **the absence of strict legal requirements for economic entities that discharge pollutants into city drainage systems, and the absence of appropriate state**

control regarding the need for them to introduce preliminary (local) wastewater treatment leads to:

- pollution of underground and surface waters as a result of unresolved issues of dewatering and disposal of sludge, which is formed as a result of cleaning urban wastewater;
- in most cities, the issues of cleaning storm (rain) sewage are not resolved;
- chemical and microbiological contamination of groundwater.

In terms of the area of arable land (32.7 million hectares or 54% of the country's territory), Ukraine in 2019 took first place in Europe (the similar average figure for arable land in Europe does not exceed 35%). Such extensive agricultural use of land, ecologically unjustified drainage reclamation in some regions, and violations of environmental protection requirements during the implementation of agricultural activities (in particular, ploughing fields up to the water level, ploughing slopes) became, during the years of independence, the main reason for the disappearance of more than 10 thousand small rivers from the geographical maps of Ukraine. This anthropogenic pressure, intensified by the negative impact of climate change, has led to an increase in the probability of both large-scale droughts and catastrophic floods. **The desertification of the southern regions of Ukraine** is gradually turning this region into a depressed one. Total damages from floods and droughts in different regions of Ukraine can reach more than UAH (Ukrainian Hryvnia) 1 billion every year. According to European experts, in the conditions of climate change, and in the absence of proper management of water resources, the indicated losses may double every five years. Evidence of this is the drought in the southern and central regions, as well as **the catastrophic floods in the western regions of Ukraine that occurred** in 2020 as a result, in particular, of massive deforestation in the Carpathian region. **The mining industry has a dangerous impact on the quality of water resources.** A huge number of dumps, production waste, tailings storage facilities, sludge accumulators, etc. leads to **uncontrolled chemical and radioactive contamination of ground and underground waters and surface water bodies.**

2 — Assessment of Ukraine’s water resources and discussion of planning approaches in water management

Except for the challenges mentioned above, need to be highlighted that since 2019, **European approaches to water monitoring have been introduced in Ukraine** in accordance with the requirements of the Water Framework Directive. Resolution No. 758 of the Cabinet of Ministers of Ukraine of September 19, 2018, approved a **new procedure**

for state water monitoring. The procedure defines a clear distribution of responsibilities between monitoring subjects without duplication of powers, new monitoring indicators that have not been measured in Ukraine until now are introduced - priority, hydromorphological and biological. The new water monitoring system provides for a six-year cycle of monitoring and classification of water status according to 5 classes of ecological status and 2 classes of chemical status.

Depending on the goals and tasks of state water monitoring, the following procedures are established:

- procedure for diagnostic monitoring of surface and underground water bodies;
- procedure for operational monitoring of surface and underground water bodies;
- procedure for research monitoring of surface water bodies;
- seawater monitoring procedure.

Diagnostic, operational and research monitoring is carried out according to the basin principle.

3 & 4 — Challenges and directions of proposed changes in water management of Ukraine, including consideration of surface water restoration needs and efforts being made to naturalize waters in Ukraine. & Identification of key elements for achieving the desired change in current water management scheme, indicating key issues that need to be changed

The most urgent actions are:

- to formulate water management plans (as members of the western Bug council did) - this year (2022), basin councils are planning and collecting information, after prioritization, the studies will be presented in 2024/25;
- to assess war damage and pollution;
- water monitoring as an important part of water management plans - currently problematic for Ukraine; in the west of Ukraine it started on the Dnieper river.

Currently, appropriate state water monitoring programs are being prepared for state water monitoring, including a diagnostic monitoring program for the Vistula basin. The measurement of priority pollutants on the Western Bug and Syan rivers is carried out by the laboratory of the Western Region of Ukraine in Ivano-Frankivsk.

According to the degree of pollution, **the rivers of Ukraine correspond to the 3rd class of water quality, namely "moderately polluted",** at the same time, **cases of high pollution are registered in more than half of the reservoirs**. In particular, this applies to the impact of high pollution of the city of Lviv on the Western Bug River - the right tributary of the Vistula.

The issue of urban storm/rain sewers is a separate issue because in most cities of the Western Bug basin, such sewers are separate from urban sewage treatment facilities and direct storm drains (containing high concentrations of suspended substances and oil products) directly to the river.
Only 2% of the rural population has access to improved sanitation, while the rest use poorly equipped street toilets, cesspools, etc., which are a source of microbiological and chemical contamination of groundwater. Currently, **local authorities do not control compliance with sanitary and environmental conditions of their arrangement.**
Despite awareness of the importance and significance of diffuse pollution, there are no methodological approaches to its assessment in Ukraine. To date, progress in the implementation of the EU Nitrates Directive is taking place at a slow pace.

In terms of damage to water and sanitation infrastructure, in the first six months of the war, the European Investment Bank EIB disbursed €1.7 billion to help Ukraine repair infrastructure and provide essential social support. These loans were backed by a guarantee from the EU principally to fund public sector investments including water and sanitation projects[28]. Also, it's worth noticing *Ukraine's river ports and sea ports play a crucial role in the country's trade, especially in agricultural commodities. To facilitate business, creating alternative transport routes – for example, by railway via neighbouring countries would be helpful.* This shift may go hand in hand with climate change adaptation activities.

Picture 3 - rzeka Stryj (credit: Paweł Pawlaczyk).

5 — Discussion of planning approaches in water management and participation of public organizations

The State Water Agency, together with the Center for Improving the Qualifications of Water Management Workers on the basis of the Dniester Basin Water Resources Administration, conducted a practical training on the preparation of Section 8 of the River Basin Management Plan (RBMP) "Full list of programs/plans for the river basin or sub-basin area, their content and problems to be solved" for the basins of the Dniester, Danube and Vistula rivers.

To meet the requirements of the EU Water Directive, a schedule for the development and creation of River Basin Management Plans (RBMPs) has been developed. This schedule includes:

- 2021 - 2023: development of RBMPs;
- the first half of 2024: informing the public and discussing the RBMPs project;
- at the end of 2024: approval of the RBMPs by the Cabinet of Ministers of Ukraine;
- 2025 - 2030: implementation (first cycle) of the RBMPs;
- 2031 - 2036: implementation (second cycle after revision of the RBMPs).

At the meetings of the Western Bug and Sian River Basin Council in 2022, the Basin Management of Water Resources (a state authority) informed about the transfer to the united territorial communities of the basin, the main water users and interested organizations of a form for filling out proposals for a plan of measures to improve the state of water. The next step will be to process these proposals and present them at a meeting of the Basin Council, which will determine the priority of the proposals for presentation to the customer.
At the meeting of the Basin Council on November 10th 2022, the following topical issues were considered, in particular:

- the Flood Risk Management Plan in the Vistula Basin approved by the Decree of the Cabinet of Ministers of Ukraine;
- the progress of the development of elements of the Vistula river basin management plan project and the restoration and preservation of groundwater, determination of their massifs;
- the implementation progress of the project "Restoration of the ecosystem of the small rivers - the way to the long-term development of the community and the well-being of the local population" which is being carried out with the financial support of the Embassy of Sweden in Ukraine in the territory of the Western Bug basin.

V BELARUS

Uladzimir Zuyeu, Nerush

1 — An assessment of the current situation of water management in Belarus - what are the main challenges?

The distribution of river flow over the territory is very uneven. Most of the river flow (64%) is formed within the country, the transboundary inflow of water from the territory of neighbouring states averages 23.9 km³. About 55% of river flow falls on the rivers of the Black Sea basin and 45% on the Baltic. The annual dynamics of the resources of the river flow of Belarus is 44-72 km³. Over the past 50 years, there have been quite significant changes in river flow volumes. According to the forecast change in runoff volumes, a sharp differentiation between the northern and southern parts of the republic is also possible. With a slight change in runoff on average per year, it is highly likely to be uneven and multidirectional in seasons and months. The runoff can change especially significantly in the south of Belarus - it will decrease in all seasons, the largest in the summer. At the same time, for the northern part of Belarus (the basin of the Western Dvina), not as significant changes in runoff are predicted as for the south.

The management of water resources in the country is carried out with the aim of their use and protection as the basis for human life and the functioning of natural systems. The development and implementation of water management and water protection measures is coordinated by the state management body, whose functions are currently performed by the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus. It develops draft legislation, standards, issues permits for the use of water in various areas of the economy. The Ministry maintains the Water Cadastre. There is a register of water bodies by region of the country[29]. For all water bodies, statistical reports of water users have been provided in the context since 2000, including by the volume of pollution with individual substances[30]. **A register of hydraulic structures has been created by region** (e.g. for the Brest region[31]). A register of wastewater discharges into surface water bodies (e.g., for the Brest region[32]) is maintained.

[29] http://195.50.7.216:8081/watres/makelist.
[30] http://195.50.7.216:8081/watstat/databasin/59cd3934-fb8a-4ed6-8112-a9d01e9610a1.
[31] http://195.50.7.216:8081/static/files/Brest_HTS.pdf.
[32] http://195.50.7.216:8081/static/files/Brest_outlet.pdf.

In the existing water management system, the Ministry of Health of the Republic of Belarus (establishment of drinking water quality standards and appropriate monitoring) and the Ministry of Housing and Communal Services of the Republic of Belarus (planning, construction and operation of water supply and sewage systems, wastewater treatment plants) play a large role.

Human activities have and continue to have a significant impact on water quality. **The drainage of marshes** led to an increase in the colour of underground waters due to their contamination with water-soluble humus substances. The groundwater also receives such products of peat mineralization as ammonium and nitrate compounds.

The discharge of municipal and industrial wastewater, along with diffuse sources of pollution, such as the removal of pollutants with surface runoff from urbanized and agricultural areas, **also leads to a deterioration in water quality**. The main sources of **water pollution** include filtrate from landfills and landfills of municipal solid waste, disposal of precipitation, filtration fields and fertilizer storage. The same large sources of pollution are the discharge of untreated wastewater by livestock farms, as well as municipal and surface wastewater from large cities.

Sewage treatment plants built in many small and medium-sized towns in the 1970s and 1980s **require modernization or reconstruction**. They cannot ensure that modern wastewater treatment quality requirements are met, including the EU Council Directive on municipal wastewater treatment, especially on nitrogen and phosphorus removal.

Pollution of water by the agro-industrial complex, both from diffuse and point sources, can lead to exceeding the permissible levels of nitrogen, phosphorus, potassium and sodium in surface runoff, which can enter streams and water bodies, in groundwater.

In Belarus, the rural population in small towns enjoys uncentralized sources of water, such as wells, **without sufficient information about the quality of water** in them. As a result, consumption of potable water contaminated with agricultural nitrates poses a health risk. The analyses carried out confirm that, from time to time, the content of nitrates in water exceeds the maximum permissible concentration by several times. Moreover, water samples taken from wells in the vicinity of farmland often do not meet the chemical and microbiological requirements for drinking water. In some territories, pesticides (e.g. Minsk region) are another problem related to the quality of freshwater.

Water resources in Belarus are of great importance not only because they are consumed by humans, but also because of the role they play in maintaining biological diversity and valuable ecosystems. **Belarus has many swamps, lake systems and other water bodies that support fragile and relatively rare ecosystems in Europe.** Representatives of the flora and fauna of wetlands are becoming smaller due to the burden of climate change on them. The situation is aggravated by anthropogenic factors, such as the fragmentation of biocenoses, leading to their degradation.

Picture 4 - Neman hydropower plant station (www.sb.by/articles/grodnenskaya-ges-za-10-let-vyrabotala-pochti-800-millionov-kvt-ch-elektroenergii-.html).

The Water Strategy of the Republic of Belarus was approved, which defines the main problems and tasks in the field of water use and protection, which must be solved taking into account the features of the upcoming stage of the country's socio-economic development. This document is the main sectoral document of the strategic planning of Belarus in the field of protection and use of water resources, it focuses on:

- the development of the paid water use system;
- widespread introduction of progressive energy and resource-saving technological processes;
- introduction of comprehensive environmental permits for environmental users;
- Implement Best Available Technical Practices for integrated pollution prevention and control;
- analysis and accounting of the impact of natural hydrometeorological phenomena and possible climate change on water resources;
- introduction of technologies to improve the quality of wastewater discharged.

Based on the monitoring data of water bodies, the Ministry of Natural Resources is calculating the indicator of the sustainable development goal number 6 "Ensuring the availability and rational use of water resources and sanitation for all" - the share of surface water bodies that are assigned a "good" and higher ecological (hydrobiological) status.

Since 2014, in the republic, the assessment of the general state of surface water bodies consists in determining their ecological statuses (hydrochemical and hydrobiological) by comparison with reference physicochemical and biological characteristics. For the Western Dvina River basin, this figure in 2018 was 85% (in 2006 - 70%), for the Neman River - changed from 58% in 2015 to 88% in 2017, for the Western Bug River - from 27% in 2015 to 53% in 2017.

In 2018, 63% of rivers and 84% of lakes were classified as having good and excellent hydrobiological status; 80% of rivers and 100% of lakes covered by observations were classified as having good and excellent hydrochemical status (standards comparable to WFD).
Surface water pollution by nutrients (phosphate and nitrates) is present and varies in different rivers - e.g. compared to 2015, the content of nitrates in the Western Bug River basin increased significantly, and over many years is the highest (from 28% in 2014 to 48% in 2018). An increase in the concentration of nitrite ions usually indicates fresh pollution mainly from fertilizers and livestock waste.

2 — An assessment of the Belarussian water resources and discussion of planning approaches in water management

According to the water resources exploitation index, water resources are most intensively exploited at the regional level in the basins of Berezina, Vilia and Neman, Dniepr, weaker - Western Dvina, Sozh and Western Bug. In general, water resources are operated normally. At the national level, the water exploitation index is only 2.8-3.0%, which indicates that **the total water intake for all sectors of economic activity does not exert significant pressure.**
Given that water transport is the minimum share of Gross Domestic Product (GDP) and is currently developing slowly, this issue is not the highest priority under the Water Strategy. **Waterways of almost all navigable rivers cross the territories of protected areas, including of international importance**, which implies certain restrictions during 26 dredging, straightening, and construction of hydraulic retaining structures.

Monitoring of surface and groundwater conditions is a key component of the EU Water Framework Directive. **Although Belarus has no obligations to fulfill the requirements of the WFD, the country has embarked on a course to increase the degree of compliance of national water legislation with EU standards in the field of water management**. Article 8 of the WFD states that monitoring of the water state should be carried out "for each area of the river basin." Thus, proper monitoring of the state of

water resources requires the determination of the boundaries of water bodies within the river basin.

Currently, the Dnieper River Basin Management Plan and the Pripyat River Basin Management Plan have been developed[33]. **Management plans have not been created for the rivers of the Baltic Sea basin.**

3 & 4 — Challenges and directions of proposed changes in water management, including consideration of surface water restoration needs and efforts being made to naturalise waters. & Identification of key elements for achieving the desired change in the current water management scheme

Currently, there are **conflicts between certain tasks of the country's economic development and the tasks of the Water Strategy until 2030**:

- The development of water transport and hydroelectric potential will lead to a change in the hydrological regime of water bodies, a reduction in the species diversity of flora and fauna and a violation of the spawning of certain fish species (in case of hydro energy). Therefore, the Ministry of Transport and Communications and the Ministry of Energy, when developing further targets for the development of water transport, must take into account all kinds of negative factors on the environment when implementing these projects;
- Increasing the efficiency of using the recreational potential of water bodies can lead to an increase in recreational loads, pollution of water bodies and transformation of water ecosystems up to the loss of their recreational suitability (example of Naroch lake, Svir lake);
- During the construction of the hydroelectric power station, a complete loss of terrestrial ecosystems subject to flooding is expected, as well as the transformation of flooded and aquatic ecosystems. When selecting and designing promising sites for the location of hydroelectric power plants, biodiversity studies should be carried out;
- Due to the prospective operation of the waterway, a slight increase in emissions from mobile sources is possible, a change in the hydrological regime is expected, as well as a complete loss of significant areas of specially protected natural areas, Ramsar lands, including floodplain oak forests, black alder forests, hornbeam forests and natural floodplain meadows preserved for the past 50 years. It is also expected to increase the

[33] http://www.cricuwr.by/plan_dnepr, http://www.cricuwr.by/plan_pr.

intensity of coastal erosion and the disappearance of a number of nesting populations of protected species of birds, insects, the loss and restructuring of ichthyofauna, the loss of a large number of plants of national and international importance. A significant loss of recreational attractiveness is also expected. The listed potential consequences indicate the need to clarify the prospects for the development of waterways, including routes and methods of their arrangement.

5 & 6 — Directional actions of the European Union in the field of the restoration of aquatic ecosystems. & EU and non-EU countries' water management within BSR, including transboundary issues - reflection on transboundary river issues in Belarus

Except a regional register of hydraulic structures, in 2022 the map of dams on rivers has been created by NGO - a unique country-scale initiative looking for and pointing out places where the watercourse is blocked by a barrier[34].

Transboundary sections of watercourses, as well as water bodies of the republic, are generally characterized by excessive content of biogenic substances in water, usually due to anthropogenic load. On the border with Poland, the Western Bug River is subject to a stable ammonium load. Long-term contamination of waters with nitrite ion was also observed throughout the West Bug River.
The main problem of cross-border sections of watercourses with Poland is their contamination with phosphate ion remains. The watercourses entering the territory of the Republic of Lithuania and the Republic of Latvia for many years were characterized mainly by the permissible level of biogenic substances. The average annual concentrations of petroleum products in the water of all transboundary sections of watercourses met the standards of maximum permissible concentrations.
In Belarus 1034.0 mln m³ of wastewater was discharged into surface water bodies in 2020, there is an increase in this indicator. In the wastewater structure in 2018, the largest volume was normatively treated wastewater - 689.3 million m³ (67% of the volume of wastewater discharge into surface water bodies). **The discharge of insufficiently treated wastewater into surface water bodies decreased by 29.8%** compared to 2015. **The volume of wastewater discharged into surface water bodies without preliminary treatment increased by 38.6%**. The most reclaimed basins of the Western Bug (25.7%), the least - Nemana (12.4%). Projects on the reconstruction of reclamation.

[34] В Беларуси создали первую в истории карту плотин (bahna.land).

networks are ongoing in Belarus.

Currently, **the most common form of engineering regulation and impact on river flow are reservoirs.** 144 reservoirs of seasonal regulation with a volume of over 1 million were created in the republic. On Belarusian reservoirs, the amplitude of level fluctuations is on average up to 5 m, and the size of flooding areas on flat rivers varies from 8 to 12%. The placement of reservoirs in the country is uneven. Most are located in the region of Belarus Polesie and belong to the basins of the Pripyat[55] and Dniepr[47], mainly designed to regulate the soil moisture of reclaimed lands. During reclamation, the water level in many of them decreased by 0.3-1.5 m. And to restore the hydro regime, lakes were specially dug, the number of which was 99.6% of the total flow control.

The country operates more than 1700 km of inland waterways. The largest ports in BSR are Brest, Vitebsk, Grodno. At the same time, the dynamics of the ten-year period show a decrease of more than 2 times in the volume of cargo transportation and stable dynamics in terms of passenger transportation by inland water transport - about 0.2-0.3 million people. **The share of inland water transport in the country's total cargo turnover is less than 1%.**

At the moment transboundary cooperation with EU countries is suspended on the initiative of the Belarusian authorities.

Picture 5 - Natural meander of Shchara river, Belarus (credit: Uladzimir Zuyeu).

VI ESTONIA

Maret Merisaar, Estonian Water Association

1 & 2 — An assessment of the current situation of water management in Estonia - what are the main challenges? & An assessment of the country's water resources and discussion of planning approaches in water management

Estonia has big water resources on its comparably small territory. For example, there is 2000 km³ of groundwater[35], 5 times more than in Lake Peipsi. Abstractable drinking water resources are estimated to be 300 000 m³ and only 25% of that is actually used for this purpose. At the same time, **80% of water abstraction is counted for the mining waters**. According to the website of the Estonian Ministry of Environment[36] and Environmental Agency[37] **79% of aquifers are in good chemical status and 94% in good quantitative status.**

Mining activities in NE Estonia have resulted in contamination with phenols and agricultural activities all over Estonia cause leakage of nutrients into the upper layers of groundwater. According to the recent report on Nitrate Directive implementation, **Estonia is one of the 7 member states that faces difficulties in decreasing nitrate pollution**.

The Environmental Research Centre monitors groundwater annually in 259 drilled wells, of which 24 are located in the Nitrate Vulnerable Zone in Middle Estonia. The level of iron is quite high due to the geological situation. **The influence of abstraction in coastal and mining areas should be followed more closely as well as the content of hazardous substances in the mining area**. The state of surface water bodies is monitored annually as well. **In 2021 52% of surface water bodies were in good status** (58% of running waters, 15% of still waters and 0% of coastal marine waters).

There are 1535 natural lakes in Estonia and these are affected by nutrients from their

[35] https://geologia.info/geology/index.html.
[36] Homepages of Estonian Ministry of Environment, Water Department, e.g. www.envir.ee/media/566/download.
[37] Homepages of Estonian Environmental Agency https://keskkonnaagentuur.ee/keskkonnaseire-ja-analuusid/vesi.

catchment (fertilisers and farming waters) as well as from bottom sediments. In addition, mercury, cadmium and PBDEs are found in the fish. Estonian rivers are short, poor in water and rapids. **Only 10 rivers are longer than 10 km,** the longest is 162 km. **The ecological state of rivers is affected by fish migration barriers and melioration ditches**. **Coastal marine water bodies receive too much nutrients that cause eutrophication.** Mercury and PBDE are found in marine fish as well and the bottom sediments release cadmium and tributyl-tin. From the 64 bathing water bodies, 62.5% are stated to be of good quality[38].

The pressures decreasing water quality are: agricultural activities, loads from municipal wastewater treatment plants and stormwater, past pollution from industrial sites and sediments, aquaculture, leachates from forest felling, atmospheric deposition, water abstraction, melioration, fish migration barriers, alien species and diseases.

The chemical, ecological and quantitative status of different water bodies can be seen on the maps by Environmental Agency[39]. The third cycle RBMP was adopted on 7th October 2022 and it was compiled together with the Flood risk management plans[40]. All public hearings have been recorded and are available on the website of the Ministry of Environment.

In autumn 2022 the priorities of the Estonian Minister of the Environment started with forestry while water management was ranked as the last one. The biggest challenge for the Minister in the water sector was said to be the fact that EU subsidies for constructing new water supply and sewage treatment infrastructures have ceased and the country needs to rely on its own financial resources again.

[38] Loel, R(2008): Kaevuprojekt tuleb saare Maakonda. “Saarte Hääl”, 5.02.2008 in Estonian. (Well project arrives to the Saaremaa Island).
[39] Homepages of Estonian Environmental Agency e.g https://keskkonnaagentuur.ee/keskkonnaseire-ja-analuusid/vesi and https://www.arcgis.com/apps/dashboards/aeb14387af0444149486a5e2513916fd.
[40] Veemajanduskava meetmeprogrammi kinnitamine. Keskkonnaministri käskkiri nr 1-2/22/357 07 October 2022. In Estonian (Adopting the Plan of Measures for the River Basin Management Plan 2021-2027).

3 & 4 — Directions of proposed changes in water management, including consideration of surface water restoration needs and efforts being made to naturalize waters in Estonia. & Identification of key elements for achieving the desired change in current water management scheme, indicating key issues that need to be changed

One example of restoration of surface waters is the clean-up of past pollution from the rivers Erra and Purtse in NE Estonia funded by the EU LIFE CleanEST project. These rivers have been polluted by oil products from the oil-shale mining and processing industry since the beginning of the last century. By now 14 000 tons of polluted soil and sediments have been removed from the river bottom and deposited in a landfill. By October 2023 the next 2.4 km of Erra river should be clean.

The status of water resources has not been significantly improved as a result of the two cycles of River Basin Management Planning. Due to adding certain hydromorphological criteria in the second cycle, the overall assessment was even somewhat weaker. There have been ideas that instead of the present central top-down administration (the Ministry of Environment serves as the Water Administrator for all three sub-basins), there could be a shift back to local melioration associations. These small communities used to take care of water management on local level in the past and coordinated all activities with the other stakeholders if needed. This approach is not supported at the moment due to personal changes at the Union of Meliorators' Associations.

The Urban Waste Water Treatment Directive (UWWTD) has been very successfully implemented in Estonia. According to Environmental Implementation Review[41], additional efforts have to be made to secure biological treatment with nitrogen and phosphorus removal for 0,8% of municipal wastewater. **85% of the population is connected to public water supply and 83% to central wastewater treatment plants**. In Estonia, there is no requirements to connect all population to public water supply and central sewage treatment services. Local municipalities are encouraged to aggregate their water companies and to manage wastewater systems regionally. Average water consumption is 88 liters per day per person and the price of water services is 2.23 euros per m^3. The amount of treated water is assumed to be the same as consumed freshwater

[41] DG Environment: Assessment of Member States' progress in Programmes of Measures during the second planning cycle of the Water Framework Directive. Member State. Estonia, 2022.

that is measured. The total population in Estonia is 1,3 million, of which ca 31% live in small settlements with less than 2000 inhabitants. From the latter, ca. 25% is connected to WWTPs. The rest (ca. 225 000 inhabitants) are using individual sanitation systems. Small water treatment plants conduct self-monitoring 4 times per year and pay for these costs themselves. Some smaller local WWTPs have problems with finding suitable staff for operating. According to the inventory of 2611 **individual sanitation systems**[42], [43] 35% are older than 35 years and 29% are older than 15 years. They **need reconstruction**. The best systems are those built in the late 14 years consisting of a septic and followed by a filter system or active sludge technology. **Nature based solutions for waste water treatment** (soil filtration, aerated ponds and treatment wetlands) **are mostly used as post treatment or as individual systems.** All treatment systems are accepted, if the discharged wastewater is in compliance with the requirements. Still, 60% of aerobic bioponds lack suitable sampling place for effluents and 30% of infiltration systems are built in areas with unprotected groundwater.

RE-usage of treated wastewater is a new standard from European legislation that has started discussions. Content of coli bacteria is still high there so there are concerns about using this water. On the other hand water companies should accept the idea to apply measures for using that water for irrigating green areas (at least those belonging to municipalities) as **the loss of drinking water for irrigating gardens in summer is so big that there are shortages of drinking water** in the central supply system temporarily. Irrigation of food crops can wait[44],[45].

Inventory of shallow and drilled wells in rural areas without central water services[46] showed that **drinking water quality outside the central supply system is not**

[42] Hajaasustuse reoveekäitlussüsteemide invrentuur ja investeerimisprogrammi kootamine https://www.kik.ee/et/projektid/hajaasustuse-reoveekaitlussusteemide-inventuur-ja-investeerimisprogrammi-koostamine In Estonian. (Investment programme for individual waste water treatment systems by the Environmental Investments Centre.
[43] Hajaasustuse reovee kohtkäitlusüsteemide inventuuri aruanne. Infragate As töö nr KM22, Leping nr. 4-1.1/13/32, ... lk. (In Estonian. (Inventory of individual wastewater treatment systems in scattered areas, ordered by the Ministry of Environment and funded by the Centre of Environmental Research).
[44] EUROOPA PARLAMENDI JA NÕUKOGU MÄÄRUS (EL) 2020/741, 25. mai 2020, mis käsitleb vee taaskasutuse miinimumnõudeid In Estonian. (Regulation on Waste water reclamation, will be in force from 26 June 2023).
[45] L. Alcalde-Sanz, B.M.Gawlik (2017), *Minimum quality requirements for water reuse in agricultural irrigation and aquifer recharge – Towards a water reuse regulatory instrument at EU level*, EUR 28962 EN, Publications Office of the European Union, Luxembourg, 2017, ISBN 978-92-79-77176-7, doi 10.2760/887727, PUBSY No109291.
[46] Kõrgmaa, V. et.al. (2020): Hajaasustuspiirkondade joogivee kvaliteedi ja süsteemide uuring. Leping nr 4-1/18/129, Tallinn, 2020, 105 lk, In Estonian. (*Inventory of individual drinking water supply systems in scattered areas, ordered by the Centre of Environmental Research*).

satisfactory. It was revealed that **bacterial contamination is present in almost half of these wells**. Overall, only 29% of the wells outside the central system corresponded to all drinking water quality criteria. The worst situation was found on the second largest island Hiiumaa. In the past, there was an initiative called WELL PROJECT, where national funds were allocated for improving the drinking water supply in the Islands and in the SE corner of Estonia. Some NGO activists have asked for Estonian Water Association's (EstWA) help to call this programme back to life[47],[48],[49].

In the field of Flood risk management, the challenge is related to the missing forecasts of future floods. The published Flood Risk Management Plan includes a database of spatial measurements of areas affected by flood risk based on previous incidents[50].

5 — Directional actions of the European Union in the field of the restoration of aquatic ecosystems

Priority measures for the River Basin Management Plan 2022-2027 include improved coordination of water, marine and nature protection policies[31].

In terms of impoundments**:** the hydromorphological parameters of rivers need to be re-evaluated in harmony with Article 4[7] of the Water Framework Directive. Estonia does not have a timetable for removing fish migration barriers. Currently, ca 10 dams are removed in NE Estonia as part of the LIFE CleanEST project. 7 impoundments were removed from river Pärnu in 2015-2021 (Cohesion Fund project) creating 3000 km of free-flowing water courses and encouraging the next steps in this field. **The Estonian Environmental Agency has made an inventory of fish migration barriers** in 2010-2015 (2.6 million euros, 100% financed by Cohesion Funds). **1005 barriers were recorded and 45 projects for opening those were designed**. Several other studies and environmental impact assessments were funded in that programme, including recommendations for impoundments belonging to the public sector[51]. In January 2022 an additional detailed

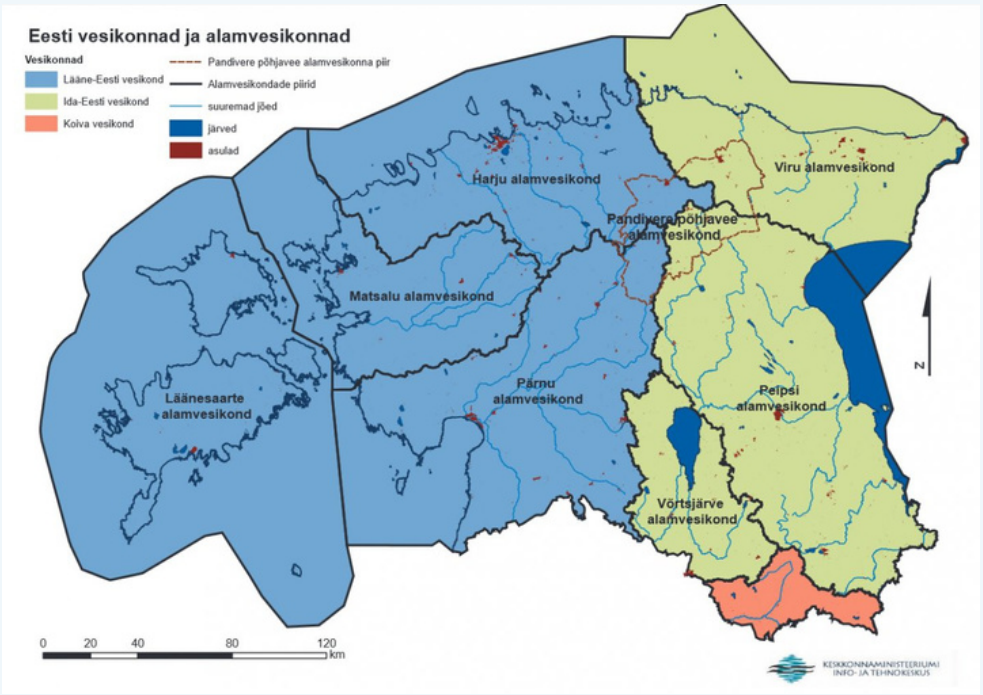
[47] Määrits, M. 2008: Esimesena käivitub kaevuprojekt: "Koit", No 45, 17.04.2008 p.1. https://dea.digar.ee/cgi-bin/dea?a=is&oid=koit20080417&type=staticpdf (Launching a financial support programme for individual wells in Põlva County, SE Estonia)
[48] Loel, R(2008):. Kaevuprojekt tuleb saare Maakonda. "Saarte Hääl", 5.02.2008 in Estonian. (Well project arrives to the Saaremaa Island).
[49] Hajaasustusprogramm 2018. EAS In Estonian (Investment programme for individual drinking water supply systems by the National Fund for Entrepreneurs).
[50] Lääne-Eesti üleujutusriskide maandamise kava (2022-2027.In Estonian) *(Flood Risk Management plan, 2022*).
[51] Tõkestusrajatiste inventariseerimine vooluveekogudel kalade rändetingimuste parandamseks. Esti Veeprojekt I ja II, 2013, In Estonian (Inventory of fish migration barriers, ordered by the Ministry of Environment, funded by the Centre of Environmental Research and implemented by Estonian Environmental Agency.

study of 50 barriers[52] that was carried out in the frame of the 3rd cycle of RBMP, was published. From the latter 10 are located in water bodies with no fishery significance, 8 should be reconstructed and 26 pulled down. In the frame of the EU LIFE CleanEST project, practical activities of demolishing have started in NE Estonia.

In terms of wetlands restoration: Estonia is rich in wetlands, but **due to draining since last century the present coverage has decreased from natural 22,3% to 5,5%.** Since 2021 Estonia participates in the HORIZON 2020 Green Deal project WaterLANDS restoring 3500 ha of peatlands that are damaged due to economic activities. The Council of Nordic Ministers has considered wetlands the most valuable types of landscape from the point of view of carbon cycles and climate regulation.

6 — EU and non-EU countries' water management within BSR, including transboundary issues - reflection on transboundary river issues in Estonia.

Estonia is divided into 3 sub-basins and two of them are transboundary**:**



Map 4 - River basins of Estonia (source: https://kliimaministeerium.ee/veemajanduskavad)

[52] Avamise vajalikkuse koondhinnanguta oluliste paisude inventariseerimine ja koondhinnangu andmine , Paper no 20033 January 2022. In Estonian. (Additional inventory of fish migration barriers implemented by AS Maves, responsible Kupits, k. , _Viirma, M., Järvekülg, R. in th frame of River Basin Management planning for 2021-2027.

The transboundary water management has no "issues“ regarding the border[53] river basin Koiva/Gauja at the Latvian border. But the recently interrupted joint INTERREG project with Russian water specialists indicated that the methodologies used for river flow measurement are different in Estonia and Russia, so all the other measurement results are not comparable either. A common methodology was elaborated and agreed upon, but the work stopped at the very last stage due to war. To remind - in 1997 a Joint Estonian-Russian Commission for the protection and sustainable use of transboundary water resources was founded between the two governments. Then the exchange of water monitoring data and unification of research methodologies was started. 80% of the border between Estonia and Russia is running in the water 122 km in the sea and 201 km in the lake. Narva River catchment area is 57 000 km² from which 17 000 km² is located in Estonia. It is also the border area between the European Union and Russia. Also, there is a big hydro-energy plant (125 MW) and 2 thermal electric power plants located in the basin. Narva River is rich in water and has a big influence on the Quality of the Gulf of Finland. This is why **the transboundary cooperation of the water experts was always considered very important.**

Lake Peipsi is the 4 largest Lake in Europe and the biggest transboundary lake in Europe. The surface area is over 3500 km² of which 44% belongs to Estonian territory.

Picture 6 - Dam removal effects on Sindi Dam in Parnu, Estonia, the most important restoration project funded by Cohesion funds (credit: Ewa Leś).

[53] Koiva-Gauja vesikonna veemajanduskava taustadokument. (in Estonian) Background document for Koiva-Gauja River Basin management plan).

VII SWEDEN

Mia Svedäng, The Swedish Society for Nature Conservation

1 — An assessment of the current situation of water management in Sweden - what are the challenges?

Pressures on water quality and aquatic ecosystems have increased due to human activities, and as a consequence, many water bodies and ecosystems have now reached a degraded state in which ecosystem services are compromised. **In Sweden, 47% of the lakes and 66% of the rivers do not reach Good Ecological Status. All water bodies in Sweden have poor chemical status** due to mercury and Polybrominated diphenylethers (PBDEs)[54]. For groundwaters, 2.3% do not achieve good chemical status, while **most ground water resources are in good quantitative status**[55].

The most prominent pressure on water bodies in Sweden is hydromorphological modification due to hydropower construction, draining, ditching etc. **Eutrophication is also a major factor affecting lakes and rivers, while acidification affects more than a third of the lakes in southwestern Sweden**[23]. Other pressures such as forestry and airborne pollution (e.g. acidifying compounds and mercury deposition) also affect the biodiversity and ecosystem services of many surface waters.

The WFD was formally adopted in Swedish law 2004 by Chapter 5 in the Environmental Code, by the Ordinance on Water Quality Management (SFS 2004:660), and by instructions from the Swedish Environmental Protection Agency (SEPA 2008)[56]. According to the WFD, water bodies that display moderate or more severe deviation than that normally associated with the water body type need to be restored to at least Good Ecological Status. In this context, **legal application and exceptions are the challenge** here -

[54] Havs- och vattenmyndigheten (2022). Levande sjöar och vattendrag. Fördjupad utvärdering av miljökvalitetsmålen 2023. Rapport 2022:17.
[55] European Commission (2019). Second River Basin Management Plans – Member State: Sweden. SWD(2019) 57 final.
[56] 1 Lindegarth M, Carstensen J, Drakare S, Johnson RK, Nyström Sandman A, Söderpalm A, Wikström S A (Editors) (2016). Ecological Assessment of Swedish Water Bodies; development, harmonisation and integration of biological indicators. Final report of the research programme WATERS. Deliverable 1.1-4, WATERS report no 2016:10. Havsmiljöinstitutet, Sweden.

research indicates that traditional legal certainty aspects often trump flexibility and a high level of environmental protection in Swedish courts. There is an inertial tendency in the legal application of the WFD environmental objectives, including a reluctance to fully apply EU law as interpreted by the Court of Justice of the European Union[57]. Additionally, according to WWF, **the misuse and abuse of exemptions is one of the main reasons why WFD objectives are still far from being achieved in Europe**[58]. For instance, **Sweden is breaching the WFD by using exemptions as a general rule**, rather than applying them on a case-by-case basis.

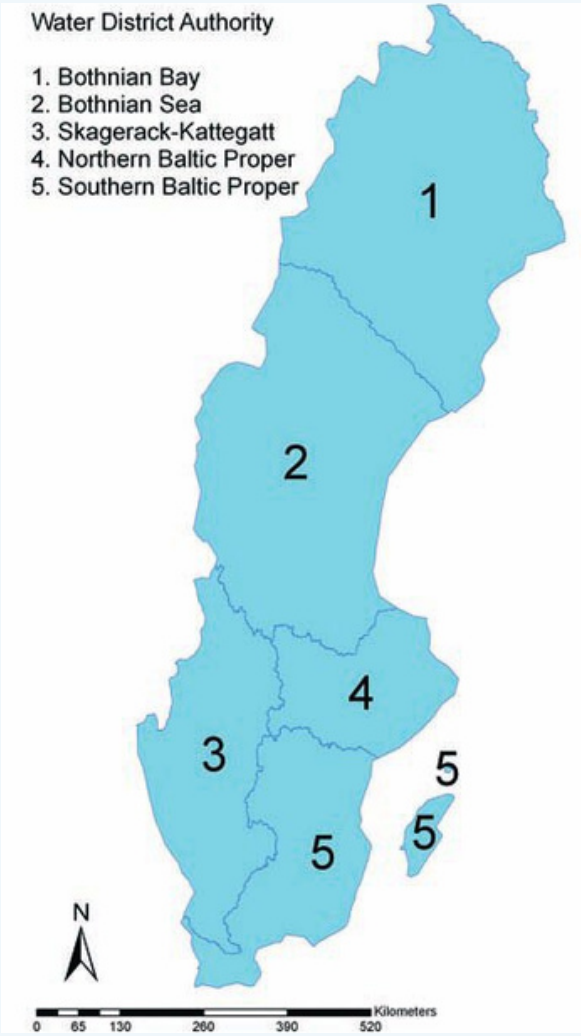
2 & 3 — An assessment of the Swedish water resources and discussion of planning approaches in water management. & Directions of proposed changes in water management, including consideration of surface water restoration needs and efforts being made to naturalise waters in Sweden

Sweden is a country rich in water resources. Lakes and rivers dominate the landscape, and you can find **40% of the EU´s lakes and 17% of the EU´s rivers within the Swedish borders**. **The majority of Swedish rivers are regulated**. **Four National Rivers in the northern part of the country are protected**: The Torne, Kalix, Pite and Vindel rivers. Only a small percentage of its water resources is used, but the resources vary regionally, and several regions are thus experiencing recurring water stress, although **total water abstraction represents only 1% of all available freshwater resources in Sweden**[59].

Sweden is divided into five different water districts, based on the borders of the major sea basins and catchment areas. In each water district, one of the county administrative boards is appointed by the government to act as water district authority. For every water district authority there is a special water district board – the water delegation. Their task is deciding on environmental quality standards, programme of measures and management plans. **Water councils have been established on the local level to meet the requirements of the WFD of broad stakeholder involvement in water management.**

[57] Söderasp, J. & Pettersson, M. (2019). Before and after the Weser case. Legal Application of the Water Framework Directive Environmental Objectives in Sweden. Journal of Environmental Law, 2019, 31, 265–290.
[58] WWF (2022). EU Countries are Failing Freshwater Ecosystems. WWF Factsheet EU Water Law June 2022. https://wwfeu.awsassets.panda.org/downloads/eu_countries_are_failing_freshwater_ecosystems__the_overuse_of_exemptions_to_the_wat.pdf.
[59] OECD (2020). Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options. Factsheet Sweden https://www.oecd.org/environment/resources/financing-water-supply-sanitation-and-flood-protection-country-fact-sheet-sweden.pdf.

As indicated above hydropower is one of the main challenges in this country - **the reason for the designation of the most heavily modified water bodies in Sweden is hydropower production**. The lack of designations due to other uses is related to the lack of national guidance on how water bodies affected by other water uses should be assessed from a heavily modified water bodies-perspective[60]. **The Swedish energy mix is highly dependent on hydropower and approximately 80% of Sweden's river systems have hydropower installations on them**[61]. Almost half of all electric power generated in the country originates from hydropower resources[62]. Intensive use of hydropower and the presence of large channels have altered river morphology and hydrological conditions **creating barriers for fish and reduced water flow in most Swedish watercourses.**



Map 5 - Swedish water districts (source: Researchgate, Patrik Olofsson).

The permits for Sweden's more than 2000 hydropower plants are currently under review. The revision follows 'The national plan for modern environmental conditions for hydropower plants' which was decided by the Swedish government in 2019. The objectives to provide Swedish hydropower plants with 'modern environmental conditions' to mitigate the negative impact of hydropower on freshwater ecosystems, balancing the need for improved ecological status with the need of hydropower. However, in December 2022, the

[60] European Commission (2019). Second River Basin Management Plans – Member State: Sweden. SWD(2019) 57 final.
[61] Lindström, A., Ruud, A. (2017). Swedish hydropower and the EU Water Framework Directive. Stockholm Environment Institute, Project Report 2017-01.
[62] Swedish Energy Agency (2022). https://www.energimyndigheten.se/fornybart/vattenkraft/.
[63] Nationell plan för moderna miljövillkor https://www.havochvatten.se/download/18.1bd43926172bdc4d64881cc0/1668421770752/regeringsbeslut-nationell-plan-moderna-miljovillkor.pdf.

new, right-wing government decided to put the review of the environmental permits for Sweden's hydropower plants on hold. This may impede necessary ecosystem restoration processes and make it difficult to achieve the WFD environmental objectives.

Draining and ditching is another challenge Sweden faces - **In Sweden, large wetland areas were drained** during the 19th and 20th centuries to make land available for agriculture. In total about 2500 lakes were shrunk or dried out, 30,000 soil-drainage projects were performed[64] and **more than 65% of naturally occurring Swedish wetlands were lost**[65]. The government has allocated funds for restoring or constructing wetlands in the landscape, but **the measures are voluntary for the landowners and the national targets for wetlands have not been reached.**

Log floating or driving, was a widespread practice in Sweden from the 16th century until the end of the 20th century. Approximately 30 000 kilometres of Swedish watercourses were rebuilt to become more like canals to make the transport of timber more efficient. In the beginning of the 20th century, there were more than twice as many floatways in the provinces of Norrbotten and Västerbotten in northern Sweden than were there railways and roads[66]! The construction of floatways profoundly changed the habitat conditions for fish and other aquatic organisms in many lotic environments. **As timber floating ended during the late 20th century, restoration programs were initiated that aimed to reverse the damage caused by floatway activities** to the ecosystems in running waters. Currently, this work is ongoing in many brooks and rivers in northern Sweden, but more has to be done.

One of the major problems for surface water in the BSR countries, including Sweden, is eutrophication caused by diffuse pollution of nitrogen and phosphorus from agriculture. Much has been done to reduce a load of nutrients from agriculture, but **still, the measures are voluntary, and more measures have to be implemented.** Among the measures proposed to fulfil the WFD and the Baltic Sea Action Plan (BSAP), are various wetlands constructed in the landscape. Essentially **all households in urban areas in Sweden are connected to municipal wastewater treatment plants**, but approximately 700,000 households (ca. 15%) in rural areas are not connected.

[64] Arheimer, B. Pers, C. (2017). Lessons learned? Effects of nutrient reductions from constructing wetlands in 1996–2006 across Sweden. Ecological Engineering Volume 103, Part B, June 2017, Pages 404-414.
[65] Graversgaard, M., Jacobsen, B.H., Hoffmann, C.C., Dalgaard, T., Odgaard, M.V., Kjaergaard, C., Powelle, N., Strand, J.A., Feuerbach, G. & Tonderski, K. (2021). Policies for wetlands implementation in Denmark and Sweden - historical lessons and emerging issues and Use Policy, 101 (2021), Article 105206.
[66] Nilsson, C. (2007). Återställning av älvar som använts för flottning. En vägledning för restaurering. Naturvårdsverket Rapport 5649.

Wastewater treatment plants in Sweden provide secondary or tertiary treatment[67], while **larger industrial and mining facilities usually have their own wastewater treatment facilities.** In rural areas in Sweden, onsite wastewater treatment systems that serve individual homes or small groups of households are common. These small-scale facilities still are a significant source of nutrients (especially phosphorus) emitted into lakes, rivers and coastal waters. **It is estimated to about 10% of the total anthropogenic phosphorus load from Sweden to the Baltic Sea is leaking from poorly functioning small-scale wastewater treatment facilities**[68].

Unfortunately, all water bodies in Sweden are failing to reach good chemical status due to persistent, bioaccumulative toxic substances such as mercury and Polybrominated diphenyl ethers. If these substances are excluded, only 1% of surface water bodies in Sweden are failing good chemical status. There has been **a significant decrease over the last decade in releases to water of heavy metals** like Cd, Hg, Ni, Pb[69]. Recently, the Swedish government has initiated a temporary grant for the treatment of pharmaceutical residue and other micropollutants in a number of wastewater treatment plants. New standards for micro-pollutants in the revised Urban Wastewater Treatment Directive hopefully will lead to advanced ('quaternary') treatment in many wastewater treatment plants in the future, and improved water quality in rivers, lakes, groundwaters and coastal areas, in Sweden as well as in Europe.

Despite reduced emissions of air pollutants, **acidification continues to be a problem in Sweden and approximately 7% of Swedish lakes and rivers are assessed as acidified**[70]. The deposition of acidifying substances over Sweden is largely due to long-distance transported air pollutants and has decreased in line with the emission reductions that have been made in Europe. Intensive forestry also contributes to acidification through the trees' uptake of nutrients which is compensated by the release of acidic ions[71]. **One of the largest environmental remedial measures in Swedish freshwaters is liming the waters to reduce damage by acidification.**

[67] OECD (2020). Financing Water Supply, Sanitation and Flood Protection: Challenges in EU Member States and Policy Options. Factsheet Sweden https://www.oecd.org/environment/resources/financing-water-supply-sanitation-and-flood-protection-country-fact-sheet-sweden.pdf.
[68] Eveborn, D. (2013). Sustainable phosphorus removal in onsite wastewater treatment. Doctoral Thesis Department of Land and Water Resources Engineering, KTH, Stockholm.
[69] European Commission (2022). Environmental Implementation Review 2022 Country Report – SWEDEN. SWD(2022) 272 final.
[70] Naturvårdsverket (2022). Bara naturlig försurning - Fördjupad utvärdering av miljömålen 2023. RAPPORT 7069.
[71] Pihl Karlsson, G., Akselsson, C., Hellsten, S., Per Karlsson, E. (2021). Försurning och övergödning i det svenska skogslandskapet. Nationell rapport från Krondroppsnätet, resultat till och med 2019/20. IVL Nr C 607.

4 — Identification of key elements for achieving the desired change in Swedish water management scheme

To decrease the environmental impact on freshwater bodies in Sweden, as well as ensure compliance with the WFD, **a higher pace of implementation of necessary measures and more funding is crucial. The Swedish water district authorities also would need increased capacity and authority to fulfil the water management plans**.

In Sweden, **a major challenge is to restore rivers damaged by hydropower, logging and other hydromorphological alterations.** To reach the Swedish environmental goals for water and fulfil the obligations of the WFD **it is central that connectivity is restored, and environmental flows re-established,** thus reconnecting organisms with habitats, nutrients, and sediments, and enabling species and ecosystems typical for running water and streams to recover. Restoration work for instance to improve habitat for fish and mussels in rivers affected by hydropower and logging is currently going on in different parts of Sweden, but more work has to be done since **the need for restoration measures is huge, and a big challenge is the lack of financing.** Among other things, **it is vital that the ongoing revision of hydropower permits is allowed to continue according to the national plan** (see above), and not is put on hold. At present, **many necessary measures to restore water bodies and improve connectivity are counteracted by political parties in Sweden** arguing that removal of barriers and restoration of watercourses will have adverse impacts on hydropower production and agricultural yields.

To prevent eutrophication land-based measures in agricultural areas, such as buffer strips, sedimentation ponds and wetlands are essential. **Restoration and construction of wetlands to counteract nutrient leakage** from agricultural areas is important – not only to mitigate eutrophication, but also to act as a carbon sink and promote biodiversity. To achieve successful and cost-efficient wetlands implementation, **more advice and support from the state, regional and local participants, and farmers' organizations to the landowners, are required**[33]. Eutrophication from small, malfunctioning sewage facilities can be reduced if the existing requirements to modernize these facilities are implemented better or if the households are connected to the municipal treatment plants.

Improving the capacity and efficiency of existing sewage treatment plants is also important to reduce nutrient loads to water bodies in Sweden, as well as decreasing the load from a wide range of pollutants, including pharmaceutical residues. The updated

Urban Wastewater Treatment Directive, which hopefully soon will be in place, will enlarge the scope and require additional treatment, resulting in improved water quality in all EU member states.

Liming of Swedish lakes and waters must continue to mitigate the harmful effects of acidification. However, in the long run, **it is crucial that the emission of acidifying substances decreases.** The current practices in Swedish forestry have to change to mitigate the acidification of soils, and more wood ash has to be recycled to forest land.

In summary, after almost 20 years of water management in accordance to the WFD, and more than two full water management cycles, **there is still a great need for measures and funding, in combination with increased capacity and authority for the Swedish water district authorities**, if Sweden is to fulfil its obligations to restore damaged water bodies to at least Good Ecological Status, and comply to the WFD.

Picture 7 - Importance of dead wood in rivers and streams - Håga river, Sweden (credit: Ewa Leś).

VIII DENMARK

Thyge Nygaard, The Danish Society for Nature Conservation

Picture 8 - Oxygen depletion in Halkær Bredning, the Limfjord, August 2022 (https://mst.dk/service/nyheder/nyhedsarkiv/2022/sep/kraftigt-iltsvind-rammer-store-omraader).

1 — An assessment of the current situation of water management in Denmark - what are the challenges?

Overall there is a **great delay in fulfilling the water management plans in Denmark**. The biggest effort has been on the reduction of nitrogen load to the coastal waters. Actually, this has been a goal since 1986, but after a rapid decline in the beginning, due to roles for storage and spreading of manure, and later mandatory fertilizer plans and nitrogen quotas, the decline has more or less been absent for the last 20 years. The annual load of nitrate till the domestic waters has last been assessed to 55.000 tons, which means that there has to be obtained a further reduction of 16.500 tons before

2027, in order to meet the annual load that is required to reach GES. As a consequence of the lacking reductions, **oxygen depletion is occurring more and more often in the Danish marine waters** throughout summer and autumn. When it comes to streams and rivers, there has been an ongoing, but very slow progress due to **very low funding for restoring natural hydrology.** For groundwater, there is a **growing concern for a rising content of pesticide residues in the upper groundwater,** despite a quite restrictive pesticide regulation. **Plans for protecting the nearest surroundings of all drinking water intakes, have been delayed** due to slow progress in negotiations with land owners.

2 — An assessment of the Denmark's water resources and discussion of planning approaches in water management

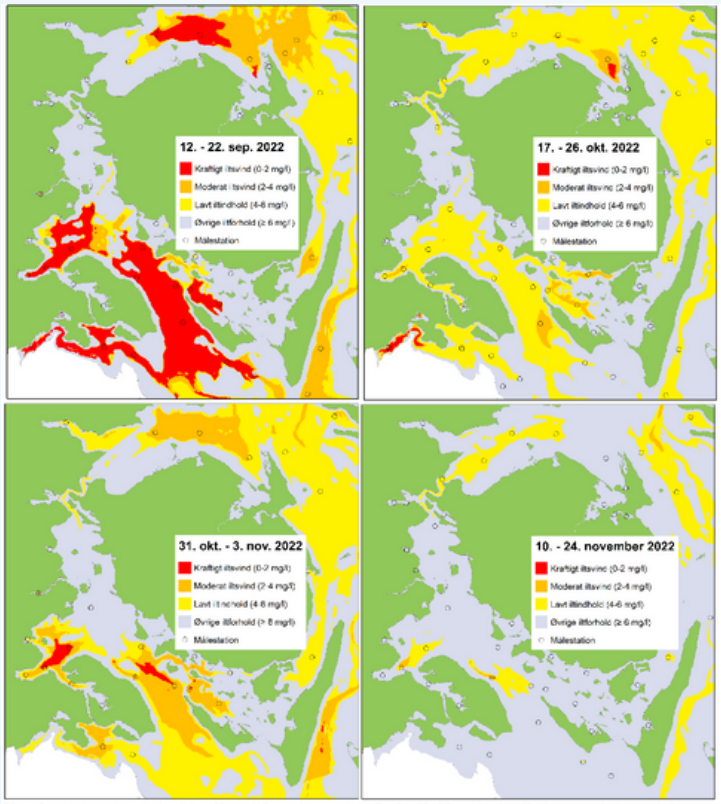
Denmark relies almost entirely on groundwater for human consumption, industrial use and irrigation. This is possible due to a general surplus of precipitation, although there are huge differences between eastern and western Denmark, actually in some years we see a negative balance in eastern parts. Therefore it is also in eastern parts that streams often run dry during summer. Climate changes lead to even more rain surplus, but unevenly distributed over the year and over regions thus increasing the existing differences. In general, water as a resource is not scarce and will not be in the future, but **the uneven distribution needs attendance in future planning for water demanding activities** and we do realize an ongoing struggle to keep enough water for our streams and lakes during dry summer periods in certain areas.

All groundwater is included in RBMPs. All drinking water comes from aquifers in Denmark therefore the groundwater is vulnerable. The key issue here is pesticides – about **half of the drinking water extraction aquifers contain pesticides**, 12% over the accepted EQS. Both pesticide use by farmers and by households is a problem. Secondly, **the authority that permits use of pesticides is simply not stringent enough.** Thirdly **area based no-use zones must be implemented** – around extraction sites (decided in 2022, but still to be fully implemented) and for important groundwater formation areas.

3 — Directions of proposed changes in water management, including consideration of surface water restoration needs and efforts being made to naturalise waters in Denmark

The efforts to fulfil the water management plans have so far been driven in a very "single approach" manner. You try to solve the problems one at a time, instead of thinking in synergies and a more multifunctional approach. The shortcomings of this system are obvious for most people now. Therefore there will be a pilot scheme in 2023, where local co-operations can propose an **alternative water action plan for their catchment area**. We believe that this can be a model for better involvement of local stakeholders, where local knowledge and more multifunctional solutions can be used.

4 — Identification of key elements for achieving the desired change in current water management, indicating key issues that need to be changed.



Map 6 - Modelled areal distribution of oxygen depletion in waters around Funen for 12-22 Sept (previous reporting period, left top), 17-26 Oct (last reporting period, right top), 31. Oct – 3. Nov (left bottom), and 10-24 Nov (right bottom) (https://dce.au.dk/fileadmin/dce.au.dk/Udgivelser/Notater_2022/N2022_81.pdf).

We need a change in the whole system, with the planning and process facilitation based on catchment areas, instead of the municipalities as the main responsible actor when it comes to restoration of water bodies and marine nature restoration.

Since the goal is to comply with the WFD it is crucial that countries stick to the common principles therein. As for now, Denmark considers the elements to be included for achieving GES to be only the ones that we have knowledge about and not all the elements pointed out as relevant in the WFD for the different water bodies. This is a **major violation of the WFD** in our opinion and against the one-out-all-out principle as well as the whole idea of a level playing field for EU member states.

Almost all Danish rivers and streams have been straightened, deepened and broadened to serve agricultural drainage. They are held in that position by individual detailed regulatory statutes, which also set into the system how and when the waters are maintained – e.g. sediment removal and cutting the weed.

1) First **key element here is to allow the streams to redevelop in a natural way** which means giving the space to meandering and to allow streams and rivers to flow over the banks. Therefore (organogenic) **lowlands must be taken out of intensive farming**.

2) A second key element will be **to make a revision of all the regulatory statutes for individual streams** in order to make them support and comply with the environmental goal of Good Ecological Status (GES).

3) A third key element will be to include all streams (and not only the approx. 25% of them in today's RBMPs) **to ensure surveillance, no-deterioration and future restoration**.

4) A fourth key element will be **to reduce the pollution load**: the goals set for nutrient reduction (N and P) to reach GES in coastal water will overall be sufficient to ensure the rivers and streams, but much more needs to be done to ensure good chemical status – the status today is largely unknown and where known the status is often not good.

Asking about groundwater - all groundwater is included in RBMPs. All drinking water comes from aquifers in Denmark therefore the groundwater is vulnerable. The key issue here is pesticides – about **half of the drinking water extraction aquifers contain pesticides**, 12% over the accepted EQS. Both pesticide use by farmers and by households is a problem. Secondly, **the authority that permit use of pesticides is simply not stringent enough.** Thirdly **area based no-use zones must be implemented** – around

extraction sites (decided in 2022, but still to be fully implemented) and for important groundwater formation areas.

In terms of coastal waters - all coastal water bodies (109) are included in the RBMPs, 5 expected to be in GES in 2027. Overloading with nitrates is the overall problem, more local overload of phosphates is an additional pressure. Reductions of at least 13.000 tonnes of nitrate - more likely close to 20.000 tonnes – must be implemented to allow for GES. A second key issue is not good chemical status in the vast majority of coastal waters. Due to various chemical substances, the sources of which are not well known, it will definitely need an additional fourth cleaning step for wastewater.

5 — Directional actions of the European Union in the field of the restoration of aquatic ecosystems

The number of artificial dams that block the free passage for flora and fauna is approx. 10. At least two major water systems block severely (Gudenå and Storå) and a long fight over solutions has been going on for several decades. **There is an official database that shows barriers as background for the RBMPs.**

Nature Restoration Law is a regulation that Denmark is officially supporting strongly. However, it will be a major challenge for our country to fulfil the obligations and we suspect that Denmark may try to water out the binding elements in the regulation.

6 — EU and non-EU countries' water management within BSR, including transboundary issues - reflection on transboundary river issues in Denmark

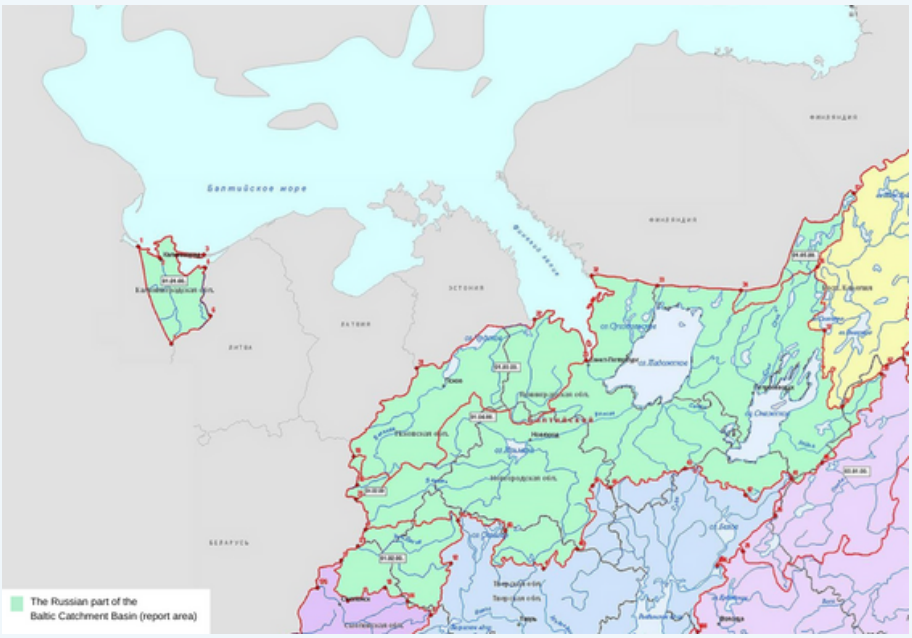
No knowledge of any conflict issues connected to Denmark's only transboundary waterbody – Vidåen, bordering Germany.

IX RUSSIA

Anna Ushakova, Olga Senova, Friends of the Baltic, with the participation of Tatiana Ivanova, Baltic Fund for Nature

1 — Assessment of the current situation of water management in Russia - what are the main challenges in the Russian Federation within the Baltic Sea Region?

According to water resources stocks of the North-Western region (most of the region belongs to the Baltic catchment area) – it is one of the most secure regions in Russia. The problem of surface and underground water quality is maintained. There are a number of programs on the federal, regional and local level to address this issue but water programs are implemented formally and often ineffective. International cooperation is highly important for the region where projects have been implemented to preserve transboundary water bodies in Russia.



Map 7 - The Russian part of the Baltic Catchment Basin (source: water-rf.ru).

The problem of access to drinking water and sewerage - unsatisfactory condition of water supply and sanitation systems is a common problem for the whole of Russia. **Almost all the rivers of the country are polluted due to pollution from wastewater.** At the same time, **88% of the wastewater to be treated is discharged untreated to the required level, 95% of rural settlements do not have sewage treatment plants at all**[72]. Absent or outdated water treatment facilities, households of more than 500 thousand people in the Leningrad region are not connected to sewage systems and produce 2275 tons of nitrogen and 275 tons of phosphorus per year. Natural reservoirs used for drinking purposes are polluted by a number of indicators[73]. 35% surface sources and 14% underground sources of natural reservoirs used for drinking purposes do not meet the sanitary and epidemiological requirements. The worst situation in the region is in Karelia republic - 83% of natural reservoirs used for drinking purposes is polluted by a number of indicators. According to Rospotrebnadzor (Federal Service for Supervision of Consumer Rights Protection and Human Welfare) of the Leningrad Region, 10% of urban residents and 40% of rural residents of the Leningrad region are not provided with high-quality drinking water.

High or extremely high levels of surface water pollution in the Russian Baltic catchment area – wastewater discharge from enterprises of various industries, as well as surface runoff, including from agricultural land and livestock complexes. Secondary pollution of the water mass itself and bottom sediments plays a significant role in the deterioration of water quality. Copper, iron, nitrite nitrogen compounds, phenols are the main pollutants. Extremely high levels of surface water pollution in 2020 were recorded on the Tigoda and Ohta rivers, Leningrad region; Pregolya and Mamontovka rivers, Kaliningrad region; Polist, Novgorod region; Gdovka, Pskov region.

Changes of the hydrological regime and the harmful effects of hydropower plants is what Russian rivers face also nowadays. Rivers flowing to the Baltic Sea or the Ladoga and Onega lake have played a significant role in producing hydropower in the region for the last hundred years. The large hydropower plants on rivers Narva, Volhov, Svir, and Vuoksa are still functioning. They have a negative impact on fish migration and reproduction and can cause riverbank erosion. HPPs deliver 20% of energy for all of Russia (but Russia have a huge HPP in Siberian rivers) and about 8,38% in Leningrad

[72] Overview of the state and pollution of the environment in the Russian Federation for 2018 (pp. 113-137) http://www.meteorf.ru/upload/iblock/41e/Obzor_2018.pdf; Environmental protection in Russia. 2018: Statistical report / Rosstat (p. 67) http://www.gks.ru/ free_doc/doc_2018/ohrana_2018.pdf.
[73] The State report Environmental Protection of the Russian Federation in 2020 (p. 861) https://www.mnr.gov.ru/docs/gosudarstvennye_dokladygosudarstvennyy_doklad_o_sostoyanii_i_ob_okhrane_okruzhayushchey_sredy_rossiyskoy_federatsii_v_2020/.

region[74]. To compensate for the **harmful effect of hydropower plants** on fish stocks hatcheries were built and fish releases occur every year. Fish restocking, as well as non-efficient and rare fish passages, are not enough to mitigate and restore harm to ecosystems.

Tens of small hydropower plants were constructed many years ago on rivers to support energy supply on the local level in the region. Most of them were destroyed with time, but dams still exist in some rivers. Such obsolete dams create an impassable obstacle for aquatic fauna and should be removed.

Baltic salmon lost the ability to spawn on almost all rivers of the Russian part of the Gulf of Finland, including due to hydropower plants dams in the 20th century, **only the Luga River and to a lesser extent the Narva River preserved a population of wild Baltic salmon capable of recovery**. The Narva hydroelectric power plant causes significant damage to the eel[75], whose population is declining due to the difficulty of the way to the breeding site.

Climate change affects and has a negative impact on water, flooding of territories, and coastal erosion. The cold season is getting shorter. The snow cover on the rivers is set late, the snowfall starts early[76]. Increasing of average annual temperatures, a change in the river discharge, an increase in the average and the intensity of annual precipitation, a change in snow cover and ice regime leads to serious consequences in river basins. **The number of floods has been increasing** over the past 30 years including extreme ones in Kaliningrad and Leningrad regions. The maximum frequency of floods shifted from autumn to winter, especially in January and February. Coastal erosion is also progressing on the Russian Baltic coast. For example, 40% of the entire length of the coastline of the Kurortny district of St. Petersburg (16 km) have emergency points where erosion of the coastline is observed.

Management of water resources goes according to the Water Code of the Russian Federation. Since 2014, this Code prescribes the development of the Integrated Water

[74] Russian database for all hydraulic structures by region https://www.google.com/url?q=http://www.dpbvu.ru/gidrotekhnicheskie-sooruzheniya/rossijskij-registr-gts&sa=D&source=docs&ust=1675106108053440&usg=AOvVaw0AqV3rgwF3smNJhQKle489.
[75] Read more about it Eel in the Narva River https://docs.google.com/document/d/1HZ-O6DsCCQsb53Aby7VW7yFTtNixXjsg/edit?usp=sharing&ouid=102774448439292550725&rtpof=true&sd=true ; About the project "Restocking of European eel as a measure of recovery of endangered species and preservation of natural diversity" (ESTRUSEEL) https://www.emu.ee/en/about-the-university/news/uudis/2022/08/25/the-collected-data-confirm-eels-are-very-mobile-in-the-narva-river-basin.
[76] Decision of the Basin Council in 2020. Electronic resource: www.nord-west-water.ru%2Fupload%2Fdocs%2Fsovety%2F21%2F2.docx&wdOrigin=BROWSELINK.

Resources Management Scheme (IWRMS) for 63 basins and subbasins, including the basins of Russian and transboundary rivers in the Baltic region. The schemes include information on the condition and use, contain goals, objectives, and priority measures for river basin management, and are the basis for water management and water protection measures. IWRMS is the main tool for ensuring the integrated use of water bodies, and their development is one of the priority areas for improving public administration. IWRMSs are developed and approved by the authorized Federal executive authority. Before the approval of the Scheme, the basin councils are considered. The procedure for developing, approving, and making changes to the IWRMS is established by the Government of the Russian Federation.

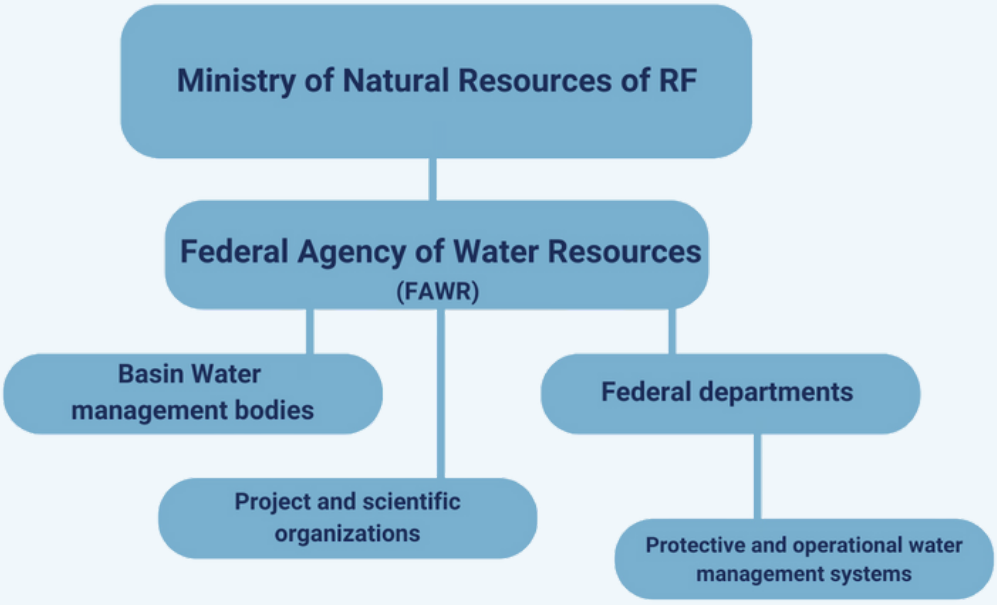


Figure 1 - Water resources management in Russian Federation.

Main challenges of water management in the Russian Federation:

- **The existing model of water resources management does not fully provide a solution to water problems:** the structures of the basin management of the Federal Agency of Water Resources (FAWR) do not have tools to influence the administrative management of territories (regions, municipalities), do not ensure the interaction of authorities in one basin and the planning and implementation of interrelated measures for the development of territories taking into account the conservation of the basin's water resources.

- Constant reorganization of state environmental protection bodies, weakening of state control and monitoring of water resources, lack of integrated basin programs, reduction of budget funding for research work worsen the water resources management system;
- Situation with dam removal and construction of fish passages is complicated in Russia because the **support of ecosystem functioning is not a priority**. The process of dam removal requires a long preparation phase, expensive construction expertise, comprehensive environmental impact assessment and negotiation with authorities at every stage. In the Leningrad region, the removal of emergency dams of former small hydropower plants happens one by one every few years;
- **Suspension of all international cooperation programs** (with the exception of programs with Belarus and partly Finland) and cross-border projects in the region;
- **Weak engagement of the public in water resources management,** people often don't understand the value of water resources and it leads to irresponsible use.

To solve the above-mentioned problems, **coordination in planning the use and protection of water resources is necessary.** One of the tools for the possibility of such planning is mentioned in the water management plan - **Integrated Water Resources Use and Protection Schemes (IWRMS)**. In structure and essence, they are similar to the EU River Basin Management Plans (RBMPS). In the Water Strategy of the Russian Federation for the period up to 2020[77], it was indicated that IWRMS **is the main tool for ensuring the integrated use of water bodies**, and their development is one of the priority areas for improving public administration[78].

Structure of IWRMS:

- volume 1 General characteristics of the river basin;
- volume 2 Assessment of the ecological state and key problems of the river basin;
- volume 3 Target indicators;
- volume 4 Water management balances and pollutant balances;
- volume 5 Limits and quotas for water intake from water bodies and for wastewater discharge;
- volume 6 List of measures to achieve the target state of the river basin.

[77] Water strategy of the Russian Federation for the period up to 2020. August 27, 2009. N 1235-p.
[78] Vildyaev V. M., Logunov O. Yu. Problems of development and practical use of IWRMS. Electronic resource: http://solex-un.ru/sites/solex-un/files/review/_001.pdf.

Yet, IWRMS also has its problems:

- the development of IWRMS is not fully provided with information and methodological materials;
- IWRMS should be a means of informational and intellectual support of management decisions on river basins, therefore they should be basin geoinformation systems. However, it is still not implemented;
- many river basins are transboundary with other Baltic states, but **the development of IWRMSs is going on without their synchronization with RBMPs of neighboring countries**, there are differences in legislation, monitoring and management methods, standards of permissible impact on water bodies;
- the existing IWRMSs do not contain integrated action plans that are mandatory for all administrative entities.

2 — An assessment of the Russian water resources and discussion of planning approaches in water management

The strategic goals of the development of the country's water management complex until 2020 were implemented within the framework of the Water Strategy of the Russian Federation. However, the results of key programs and projects were not achieved, improper use of funds or underspending of funds for the implementation of the tasks set appeared. The tasks have not been completed either qualitatively or quantitatively[79]. The Water Strategy completed its operation in 2020, and **currently there is no approved medium- and long-term water management strategy in the country.** Russia withdrew from the Council of the Baltic Sea States in 2022, which created difficulties in developing cooperation in the field of Baltic Sea protection.

Picture 9 - Intense algae blooms in Eastern part of the Gulf of Finland, Neva Bay, August 2022 (credit: Friends of the Baltic).

[79] Bulletin of the Accounting Chamber of the Russian Federation, 2022, No. 5. Water resources.

3 & 4 — Directions of proposed changes in water management, including consideration of surface water restoration needs and efforts being made to naturalize the waters of Russia. & Identification of key elements for achieving the desired change in current water management, indicating key issues that need to be changed in Russia.

- Revision of the Water Code for providing integrated water resources management, conservation, and restoration of water ecosystems;
- Delineating the functions of federal bodies and bodies of the regions of the Russian Federation for water management, and transferring responsibility for improving the ecological condition of water bodies to regions and municipalities;
- Introducing a thorough control and audit of the funds transferred to the regional budget for the elimination of accumulated environmental damage;
- Improving of state monitoring of water bodies, ensuring the availability of information on the results of state monitoring of water bodies;
- Switching from single use of freshwater to circle water consumption systems in production and housing services;
- Establishing special management regimes for potential flood zones to protect water bodies from pollution[80];
- Introducing the practice of dismantling dams and other hydraulic structures after the end of their operation.

Also, significant are the measures to reduce pollution of water bodies:

- Inventorying of wastewater releases, cesspools, diffuse runoff, abnormal storage and disposal of livestock waste at the municipal level;
- Eliminating of wastewater sources without treatment, reclaiming dumps;
- Reducing the biogenic load on natural waters from domestic wastewater and agriculture - by basins, municipalities, and enterprises — including both point and diffuse sources of pollution (introduction of local wastewater treatment plants, individual treatment plants or dry compost toilets; prevention storage in open lagoons; introduction of a cyclical method of livestock waste management;
- Adapt water bodies to climate change - on a basin scale.

[80] Flood Risk Management in the Baltic Sea Region, CCB, 2021.

Improvement of water legislation, creation of consolidated water basin management plans for basin regions, and creation of transboundary water basin management plans are the top priorities in Russia. **River basin management plans (IWRMS) should become a means of informational and intellectual support for management decisions on river basins.** Therefore, they should be basin geoinformation systems, where it is possible to introduce new data, which helps to keep them in constant updating mode and - if necessary - receive operational information about the state of water bodies. **Compliance with the regulations of the IWRMS, as well as the standards permitting discharges into water bodies, should be mandatory for all water users.**

The change should include the modernization of water resources management technology, the transition from large infrastructure facilities to green technologies and nature-based solutions; support for organic farms, and monitoring of the impact of large agricultural enterprises on the environment.

Public participation in water resources management processes needs to be improved as well as access to up-to-date reliable information on the state of water bodies, planned measures, and **public participation in decision-making processes, by creating River Public Councils**.

Picture 10 - Intense algae blooms in Eastern part of the Gulf of Finland, Neva Bay, August 2022 (credit: Friends of the Baltic).

X CONCLUSIONS

The need to maintain and restore ecosystems, including freshwater ecosystems is visible throughout the European Union and Baltic Sea Region. That is why the European Commission took an initiative to create a **restoration policy**[81]. This policy is to be one of the key measures announced in the EU's 2030 Biodiversity Strategy. Following an impact assessment, it proposes legally binding targets for the **restoration of natural resources, including water resources**. This initiative aims to contribute to the Biodiversity Strategy's goal of putting Europe's biodiversity and natural resources on a recovery path by 2030. This action extends the current EU policy in the field of water protection, which in many sectoral strategic documents includes restoration:

- Community Action Program in the field of the Natural Environment entitled The 2013 'Living well, within the limits of our planet' states that *'in order to protect, conserve and enhance the EU's natural capital, the program must ensure that by 2020:*
  - *(a) biodiversity loss and the degradation of ecosystem services are halted and ecosystems and their services will be maintained and improved;*
  - **(b) the effects of pressure on fresh, transitional and coastal waters will be significantly reduced to maintain, maintain or improve good status as defined in the Water Framework Directive';**
- The plan to protect Europe's water resources from 2012 indicates, among other things, that:

*"If existing structures, whether built for hydropower, navigation or other purposes, disturb **the continuity of the river** and, as a result, often interfere with fish migration, it should be standard practice to use compensatory measures such as fish passes and lifts (...) to improve the water condition, they should be gradually installed in existing structures";*

*"**Member States can and should improve the implementation of the WFD and reduce hydromorphological pressure** in European river basins by restoring the continuity of rivers, for example through green infrastructure";*

[81] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12596-Ochrona-roznorodnosci-biologicznej-cele-dotyczace-odbudowy-zasobow-przyrodniczych-w-ramach-unijnej-strategii-na-rzecz-bioroznorodnosci_pl.

- The EU Biodiversity Strategy 2030[82], which is a plan for the protection and restoration of nature in the European Union and part of the so-called "Green Deal". Adopted by all EU Member States sets solid goals: creating a coherent network of protected areas, target of 30% of protected areas and the strict protection of at least one-third of EU-protected areas - the target of 10%, **restoring 25 000 km of EU rivers to be free-flowing**.
- The draft Regulation of the EU Parliament and of the Council on the restoration of nature, specifying the above-mentioned Strategy, which is to define detailed restoration requirements by 2050 for all ecosystems in need, including the effective restoration of 20% of the EU's land and sea area by 2030.

In order to take action on such a wide scale of needs, investment funds for the cohesion policy and regional development are necessary. It is also necessary to **improve water management and to adapt the common agricultural policy** - these are the urgent needs being heard in many corners of the policy sector:

> *(...) a **general failure of Member States to integrate water protection and the WFD's environmental objectives for Europe's waters with other policies, in particular energy, agriculture, and infrastructure policies** (the failure to recover environmental and resource costs from strong economic sectors). This reflects **resistance to change from vested interests and a lack of political understanding of the importance of European waters** for people and our planet[83].*

[82] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020DC0380&from=EN.
[83] https://eeb.org/library/the-final-sprint-for-europes-rivers-report.

Key findings from our analysis

Our research "The greatest water management challenges in the Baltic Sea Region" indicates the main pains of water management in the countries of the Baltic Sea Region, but also the needs and proposed directions of changes important for the good condition of waters and for us, citizens:

- urgent and massive restoration of the water ecosystems and focus on restoration of natural processes, as well as massive and immediate cessation of drainage of such areas;
- land availability: more land must be available to protect the water bodies (the need of common buffer zones in BSR) and to provide restoration;
- the need for restoration measures is huge but a big challenge is the lack of financing (chronic underfunding of the agencies);
- reduction of maintenance activities on rivers;
- reduction of pollution - except for the reduction of nutrients in our waters also other solutions are needed to implement: buffer zones in the whole BSR as a standard solution (separate research on that will come from the CCB side this year), strengthen the control in water management (strict legal requirements and execution);
- modernisation and reconstruction in the wastewater treatment sector which plays an important role in the reduction of the nitrogen input to the waters and to fight eutrophication which affects the whole BSR region;
- education of the water administration in terms of nature-based solutions, restoration and good practices in water maintenance;
- transboundary cooperation is vital as the example of the Odra environmental catastrophe has proved recently and as it's visible from our research - it needs to be strengthened despite difficult circumstances in some cases;
- still legal application and exceptions are the challenges - breaching the WFD by using exemptions as a general rule;
- good project planning practice in water management should be a standard which is not obvious at the moment;
- better groundwater protection based on stringency - in some cases the authority that permits use of pesticides is simply not stringent enough;
- to increase the awareness of society on water management problems which affect them so they are well understood;
- water councils seem to be a helpful example: established on the local level to meet the requirements of the WFD of broad stakeholder involvement in water management;
- Ukraine: particular care towards damage assessment within water & sanitation sector and green recovery is priority.

Within our research, it is noticed that **the existing model of water resources management does not fully provide a solution to water problems**. It is already known that at least few countries are breaching the WFD law and that the objective of the Water Framework Directive will not be fully achieved until 2027, so further actions are also needed at the EU formal level. EU Member States are aware that the European Commission may summon them to the European Court, due to failure to fulfil their obligations towards the WFD what means also enormous financial consequences.

What is also noticed here, is **cross-sectoral and transboundary need for cooperation on water resources and their management, which could be used to leverage the current situation of water management in the Baltic Sea Region. Making our national efforts we must remember that Good Ecological Status in the Baltic is strongly dependent on Good Ecological Status of the rivers in the catchment**[84].

Picture 11 - Importance of source to sea approach. Orzechówka river flows into the Baltic Sea, Ustka, Poland (credit Ewa Leś)

[84] https://www.researchgate.net/publication/371599433_'Natural_river_processes_as_a_base_for_river-related_protected_areas_and_river_restoration'_-_summary_report_from_CCB_EC_expert_workshop.

XI AUTHORS

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Citizen of the Oder river basin, founder of the unique interdisciplinary River University, Leader of Eutrophication Working Area at CCB, co-founder of Polish Save The Rivers Coalition (Koalicja Ratujmy Rzeki), observer of the International Commission for the Protection of the Oder River against Pollution. Co-initiator and coordinator of 'the Water Round Table. Partnerships for society and nature', in cooperation with the Ministry of the Environment, on flood protection policy and water management in Poland. Biologist, PgD in Environmental Law, certified PRINCE2® Project Manager, also in Governance for Transboundary Freshwater Security. Determined to cooperate cross-sectorally for the protection of rivers and water security.

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BUND e.V. (Friends of the Earth Germany)

eNGO with the mission of enforcing an effective protection of the natural environment at the political and societal level. Among other activities, BUND advocates on issues regarding the health of marine, freshwater and land-based ecosystems and accompanies EU processes such as the MSFD or the Birds and Habitats Directive and their national implementation.

Petro Hrytsyshyn

Accomplished environmental professional who served on the board of the Coalition Clean Baltic 2008 - 2021. He held positions in the Western Bug basin Council, Basin Council of Western Bug and Syan rivers, and the Dniester River Basin Council. Currently, the Director of the Western Centre of the Ukrainian Branch of the World Laboratory. Petro's expertise lies in coordinating international projects, conducting analytical work on environmental protection and sustainable development, developing strategic approaches, and excelling in leadership within group settings. He is also an expert of the UNDP Poland Umbrella project for sustainable local development.

Adriian Hrytsyshyn

Dedicated environmentalist, serving as a Coalition Clean Baltic (CCB) board member since 2018. He has volunteered with Worldlab since 2010 and actively participated in CCB-organized events. With a Master's degree in Political Science from Lviv National University, he combines academic knowledge with his lifelong involvement in environmental campaigns.

Tatiana Ivanova

Conservation Action Project Officer at IUCN, Conservationist. Tatiana has a Master's Degree in Biodiversity and Nature Conservation. She has 9 years of experience in the NGO Baltic Fund for Nature in projects mainly related to the protection and restoration of aquatic ecosystems. Her current focus is on working with protected and conserved areas at IUCN.

Maret Merisaar

Graduated from Tartu University as a biologist and has a PhD degree in water protection in agriculture. Through the Estonian Water Association she is taking part in the work of international networks of environment protection like CCB and Global Water Partnership. Currently, she is teaching the subject „Environment protection and sustainable development“ at Tallinn University of Technology. She was also the co-organizer and host of the 3rd edition of River University held in Estonia.

Thyge Nygaard

Graduated from the University of Copenhagen as an agronomist in 1998. Experienced as an agricultural advisor for 20 years before present employment as an agricultural policy officer at the Danish Society for Nature Conservation. Expert, among other things, in nutrient pollution, climate impact of farming and environmental impact of animal production.

Olga Senova

Expert on water and climate with more than 25 years of experience, she has a master's degree in physics and a postgraduate in environment and environmental education. Since 1997 she has been working on public river watch with public participation in water basin management. She is the head of Friends of the Baltic NGO and a director of Ecocentrum environmental enterprise. Olga is a member of the Basin Council of Neva-Ladoga basin department (a public body related to the Russian part of the Baltic Sea basin). 2010-2020 Olga was leading the Working Group for River Basin and Wastewater Management at CCB.

Mia Svedäng

Senior Policy Advisor for Freshwater at the Swedish Society for Nature Conservation, a Biologist with a PhD in Limnology. Her main working areas are hydropower and river restoration, eutrophication, water management and shore protection.

Anna Ushakova

The Maritime working area leader in the Coalition Clean Baltic since 2022. The Baltic Ocean Literacy School (2023) originator and moderator. She is working in CCB also on marine water-related issues due to climate change consequences, co-author of the CCB report on climate change adaptation measures in the Baltic Sea Region river basins. Her field of activity is related to water quality, climate, public monitoring of water bodies, citizen science and ecological education. She holds a Master's degree in International Cooperation in Environmental Policy and Sustainable Development (Saint Petersburg State University), with a background in ecology and environmental safety.

Uladzimir Zuyeu

Environmental Explorer, author of more than 120 scientific articles and manuals. Founder and chairman of the NGO Nerush. Master of Political Science and expert on water resources, sustainable development, ecotourism.

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