

INTERIM REPORT

ON THE IMPLEMENTATION OF THE JOINT PROGRAM OF MEASURES IN THE DANUBE RIVER BASIN 2018



International Commission
for the Protection
of the Danube River

Internationale Kommission
zum Schutz der Donau

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The data in this report has been dealt with, and is presented to the best of our knowledge. Nevertheless inconsistencies cannot be ruled out.

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1. WHERE THINGS STAND

Restoring the Danube River Basin

At 2,857 km, the Danube River is the second longest river in Europe and its basin covers 817,000 square kilometres and 10% of continental Europe. It is a central feature of European life and is critical for the generation of hydropower, navigation, agriculture, recreation, water supply, and the natural environment. The Danube River Basin is shared by 19 countries and the Danube passes four national capitals (Vienna, Bratislava, Budapest, and Belgrade). However, while some 20 million people rely on the Danube for drinking water, currently just 25% of the region's waters are considered able to reach the environmental objectives for good conditions for habitats and water quality. Improving this state of affairs is essential work, and accomplishing it requires more than just a few new regulations and clean-up efforts: it depends on the cooperation of every Danube country, many different sectors, and any individual who needs and enjoys the Danube's water.

This is where the International Commission for the Protection of the Danube River (ICPDR) comes in. The ICPDR was established by the contracting parties of the Danube River Protection Convention to join the efforts of all Danube countries – both EU and non-EU alike – to work towards a crucial common cause: ensuring the sustainable use of freshwater in the basin for the benefit of over 80 million people. A self-sustaining and financially independent institution, the ICPDR provides a platform for countries to assess the health of their waterbodies, develop basin-wide plans to improve it, and collaborate to overcome the obstacles preventing this. In this document, you'll find an overview of the accomplishments and progress we've made together over the past 20 years.

The Goals of the ICPDR

The ICPDR works to safeguard the Danube's Water resources for future generation:

- Healthy and sustainable river systems
- No risk from toxic chemicals
- Naturally-balanced waters free from excess nutrients
- Damage-free floods

The Danube River Protection Convention was signed in 1994, and its signatories have agreed to cooperate on crucial water management issues, including the conservation of surface and groundwater, controlling hazards from accidents and floods, and reducing pollution entering the Black Sea from sources in the Danube River Basin. The Convention takes a holistic approach, based on the understanding that water resources play an essential part in ecosystems as well as in human societies and economies.

However, the ongoing goal of the ICPDR is not only to carry out the activities under the Convention, but also to serve as the platform to implement EU water legislation and make it a living tool to benefit the Danube River Basin countries and their people.

Since 2000, the European Union has been one of the main drivers for river basin management in the Danube region, particularly through its Water Framework Directive, which is some of the most comprehensive water legislation in the world. To implement this Directive, the Danube countries nominated the ICPDR as the platform to coordinate the work necessary.

While only EU Member States are legally bound by the Water Framework Directive to achieve the requirements of good conditions for habitats and water quality, all the Danube countries have agreed to implement the Directive. Through this cooperation, the ICPDR and its partners have turned the Danube into a classic example of successful integrated river basin management while also helping to reinforce the political stability of the whole Danube region.

As required by the Water Framework Directive, the ICPDR and its contracting parties integrated each country's own river management plan to create the Danube River Basin Management Plan. The first River Basin Management Plan was developed in 2009 and is updated every six years. The Management Plan includes an assessment on significant pressures on waterbodies, as well as a program of measures jointly agreed by the Danube countries to further protect all waters and prevent their deterioration.

Furthermore, the Water Framework requires a document – such as this one – reporting on the implementation of this Joint Programme of Measures identified in the Management Plan. In addition to the work under the Water Framework Directive, the ICPDR developed the first Danube Flood Risk Management Plan in 2015, based on the EU Floods Directive. Aiming to reduce flood risks, this plan promotes the "Solidarity Principle" that prevents countries from simply exporting their flood problems to downstream neighbours and to protect people from the damage caused by floods.

Along with the Water Framework Directive and the Floods Directive, protecting and restoring the region's waterbodies depends on a wide array of more detailed and specific Directives.

When taken together, these create a framework that protects natural habitats, keeps water clean, ensures proper wastewater disposal, improves knowledge about toxic chemicals, ensures industrial safety, and helps businesses move toward a sustainable economy. They include:

- Urban Waste Water Directive
- Industrial Emissions Directive
- Drinking Water Directive
- Bathing Water Directive
- Nitrates Directive
- Birds Directive
- Habitats Directive
- Environmental Quality Standards Directive
- Seveso Directive (to prevent major accidents involving dangerous chemicals)

The ICPDR's ultimate purpose in implementing the Danube River Protection Convention, the Water Framework Directive, and the Floods Directive – as well as the various directives and strategic plans shaping its work – is to achieve the three key goals of the 2016 Danube Ministerial Declaration:

- "CLEANER" water;
- a "HEALTHIER" home for aquatic animals and plants and;
- a "SAFER" environment for people to live without the fear of floods.

The success of the ICPDR is thanks to all of the country delegations, Expert Groups, Task Groups, and the Permanent Secretariat – along with representatives from industry, the scientific community, and the public – all cooperating to ensure the sustainable and equitable use of water resources in the Danube River Basin.

This brochure is a snapshot of the progress to implement measures improving the environmental situation of the waters in the Danube River Basin today and what's still yet to come as the region's many countries come together to secure their collective future.**

HEALTHIER



habitats and ecosystems for aquatic plants and animals

CLEANER



Reduced pollution from settlements, industry and agriculture

SAFER



waters free from harmful substances and accidents

** More detailed information on national environmental protection activities can be found in the national reports of each country.
www.icpdr.org/main/publications/reports



2. THE STORY OF SEWAGE



Cleaning Up Organic Pollution

Wastewater contaminated with organic pollution – feces and household waste that can be digested by microorganisms – has caused big changes to the waters of the Danube, creating an unfriendly and unhealthy environment for many aquatic creatures. Efforts are now underway to clean up this waste at its source to ensure much **CLEANER** waters for people to enjoy and **HEALTHIER** ecosystems for a better life.

Meeting the Challenge

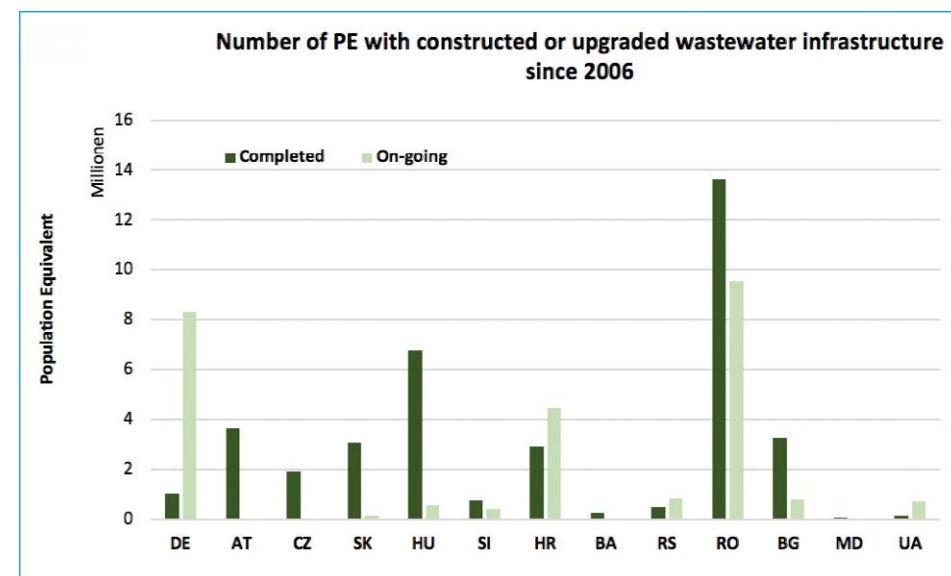
A common misconception about non-toxic organic matter is that it always decomposes harmlessly, disappearing back into the environment in a natural cycle that maintains the status quo. The reality is significantly different when cities, industrial facilities, and major farms enter the picture. The large amount of untreated wastewater they produce makes it difficult for the environment to cope.

When untreated municipal wastewater is released into a water body, microorganisms start to work on digesting the organic waste. When pollution increases, a large amount of organic matter needs to be decomposed and as a result, the waters start to lose one of the most essential components of aquatic life: oxygen. In the most severe cases, this can lead to conditions that no longer support the plants and aquatic species that once lived in those waters.

This has led to one of the most effective and expansive projects ever undertaken in the Danube River Basin. Danube countries across the region have constructed or modernized sewer systems and treatment plants as part of their goals to clean up the rivers.

Where Things Stand

The actions needed to combat organic pollution are straightforward and depend on putting the latest technology to work for the environment. Upgraded wastewater collection and treatment systems, along with modern pollution prevention and control measures at all major industrial units are essential – especially for paper and wood manufacturing, the chemical industry, food-processing industry, and livestock enterprises. For European Union Member States, ensuring adequate wastewater collection and treatment systems is obligatory for municipalities bigger than 2,000 **Population Equivalent** (PE). Industrial facilities must have a permit that is in line with the provisions of the respective **Best Available Techniques** (BAT) reference documents including emission limits values.



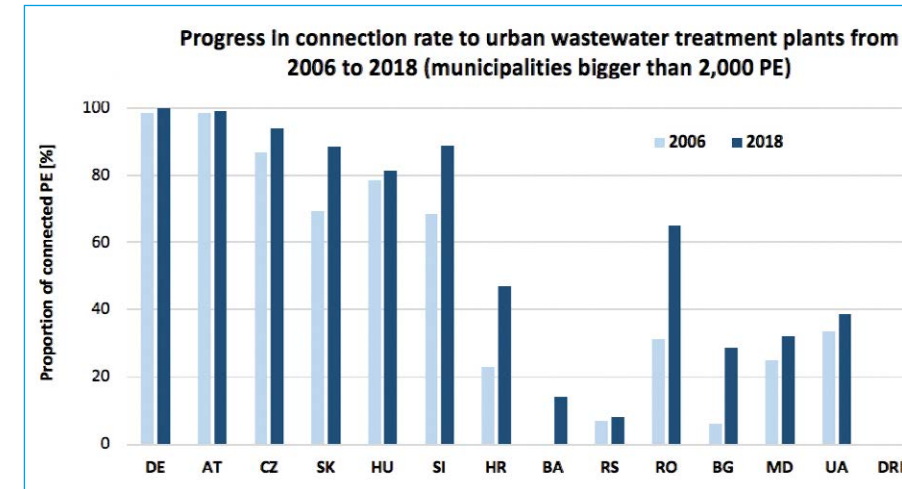
In the last twelve years, Danube countries have invested more than €22 billion in wastewater infrastructure. Since 2006, almost 5,000 municipalities and almost 40 million PE have had collecting and treatment facilities constructed or upgraded, with over 2,000 more planned or currently in progress to improve the services for 25 million people. In addition, nearly 400 industrial facilities have been certified with updated technology standards.

Population equivalent

To identify the capacity of facilities needed to handle urban wastewater, the amount of wastewater load entering the facility needs to be calculated. This is expressed with the term of Population Equivalent (PE), which represents the ratio of the total daily load of organic biodegradable substances entering the treatment plant to the average household load per person per day.

Best available techniques

Best available techniques (BAT) mean using the optimal techniques – both technology used or the way a facility is designed, built, maintained, or operated – to prevent or minimize pollutant emissions and their impacts on the environment. The European Commission produces BAT reference documents defining the required technological conditions for the main industrial activities.



During the same time period, the percentage of communities and industrial facilities (bigger than 2,000 PE) connected to a sewer system and wastewater treatment plant also increased substantially (to nearly 75% at the DRB level), demonstrating a remarkable improvement in both the technological response to the problem and improving water quality across the region.

Biological treatment

After mechanical filtering and primary settling, raw wastewater is treated in aerated biological reactors where microorganisms consume biodegradable organic matter. Bacteria population and organic residues subsequently transform into sludge. In secondary settling tanks the sludge settles and excess sludge is then transported to digestion tanks for further treatment.

Success Stories

Construction projects and engineering know-how have already made a significant difference, with improvements to wastewater treatment plants adding substantial capacity throughout the region.

In the city of Sarajevo, the nearly 40-year-old wastewater treatment plant had been out of commission since April 1992 when its operation was disrupted by war. Designs for the refurbished plant allow for a biological load of 600,000 PE, with the possibility of expanding capacity to 650,000 PE in the second phase. The plant consists of three parts: wastewater treatment, sludge treatment, and biogas. It finally resumed operation in May 2017 with a capacity of 150,000 PE.

In Serbia, the implementation of the respective EU Directives regulating industrial emissions has been enhanced by a project to support competent authorities in their adoption

of sustainable approaches to the intensive rearing of poultry and pigs. A variety of activities were organized within this project, such as a joint workshop for competent authorities and operators, visits to selected production facilities, training for representatives of local self-governments, and an environmental inspection, as well as active participation in the preparation of integrated permits. The project supported ten operators in preparation of integrated permit applications and other relevant documentation, and ten local self-governments in preparation of draft permits.



Looking Ahead

Wastewater management continues to develop, and it can be achieved both cost effectively and more intensively than ever before if we make use of technological advancements and embrace the team spirit of jointly funded construction projects. Wastewater treatment and sewer projects that are still to come in the Danube region are numerous, with hundreds already underway and just as many in the planning stages. At this rate, levels of organic pollution are set to decrease significantly in the years to come.

Current pressures

As of 2018, some 90 million PE of the Danube River Basin generate more than 10 million m³ of wastewater each day. The majority of this wastewater amount is collected by public sewers or handled by adequate local technologies (80%) and treated in centralized treatment plants (73%). However, the remaining part still needs to be appropriately collected and treated. There are about 250 large industrial facilities in the Danube River Basin, which release significant pollutant emissions into surface waters and which must ensure that the applied technologies are in line with the BAT requirements.

In new and non-EU Member States, the most important issues are financing infrastructure projects, tariff setting and ensuring affordability, establishing proper legal framework, and reforming or restructuring the utility sector. For other EU Member States, investment needs will be shifted towards the proper maintenance and rehabilitation of the existing infrastructure. In addition, to achieve sustainable wastewater management in the Danube River Basin, capacity should be strengthened at the national and local administration levels as well as at the utility level to improve financing, operational, and technological aspects of the wastewater infrastructure and services.

Improvements to urban and industrial wastewater management have significantly decreased organic pollution, resulting in much cleaner waters for the environment, human health, and for people to enjoy.



3. RESTORING THE AQUATIC ECOSYSTEM



Reducing Nutrient Pollution Effectively

Urban and industrial wastewater and polluted water from agriculture can lead to massive algae blooms when nutrient pollution flows through the Danube's waters and enters the Black Sea. A comprehensive international effort is currently underway to enhance wastewater treatment and establish good agricultural practices that will balance the needs of water and agriculture to make water **CLEANER** and ecosystems **HEALTHIER**.

Meeting the Challenge

Nutrient pollution occurs when polluted water from agriculture containing nutrients from fertilizers and municipal and industrial wastewater enters a surface water body. This can change the quality of the water so severely that aquatic life itself begins to change in response. This impairs the ecological balance of surface waters, making the water more hospitable to algae and less so to fish – not to mention humans who can no longer drink from, swim, or fish in the water!

What is nutrient pollution?

When nutrients such as nitrogen or phosphorus from wastewater or fertilizers enter surface waters, they feed algae growth. As the algae grow, they block sunlight from reaching other aquatic plants, which eventually die. Bacteria then digest the dead plants and algae, using up the oxygen in the water, and fish and other aquatic species may die.

The solutions to reduce nutrient pollution are complex and require substantial financial resources, technical investments, and a change of mindset. These include installing nutrient removal technology at wastewater treatment plants, reducing the use of phosphates in household goods like washing powder, and improving farming practices to ensure that less pollution ends up in the water.

Where Things Stand

Nutrient inputs into surface waters have declined thanks to measures put in place, but further actions are still needed in urban wastewater, industrial, and agricultural sectors. EU legislation requires more stringent removal technology for nutrients at municipalities bigger than 10,000 PE in areas sensitive for nutrient pollution than it does for organic substances. Implementing and updating the Nitrates Action Programmes in EU Member States, which limit the amount of nitrates applied with manure and fertilizer and regulate the way and con-

ditions of their spreading, help to reduce nutrient pollution from the agricultural sector. EU regulations also limit the phosphate contents allowed in laundry detergents and dishwashing soap. What's more, substantial EU financial resources are spent each year in the farming sector to support and introduce environmentally-friendly agricultural practices – all of which is already making a noticeable difference. These measures are either obligatory and linked to financial support or they are voluntary with financial compensation.

Nutrient removal (tertiary treatment)

Nutrients are removed from urban wastewater with the help of specific bacteria (for nitrogen) and metal salts (for phosphorus) ensuring low nutrient concentrations in the effluent. Nitrogen is transformed into a gaseous form and released into the air while phosphorus is detached from wastewater with the sludge.

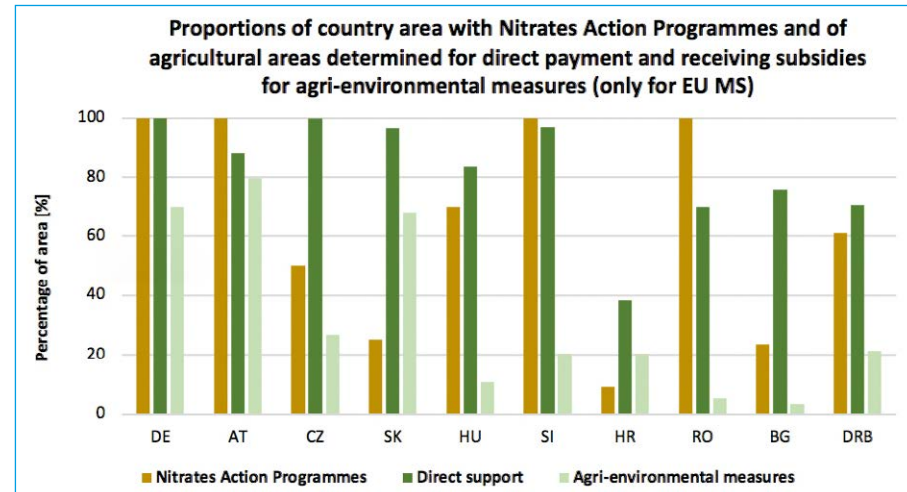
Since 2006, over 1,000 municipalities and more than 25 million PE have had treatment plants with nutrient removal technology either constructed or extended. More than €10 billion have been invested for these projects. Besides this, almost 600 more are planned or in progress by the end of 2018 to serve an additional 12 million PE. During the same time period, the percentage of people connected to nutrient removal in mid-sized and big settlements has increased by a remarkable 25% and reached 75%.

Best management practices for agriculture

Best management practices are the most effective and practical methods of preventing or reducing non-point source nutrient pollution from croplands and animal farms. They include good agricultural practices, fertilizer application limits, standards for good agricultural and environmental conditions, agri-environmental measures, and natural water retention measures.

Nitrates Action Programmes with strict rules on manure and fertilizer application are being implemented for more than 60% of the Danube River Basin.

For agricultural areas in EU Member States across the Danube River Basin, 70% are determined for direct support linked to cross-compliance and 20% receive additional subsidies for implementing environmentally-friendly measures. These financial mechanisms are linked to the EU Common Agricultural Policy. In the last decade, more than €70 billion has been spent to support farmers and finance best management practices. The percentage of these areas has increased substantially since 2006.



Success Stories

Successful nutrient pollution reduction programs have been implemented or are currently in progress throughout the Danube region.

In the Czech Republic, existing treatment plants in the Bzenec, Straznice, Hodonín, Veselí nad Moravou, and Ratíškovice municipalities have been reconstructed to provide high-quality treatment of wastewater from households, civic amenities, small facilities, services, and industrial plants. Moreover, new sewerage in Petrov (with treatment in Straznice) and reconstruction of existing sewerage in Hodonín and in Veselí nad Moravou has been finished. The project, financed from the EU Cohesion Fund (2008-2010), represents a cluster of sub-projects eliminating the main sources of pollution, improving the quality of life and enabling further development of the region. The project encompasses 11 cities and municipalities with almost 70,000 inhabitants.



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© Ministry of Waters & Forests of Romania

When Romania started its "Integrated Nutrients Pollution Control" project in 2008 to reduce the flow of nutrients into the Danube River and Black Sea tributaries, they had an ambitious series of activities ahead of them. The project included creating 1,000 new facilities for manure storage, connecting homes in rural areas to 13 sewage systems and treatment plants,

investing in laboratory equipment to monitor algae blooms and aquatic environment, and the drafting of the Code of Good Agricultural Practice (with accompanying training sessions) for 1,000 participants. By the end of its initial phase, the project was so successful that it has since been extended twice and will continue to receive World Bank funding until 2022. Nitrates levels have been reduced, and more people are adopting measures to address nutrient discharge and adopt sustainable land management

practices in a shining example of how it is possible to reverse nutrient pollution with just a few goals in place and the willingness of people and communities to make changes for the better.

In Germany, a model project to develop 13 demonstration farms in the federal state of Baden-Wuerttemberg is being implemented. These farms are using new environmentally-friendly methods of integrated crop protection that result in less nutrient polluted water entering the water supply. The aim is to provide farmers throughout the region with information to help them introduce these new methods.



© BWVB

The "Boden.Wasser.Schutz.Beratung" project in Upper Austria is tackling the challenges of protecting soil and water while keeping agriculture competitive. The project offers advice on how to reduce pollutants in ground and surface water and ensure a sustainable drinking water supply. Fifty-four working groups are led by qualified farmers who share their specialized know-how through info sessions in local farming communities.



© JKI

Looking Ahead

Local farmers and experts have been working hand-in-hand to improve their farming methods and treatment plants have expanded and upgraded their technologies. As a result, nutrient pollution has been reduced to a level where the natural habitats of the Danube's waters can once again continue to support beneficial water uses and a wide variety of fish and aquatic life – not just today, but well into the future.

Current pressures

Settlements above 10,000 PE (representing about 70 million PE in total) are mainly equipped with nutrient removal technologies (75%), but there is still room for improvement. About 50% of the Danube River Basin (about 45 million ha) is under agricultural cultivation. The current mean nitrogen surplus for the basin is relatively low (about 21 kg per hectare and year) compared to the EU average (50 kg per hectare and year, in 2015) but shows high regional differences, and agriculture in regions with current low values might be intensified again.

However, further efforts are needed to enhance wastewater treatment technologies and to better align the goals of the water and agricultural sectors. Win-win strategies and targeted actions should be developed and promoted in order to decouple nutrient pollution and water scarcity from agricultural development. Knowledge gaps on measure efficiency need to be closed. Awareness raising on the link between agricultural practices and biodiversity is needed. Agri-environmental measures should be made more attractive. Technical and financial support as well as appropriate information on modern technologies and tools should be provided for farmers to improve agricultural practices.

Enhanced wastewater treatment and good agricultural practices can reduce nutrient pollution, restoring stable, healthy ecosystems and allowing us to continue to use and enjoy the waters of the Danube River Basin.



4. CLEANING UP THE CHEMICALS



A New Course to Safer Waters

Aiming for **CLEANER** waters that are **HEALTHIER** and **SAFER** for both people and aquatic life, new technologies, updated regulations, and scientific measures are being implemented to reduce or halt the spread of dangerous substances in the waters of the Danube River Basin.

Meeting the Challenge

When most of us hear the word, “pollution,” we tend to think of hazardous substances – the toxic chemicals and metals that come from industry, farming, and everyday household activities, such as the use of garden pesticides, cosmetics, or medicines. Recognizing how dangerous these substances might be to human health and ecosystems, EU legislation has been stepped up significantly to reduce the pollution of these hazardous substances.

Chemical pollutants can find their way into the natural environment through municipal wastewater, polluted water from agriculture, industrial facilities, air pollution, and sewer overflows, to name just a few. Depending on their concentration, they can either cause immediate toxicity or slowly accumulate in the ecosystem over time. Both pose a serious threat to human and aquatic life.

After the European Union had identified the most important of these pollutants with the most toxic effects to human health and to aquatic environment, it was time to find solutions. As with nutrient and organic pollution, one of the most effective ways to combat hazardous substance pollution is to stop it from entering water bodies in the first place. Today, countries throughout the Danube region are developing and employing modern wastewater treatment and industrial technologies, fostering appropriate pesticide use, and undertaking scientific investigations of pollution sources to reduce pollution from hazardous substances and their threats to people and ecosystems.

Priority substances

The list of priority substances set by the European Commission contains 45 substances or groups of substances posing significant risk to aquatic ecosystems. Environmental quality standard values have been set up for these chemicals in surface waters or in aquatic animals to ensure that these harmful substances are no longer present in substantial amounts in the aquatic environment.

Where Things Stand

We’ve already seen great technological progress towards cleaning up organic and nutrient pollution. However, Danube countries need to make additional efforts to minimize potential harmful effects of hazardous substances pollution in order to protect human health and the environment. EU Member States have to phase out priority hazardous substance emissions and to reduce priority substances releases. Since 2006, over 20 urban wastewater treatment plants have added specific technologies activated carbon filters to remove hazardous pollutants.

The fourth treatment stage

Priority and emerging pollutants, and microorganisms can only be partly treated by traditional wastewater treatment technologies. Specific methodologies – such as activated carbon filters, membrane filtration or ozone-treatment – can substantially remove these contaminants from the wastewater.

The release of agricultural chemicals has been minimized thanks to measures enforcing the use of less toxic substitutes, ensuring proper management and safe application and storage of pesticides and biocides, and setting emission limits. In agriculture, the use of sewage sludge which could contain hazardous substances is regulated to prevent harmful effects on soil, vegetation, animals, and people. Pollution via industrial accidents is also regulated and minimized through safety measures and reports, accident emergency plans, and early warning systems.

Sustainable use of pesticides also known as integrated pest control

Integrated pest management and the environmentally-friendly application of pesticides aim at applying the least harmful practices and products, preferring low or non-chemical methods, minimizing or avoiding pesticide use in sensitive areas, and establishing buffer zones to protect aquatic ecosystems. Pesticide use is highly limited or banned on organic farming fields.

Success Stories

A new collaborative research initiative called SOLUTIONS made great strides towards faster and more accurate identification of chemical pollutants. This large-scale data collection project was a consortium of 39 renowned scientific institutions and enterprises from Europe, Brazil, China, and Australia. The ICPDR was both a project partner and a member of the SOLUTIONS stakeholders’ board. The project developed new research and monitoring tools for both current and yet-to-be-developed chemicals that pose a risk to European waterbodies, as well as legacy chemicals, which remain in the environment long after their use has been restricted or banned. In addition, the SOLUTIONS project created a comprehensive knowledge base that the whole region can draw from when looking for ways to significantly reduce hazardous pollution. The SOLUTIONS project contributed substantially to the Joint Danube Survey 3 (see Chapter 6) by analysing samples for a wide range of hazardous substances, making it possible to address these pollutants in the 2015 update of the Danube River Basin Management Plan.

The Steinhäule wastewater treatment plant association, which is also responsible for wastewater treatment in the cities of Ulm and Neu-Ulm, has been conducting research on the topic of improved wastewater treatment for ten years. The objective of the research conducted in cooperation with the Biberach University of Applied Sciences was to identify a suitable process variant that could permanently reduce a variety of micropollutants. In various research projects, the ‘adsorption stage’ was developed, which not only reduces the dissolved organic residue by means of powder activated carbon but also largely eliminates a variety of micropollutants (such as pharmaceutical residues and other less biodegradable compounds)



from the wastewater. Essentially, adsorptive treatment of the wastewater succeeds the biological treatment and involves a contact reactor, which is designed as a three-stage cascade, and a downstream sedimentation tank. A new filtration plant, which is required for solids separation, has also been installed. It is designed as a two-layer filter (75 cm quartz sand, 75 cm hydroanthracite). With an extension size of 445,000 PE, the Steinhäule wastewater treatment plant cleans 39 million cubic metre wastewater annually. In February 2015, the official operation of the adsorption stage began, which had been installed on a large scale.

The Danube Accident Emergency Warning System (AEWS) is activated whenever there is a risk of transboundary water pollution, or threshold danger levels of hazardous substances are exceeded. The AEWS sends out international warning messages to countries downstream based on a predefined routing scheme. Details about each incident, such as time, place, involved substances, causes, observed effects, and counter measures taken are collected in predefined forms and automatically translated into



the recipient’s language. This helps authorities to put environmental protection and public safety measures into action. The AEWS operates on a network of Principal International Alert Centres in each of the participating countries. The system is continuously operated, maintained, and tested by the ICPDR.

Looking Ahead

While still in its early stages, the ICPDR’s strategy on hazardous substance pollution mitigation is underway, building on technological progress at wastewater treatment plants and the outcomes of the SOLUTIONS project and the Joint Danube Surveys. With much more information still to come, the next steps will be to more comprehensively evaluate the measures taken so far and help the whole region implement the practices that work best.

Current pressures

The sources of hazardous substances pollution are rather unknown; only very scarce information is available from industrial inventories. Similar to nutrient surplus, pesticides sales rates over agricultural areas are relatively low (1.1 kg per hectare) as compared to the EU level (3.8 kg per hectare, in 2015) but it shows higher regional inhomogeneity. More than 250 industrial facilities with significant hazard to cause accidental pollution are located in the Danube River Basin. These installations store more than 6.5 million tons of hazardous substances.

Nevertheless, further investigations are needed to close knowledge gaps on the monitoring of hazardous substances in surface waters, determining sources and pathways of hazardous substances emissions, quantifying water emissions and loads, and implementing mitigation measures. In addition, capacity building is needed to improve safety management at industrial facilities storing large amount of dangerous chemicals, particularly in the mineral processing, energy, and chemical industries.

By using advanced wastewater treatment and pesticides appropriately, we can minimize or eliminate hazardous substances from our waters to protect ecosystems and human health.



5. RESTORING THE RIVER



Helping Rivers Recover from Decades of Transformation

Over the last few decades, human activities – such as building dams, fragmenting rivers, ponding or channelizing them, and abstracting water – have led to changes in the physical conditions of the Danube and its tributaries. Natural habitats have been substantially decreased and biodiversity significantly reduced. Today, however, Danube countries are working hand-in-hand to make our waters a **HEALTHIER** home for aquatic life once again, with great benefits for society.

Meeting the Challenge

When admiring a mighty flowing river, one small island in one of its many side-arms might seem almost inconsequential; just a small patch of gravel with trees near the riverbank that you pass by on your way to somewhere else. But hidden among the land and waters of these side-arms are important natural habitats: safe havens for the river's fish to spawn, a place for birds to rest during migration, and maybe also a lovely place for people to relax. Even small areas like these can be massively affected when the river's natural course is changed.

Physical changes to a waterbody are usually caused by projects that serve people, such as flood protection measures, hydropower plants, navigation, irrigation, land drainage, or urbanization. However, over the last century, these legitimate water uses have significantly changed the habitats for aquatic species and damaged the way these ecosystems function. One of the major challenges faced by the ICDPR is to restore rivers to a more natural state and strengthen their resilience against pressures without having to give up the water uses which caused these problems.

Now, with a better understanding of how physical changes to rivers affect the environment, Danube countries are identifying concrete actions to mitigate these impacts and increase habitat diversity. These include constructing fish migration aids, reconnecting wetlands that have been cut off from the river, providing enough water for aquatic species to survive, re-establishing spawning grounds, and restoring natural riverbanks. By studying the effects of man-made changes and thinking of the environment while planning new projects, we can avoid additional damage and costly restoration measures, and safeguard rivers for the future.



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Where Things Stand

Balancing our demands on the rivers with the needs of water protection is a shared responsibility. An important part of the Danube River Basin Management Plan, jointly developed by all Danube countries, is addressing the ecological pressures caused by physical changes to our waters – especially the interruption of river continuity, disconnection of floodplains, straightening of the river, as well as impoundments and reservoirs which can change the character of a river so much that it resembles a stagnant pond. In addition, the Danube River Management Plan address the pressures caused by changes in quantity and dynamics of flow of the river, as well as groundwater levels.

The rivers of the Danube Basin contain valuable habitats and spawning grounds that are vital to the life cycle of fish and have to be accessible for fish migration. When man-made structures such as dams and weirs interrupt the river's continuity, these routes are cut off. Measures to improve this situation, such as building fish passes, address both up and downstream migration of fish. Barriers can also block the natural movement of sediment, which can dry out wetlands and deepen the riverbed in the downstream part of the river.

Improving and strengthening the ecological conditions of a river is good for aquatic life, but also offers many significant benefits for people. Restoring rivers to a more natural state means that aquatic ecosystems are more resilient to the challenges of climate change, have more natural retention areas for floods, and have a greater capacity for self-purification to cope with pollution. What's more, restored rivers can provide important services to society such as the provision of drinking water, and are also highly appreciated by people for recreation.

Number of river water bodies affected and restored for fish migration by 2021

	Total number of WBs	WBs affected by continuity interruptions by 2021	Water bodies restored for continuity by 2021
Danube River	64	23	8
DRBD tributaries	707	204	66
All DRBD rivers	771	227	74

Progress of projects improving river flow for fish migration.



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Disconnecting wetlands and floodplains from the main river leads to the disruption and loss of natural habitats that fish use as spawning, nursery, and feeding grounds. In addition, disconnecting wetlands leads to a lower groundwater level and weaker resilience to droughts and floods. Reconnecting isolated wetlands to their adjacent bodies of water not only creates retention areas during floods, but also revives the thriving ecosystems they once had. Reservoirs and impoundments – as well as significant abstractions for hydropower use, industry, or irrigation – can seriously impact water flow with regard to quantities, dynamics, or flow velocities, negatively impacting habitat conditions and water quality.



© Balint Bajomi, WWF Hungary

Success Stories

Recognizing that fragmenting rivers is a major factor preventing the establishment of self-sustaining fish populations, Austria has set out to make the entire 300 km section of the Austrian Danube impacted by a chain of hydropower dams in that country passable for fish by 2021. The project's ambitious objectives are to restore river continuity by building fish passes, reconnecting side-arms, and creating gravel structures for spawning and breeding. Run by the responsible hydropower company, the project will restore habitat connectivity between four Nature 2000 areas.

In 1982, Liberty Island, a small natural island in the Hungarian stretch of the Danube, was connected to the riverbank by a rock-fill dam for water regulation purposes. As a consequence, the small Danube side-arm became blocked and clogged with sediment, essentially becoming standing water. Then when two large capacity delivery pipes were placed on top of the dam, it became so high that almost no water, apart from the highest floods, could rise above it. So after more than 30 years of sediment build-up, Liberty Island was in danger of no longer being an island at all. Not only did this make life difficult for the protected fish species that depended on the special conditions of the side-arm, but it also had a negative effect on the quality of the local drinking water supply.

A reclamation project began with the purchase of the island, thereby preserving it exclusively for nature conservation and leading to its designation as a Natura 2000 site. Then a remarkable transformation began, with the reintroduction of native forests, the removal of invasive tree species, ecological dredging of the side-arm to remove silt and sediment, relocating the heavy delivery pipes under the riverbed, and finally, dismantling the rock-fill dam. The project is now complete, and the site is open for visitors who can walk the Aquarius nature trail, with five stops along the way showing the dramatic restoration (or, you can simply watch the documentary film at home!).

Fischwanderhilfe Greifenstein



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Looking Ahead

With many more projects underway, there is still much to be done to return the rivers to a more natural state. However, improved knowledge on pressure-impact relationships and team efforts across international borders are demonstrating what can be done when governments, businesses, scientists, and the general public work together to balance the many functions of the river for a shared future.

Enhanced wastewater treatment and good agricultural practices can reduce nutrient pollution, restoring stable, healthy ecosystems and allowing us to continue to use and enjoy the waters of the Danube River Basin.

6. GROUNDWATER

Protecting a Hidden Treasure

With groundwater making up most of the Danube region's drinking water supply, protecting it from pollution and drought is a top priority. Years of overuse and agricultural pollution have put stress on essential groundwater bodies. The Danube countries have therefore launched wide-reaching measures to tackle both problems head-on. Their goal is to restore and maintain **CLEANER** groundwater while managing its use for a more ecologically balanced and **HEALTHIER** water supply.

Meeting the Challenge

Over 59 million people in the Danube River Basin get their drinking water from groundwater – that's 72% of the total population. Yet groundwater is extremely vulnerable to over-abstraction, when more water is used than can be replaced by nature. What's more, agricultural pollution caused by nitrates from fertilizers or pesticides entering groundwater via the soil or connected surface water has also become a major problem. Since groundwater flows so slowly, once the supply deteriorates or is contaminated it can stay that way for decades. This combination of need and sensitivity has created a serious problem.

Where Things Stand

Danube countries are undertaking projects throughout the region to tackle this problem on all fronts. Measures include improved farming techniques, water use regulation, pollution clean-up and a wide range of ingenious economic activities.

In Bavaria, a number of improved agricultural practices are underway to reduce nitrogen discharge through annual soil analysis, organic-farming, reduction or elimination of organic and mineral fertilizers, water-conserving crop rotation, the avoidance of high-yield crops like oilseed rape, winter greening, and extended grasslands and wildflower planting. The Bavarian Ministry of Food, Agriculture and Forestry has also appointed advisors to help individual farmers put optimal groundwater protection measures in place.

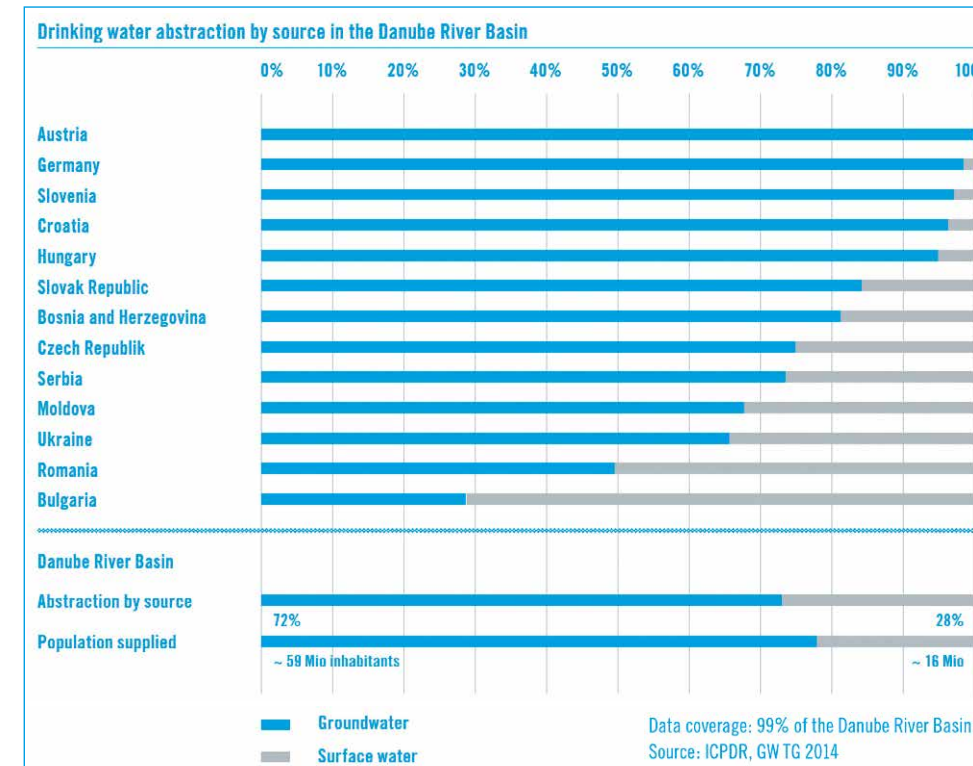
Romania completed several water clean-up projects between 2012 and 2018, including constructing new sewer systems and manure storage facilities as well as increasing the number



of populated areas connected to wastewater treatment facilities. New legislation has established protected areas and banned activities that contribute to water contamination. Hungary has its own set of initiatives, and the number of inhabitants connected to a sewer system nationwide has increased by 5% in as many years. Slovakia has tackled its nitrate pollution problem in similar ways, and the number of households connected to a sewer system has risen by 7% in as many years.

Over-abstraction of groundwater has been addressed throughout the region by establishing registers of groundwater extraction, which collect data on water usage that can be used to provide information for a variety of water conservation measures. In Hungary, for example, reconstruction of the drinking water supply network decreased abstractions between 2009 and 2015. Hungary has also revised legislation concerning licensing for wells and construction, as well as adopted demand management measures and adapted agricultural production by using innovative techniques such as drought-resistant crops. Similar registers and legislation in Romania and Slovakia have resulted in improved data on water use, and an increase in the number of established protected areas and abstraction permits.

Water consumption by the public and other users is also an issue. Water-saving techniques, including using less water in manufacturing by reusing water or using water saving devices in households are already in place and are becoming more popular.



Success Stories

Since the vast majority of surface and groundwater bodies in Hungary are the sole property of the state, all water, including irrigation, is subject to authorization. A new project called "VIZEK" aims to reduce the administrative burden on water users through a fully electronic water licensing process. The system will provide credible data on actual agricultural water use to water management and administrative bodies and research agencies. This will help water managers plan new and more efficient irrigation systems that reduce over-abstraction.

When wheat farmers in the Lower Franconia region of Bavaria discovered that their multi-stage fertilization process was leading to unused nitrogen flowing into the groundwater, they were faced with a dilemma; using fertilizers shortly before harvesting gave them a more profitable crop, but was clearly not good for the environment.

The solution was the "Wasserschutzbrot Unterfranken" initiative to encourage farmers to stop using fertilizer during the final stages of crop production. The farmers still get a fair price for their wheat from the flour mill and also receive compensation from the local water company. This ground-



water-friendly grain is milled and stored separately, then sent exclusively to bakers participating in the project.

After a successful test phase in 2014-15, the initiative was extended to other areas of the country, and this year it won the German Sustainability Award. In 2016, four farmers, two mills, 12 bakers, and three water suppliers participated in the initiative. Today, the project has grown to 20 farmers, three mills, 13 bakers, and six water suppliers. Now each morning, hungry customers at the bakery can choose bread labeled as "Wasserschutzbrot", knowing that with each loaf they buy they are ensuring that generations to come will be able to enjoy the same pleasure that comes from a robust, clean body of groundwater.

This type of ingenuity and teamwork – involving everyone from top-level experts to farmers and everyday people – is the way forward for all groundwater restoration efforts. Under the ICDPR's vision, these include stopping the emission of polluting substances, cleaning up pollution that already exists, and balancing water use against the available supply.



© District Government of Lower Franconia



© District Government of Lower Franconia

Looking Ahead

As research closes the data gaps needed to properly assess groundwater restoration progress, and we celebrate the successes so far, the key to achieving the region's goals by 2027 lies with a strong coalition of both experts and citizens leading the way. Reducing uncontrolled, inappropriate water use is most effective when everyone understands the challenges and is inspired to make changes. By sharing information on new approaches, we can improve the way we share this valuable resource.

To protect our precious groundwater resources, Danube countries are working together to reduce the input of pollutants into the groundwater, while at the same time avoiding over-abstraction through effective water management.



7. BUILDING A KNOWLEDGE BASE



You Can't manage What You Can't Measure

Water protection in the Danube Basin requires reliable information about the state of our rivers, especially where water is shared by countries. With a joint monitoring network and regular joint surveys, the Danube countries are putting their collective knowledge to use for new efforts to maintain **CLEANER**, **HEALTHIER**, and **SAFER** waters in the region.

Meeting the Challenge

In 1996, the ICDPR established the TransNational Monitoring Network (TNMN), aiming to provide an overview of the general status and long-term changes to surface water and groundwater basin wide. It includes 114 monitoring locations across the Danube and its main tributaries. Samples are taken at least 12 times a year to monitor chemical parameters and once or twice a year for selected biological parameters. Since the Danube is the most international river basin in the world, a key focus has been tracking the pathways of pollution that crosses borders, and the effects of measures taken to reduce them.

All Danube countries are involved in these monitoring activities, which collect data on the concentration of pollutants to assess the status of surface water and groundwater bodies. The results are published annually in the TNMN Yearbooks, which can be downloaded from the ICDPR website. Monitoring data is also an important part of the Danube River Basin Management Plan, which is published every six years.

The Joint Danube Survey, coordinated by the ICDPR, takes place every six years along the Danube River and is the largest survey of its kind. Lasting for several weeks, all Danube countries work together intensively to monitor the Danube and its tributaries to gather data on pollutants and species. Once analysed, this information reveals areas that need improvement, and areas where there is cause to celebrate.

Where Things Stand

With the TransNational Monitoring Network collecting and analysing data for over 20 years now, the knowledge base is impressive and the results are encouraging. As a result of the TNMN, we know that 25% of the region's 28,836 kilometres of rivers had the potential to meet environmental objectives for good water quality and habitat conditions, and 71% were reported to have good water quality conditions in 2015.



Success Stories

The world's biggest river research expedition of its kind was conducted in 2013: the third Joint Danube Survey. Known as JDS3, the survey had international cooperation from all 14 of the main Danube Basin countries and the European Commission, united through the ICDPR. It was a unique opportunity to assess the water quality in the whole Danube region and provided the largest ever amount of knowledge about Danube water pollution collected within a single scientific exercise. Many key findings came from JDS3, revealing several crucial areas that need improvement – a victory for comprehensive research.

Results from JDS3 showed that improvements to wastewater treatment have had a positive impact. Levels of nutrient pollution, especially nitrogen and phosphorus, have declined since the previous JDS.

JDS3 found a high degree of biodiversity of plants and animals in the Danube (over 139,000 fish of 67 species were sampled!). However, comparisons with results of the previous two surveys clearly showed that invasive species are continuing to deplete the habitat of native Danube fish.

Most of the hazardous substances were found to be below levels of concern, but some substances exceeded environmental quality standards, such as mercury concentrations in all fish samples.

New analytical techniques and strategies were used to target organic substances during JDS3, resulting in the most comprehensive information ever gathered.



© André Künzelmann (UFZ)



© André Künzelmann (UFZ)

Looking Ahead

While monitoring and assessment of water status have improved since 2009, some gaps still exist. JDS3 in particular revealed the need to harmonize monitoring practices across the Danube countries, and demonstrated that a lack of analytical instruments and methods in certain areas prevented a full assessment of the state of chemical pollution. These lessons are why such joint monitoring efforts are essential. Building on these findings, the next round of data collection (and the next wave of progress) is already underway: JDS4 will take place in 2019 and will include monitoring of microplastics for the first time.

Monitoring water quality provides us with the information needed to design appropriate measures to achieve good conditions for habitats and water in the Danube River Basin.



8. PROTECTING A LEGACY



Europe's Endangered Sturgeons are Staging a Comeback

*A historic species essential to the Danube region's ecosystem has weathered seismic change over millions of years, only to be driven to near extinction in the last century by human activity. A coordinated effort is now underway to turn this situation around and restore **HEALTHIER** waterbodies and habitats for sturgeons, so they have a fighting chance of survival.*



Meeting the Challenge

Sturgeons are among the oldest and largest fish species still living in freshwaters – first appearing in Europe over 200 million years ago – and they are an integral part of Europe's heritage. And yet, with their numbers in dramatic decline, these species are critically endangered. For the first time in human history, there is a high threat there won't be any sturgeons at all in years to come.

Many factors have caused this sharp decline in the status of the Danube's flagship fish, including over-exploitation and illegal fishing, migration routes blocked by dams, and the loss of adequate habitats due to pollution and physical alterations. Sturgeons depend on a network of habitats from rivers to the sea – waters for migrating, feeding, and spawning – and they need to migrate between these sites over time. Their homing instincts bring them back to the same freshwater spawning sites along the same routes, and these patterns make them especially sensitive to environmental pressures. Changes to their habitats and blocked migration routes are severely affecting their ability to reproduce and live as long as they should – upwards of 100 years in ideal conditions!



Sturgeons and their survival have become a Europe-wide concern as people band together to protect this essential legacy species. An urgent and comprehensive series of measures is therefore necessary to save the Danube sturgeons from extinction.

Where Things Stand

Of the six native Danube sturgeon species, the European sturgeon is already extinct and the ship sturgeon is now considered functionally extinct, with only accidental catches recorded over the last ten years. The Danube sturgeon, once the most abundant sturgeon species in the region, has only been observed in single numbers over the past few years. The population numbers and natural reproduction of the Stellate sturgeon and Beluga sturgeon (or great sturgeon) are also rapidly declining. The Sterlet, a freshwater species, is considered threatened in the lower and middle Danube and nearly extinct in the upper Danube.

A number of projects are needed to turn this dire situation around, and several of these fall squarely within the framework of the ICPDR's goals and activities in the region. These include restoration of altered habitats, prevention of habitat degradation, re-opening blocked migration routes, and improving water quality. However, other activities, such as the establishment of a living gene bank and conservation stocking, as well as combating poachers and over-fishing, require cooperation with other partners who are competent in these areas. Many of these partnerships and projects are already in existence.

Success Stories

A problem of this magnitude cannot be resolved with just one single measure; it takes many smaller, more focused projects concentrating on specific factors. Not all of these are straightforward conservation measures. Helping the sturgeons requires a combination of legal, political, scientific, environmental and socio-economic measures.

The establishment of the Danube Sturgeon Task Force was a significant step toward reviving sturgeon populations. Founded in 2012 under the framework of the EU Strategy for the Danube Region (EUSDR) and its Priority Area 6 (Biodiversity and Landscape Diversity), the Task Force brings together major stakeholders such as the ICPDR, the International Association for Danube Research (IAD), World Wildlife Fund (WWF), and World Sturgeon Conservation Society (WSCS) to secure viable populations of Danube sturgeon species by 2020. The Task Force's "Sturgeon 2020" program combines environmental projects with social and economic initiatives that help local and regional stakeholders conserve Danube sturgeon populations.

The "LIFE Sterlet" project is a scientific initiative to breed native Sterlets and release them into the wild. This supports the wild population by helping it to grow to a size whereby sustainable natural reproduction is possible. The target areas are the two free-flowing sections of the Austrian Danube in the Wachau and the Danube National Park regions, including the Morava River close to the Austro-Slovakian border. The project also identifies threatened habitats and provides recommendations for their conservation.



The "LIFE for Danube Sturgeons" project focuses on protecting lower Danube sturgeons from poaching and illegal trading. Working with fishing communities, the project aims to develop alternative income sources that will reduce dependency on illegal activities. Law enforcement agencies will be supported in their fight against poaching, and the markets for caviar and sturgeon meat will be closely monitored and forced to conform to legal requirements.



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The MEASURES project contributes to the implementation of both in-situ and ex-situ conservation topics, aiming to enhance and protect routes for migratory fish in the Danube River Basin. It also includes broad communication actions at the policy level, targeting stakeholders involved in water uses.

The European Commission's Directorate-General for Regional and Urban Policy (DG REGIO) is supporting activities to restore fish migration at the Iron Gate I & II dams in Romania.

The ICPDR Sturgeon Strategy as well as the first European Sturgeon Conference and its key messages have enhanced efforts to focus on the urgent establishment of living gene banks as the basis for future restoration programs.

As further follow-up to its efforts, the ICPDR welcomes the newly adopted Pan-European Action Plan for Sturgeons by the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention). The plan covers eight European sturgeon species and aims to conserve the last surviving populations, restore habitats, end poaching and reintroduce sturgeon to many rivers.

Looking Ahead

With several successful projects already underway, the path forward means repeating these successes by continuing to bring together key stakeholders from different fields and organizations to find creative solutions to problems that benefit everyone, especially the sturgeons! A continued focus on raising awareness will also help strengthen support for this work. As more of us come to marvel at the sturgeons' remarkable resilience over the past 200 million years, we recognize that the sturgeons now urgently need our help if they are to have a chance for the future.



Sturgeons represent the natural heritage of the Danube River Basin and are important indicators of thriving ecosystems. With their long reproductive cycles, very specific habitat requirements and long migration patterns, sturgeons are extremely sensitive to environmental pressures. Healthy populations of sturgeons mean healthy rivers.



9. INVESTING IN THE FUTURE

Financing the Costs of Saving the Environment

The Danube countries are financing the region's wide-ranging water protection projects, and a mix of public and private funding sources are answering the call, thereby ensuring the Danube River Basin's ecological future.

Meeting the Challenge

"Who pays for it?" This is the big question when discussing major environmental restoration programs such as those underway in the Danube River Basin. It takes more than just teamwork and ingenuity to clean up and prevent pollution, improve natural water retention, and re-establish migration routes for fish; it takes funding on a massive scale from everyone who has a stake in the future of the region's waterbodies.

The Polluter Pays Principle

The 'polluter pays' principle is a legal requirement of the EU Water Framework Directive, stating that those who produce pollution – or who harm the environment in any way – must bear the costs of managing it to prevent damage to human health or the environment. This principle not only makes those who cause damage to take responsibility for their actions, but can also motivate others to take measures to prevent pollution or minimize its effects, in order to avoid additional costs for restoration.

Each Danube country is responsible for financing the projects within its borders, and a significant amount of money has already been spent to help the Danube countries meet environmental goals – over €20 billion has been invested in water treatment facilities alone. Through these activities, we've learned that while investing in environmental restoration is crucial, it is even more cost-effective to prevent environmental deterioration in the first place. Both approaches are essential to achieve good conditions for habitats and water quality, and national governments are taking the lead with the help of several EU-supported funding programs and the private owners and operators of facilities that have an impact on the region's water.



© Remoto Tavan / iStock

Where Things Stand

To support their financing efforts, EU Member States can call on help from the EU through several key funds. These include:

- **European Regional Development Fund (ERDF)**
Aimed at economic, social, and territorial cohesion in the EU.
- **European Social Fund (ESF)**
The main EU financial instrument for investing in employment opportunities, education, help for vulnerable people, and the environment.
- **Cohesion Fund (CF)**
Supports investments in TEN-T transport networks and the environment in EU Member States with below-average Gross National Income.
- **European Agricultural Fund for Rural Development (EAFRD)**
Finances the Rural Development and Agri-Environmental Programs of the EU Common Agricultural Policy.

- **European Maritime and Fisheries Fund (EMFF)**
Supports marine and fisheries policies in the EU.

Since they are not under any legal obligation to implement these policies, funding in non-EU Member States is more difficult. However, the following programs are available to them:

- **European Neighbourhood Instrument (ENI)**
Provides direct support for the EU's external policies, including environmental protection.
- **LIFE**
Entirely devoted to environmental objectives.
- **Instrument for Pre-Accession Assistance (IPA)**
Provides assistance for building institutions and cross-border cooperation.
- **INTERREG Europe**
Helps regional and local governments across Europe develop policies to protect the environment and improve resource efficiency.

Success Stories

Danube countries have begun to see success with several measures to implement the economic principles of the EU environment legislation, such as the 'polluter pays and user pays' principle and the level of cost recovery.

Austria is an alpine country where flood protection measures and hydropower have led to more than 25,000 barriers interrupting the flow of rivers, which fragments river habitats and hinders fish migration. Responsibility for restoration follows the polluter pays principle, however restoration was intended to be accelerated by a funding program. Once the total costs for restoring river continuity and improving habitats were calculated, a financial program was created that included a governmental environment fund combined with federal state funds. The program subsidized construction measures to improve aquatic ecology, such as building fish passes, widening rivers, or reconstructing riverbanks in areas where restoration was determined to be of the highest priority. Investment costs for measures implemented by companies were subsidized up to 55% and those by communities up to 90%. This concept was a huge success. Between 2009 and 2015, about €400 million



© Verbund

Between 2009 and 2015, about €400 million

were invested in restoration projects, and river continuity was restored at 900 sites, including 400 hydropower stations, and habitats were improved at more than 240 sites.

In Slovakia, farmers pay 100 % of costs for the water they use, without any subsidy from the state, with the price set by government regulation. This aims to reduce the overuse of water, and leave more of it in the ground to prevent future drought.

Similarly, Hungary's regulations encourage the efficient use of water through reintroduced fees in agriculture. Farmers pay for the water they use, along with a water resource fee and service costs. Not only do these fees contribute to the recovery of environmental costs, but they motivate farmers to conserve water and use it wisely.



© VEDA, Publisher of the Slovak Academy of Sciences, 2015



© Duna Múzeum / Danube Museum, Esztergom, Hungary

Looking Ahead

While there are still gaps in financial coverage for the many water protection projects needed throughout the Danube River Basin, success stories so far provide some examples of how to close them. In order to successfully reach the environmental goals of the Danube River basin, it is necessary to mobilize adequate ways of financing the planned measures. In addition, links to EU legislation and to environmental measures are needed in EU funding instruments. Danube countries need more and better targeted EU funding to reach environmental objectives with a more simplified application process, yet even with these sources in place, many Danube countries still have difficulty meeting their share of the financial responsibility. Strengthening cooperation and integration between different sectors and for policies such as agriculture will help, as will shifting more responsibility onto the entities that created the situations in the first place.

Preventing the deterioration of water ecosystems is one of the most cost-effective investments in our environment, our health and our economy.



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10. TEAMWORK

Teamwork Across Sectors Finds Common Ground to Save Our Waterbodies

Of all the environmental pressures we face, water is particularly universal. It crosses borders and cultures and affects economics, energy, transportation, and agriculture. To face these integrated challenges, we need integrated solutions to match.

Meeting the Challenge

Most of us don't think much about the water we use on a daily basis; we turn it on, make a cup of coffee or tea, and turn it off. But the water that flows into the kitchen sink when we wash our breakfast dishes is just a small part of the water's journey. It flows away, through the sewers to water treatment plants, and, once clean, back out into the river to a hydropower plant supplying electricity for a small town, into a farmer's irrigation channel along the riverbanks and into streams that feed larger waterways where a cargo ship is bringing goods to another country. Just like a river flowing from country to country regardless of borders, water touches every aspect of life, through all types of industries with overlapping needs and sometimes conflicting interests. Meeting this challenge means working together to find solutions that balance what we need from water with our responsibility to preserve it.

Where Things Stand

One of the many interconnected issues facing the waterbodies of the Danube River Basin is hydropower which, although it is a crucial tool for reducing greenhouse gas, hydropower plants also have an impact on aquatic ecosystems. For this reason, Danube countries are equally committed to sustainable hydropower use minimizing impacts on aquatic ecology.

Although **inland navigation** is more environmentally sustainable than road transportation, it can also have a negative impact on river ecosystems. The challenge here is to find new ways to use waterbodies for transportation and shipping while still preserving the environment.



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Agriculture is a major source of income for many people living in the Danube River Basin, but it is also a major source of pollution from fertilizers and pesticides. As agriculture continues to modernize throughout the EU, advanced agricultural management will need to spread throughout the region as well, or the Danube and the Black Sea will be at even greater risk for pollution.



© BMLFUW

Water scarcity and droughts can affect many aspects of life, including the economy and the environment, and there's a growing imbalance between water needs and supply in Europe. Over the past ten years, droughts have repeatedly affected a large part of the Danube River Basin, and the combination of rain shortages and high temperatures has resulted in higher water demand for plants.

Despite many international climate protection actions, enhanced adaptation to climate change is urgently needed. Temperatures are expected to increase across the Danube River Basin during this century, with the highest temperature increases occurring in the southeast. Since water is an issue that cuts across different sectors, it is the key to adapting to the pressures of climate change.

Lastly, **floods are a natural pressure** on all river systems, but they can have disastrous consequences for the people living there, especially when the threat of floods and their impact is made worse by human activity. Climate change is expected to increase the magnitude and frequency of floods and the coming decades are likely to see a higher risk of flooding in Europe, with greater economic damage. While flooding cannot be prevented, it is possible to reduce its impact by returning rivers to a more natural state, which is where the conflicting concerns of flood risk management and river basin management meet.



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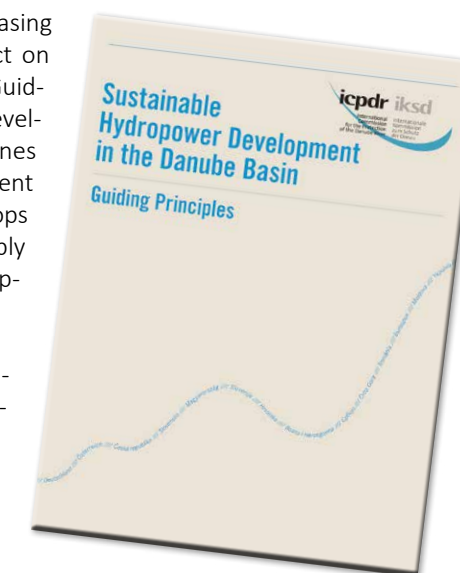
© Csaba Gont EKOVIZIG

Success Stories

Collaborating on solutions to these interconnected challenges is essential, since each stakeholder has a unique focus on their area of concern. The ICPDR is leading several joint efforts to balance the overlapping needs of the river throughout the region and integrate these issues at all levels, from the international stage down to individual projects.

To address the conflicting concerns of increasing renewable energy while minimizing its impact on the environment, the ICPDR has developed "Guiding Principles on Sustainable Hydropower Development in the Danube Basin." These guidelines ensure the balanced and integrated development and sustainable use of hydropower. Workshops are organized to support stakeholders to apply the guidelines and learn about new developments.

Recognizing the potential conflict between inland navigation and the environment, a discussion process among various stakeholders led to the "Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube River



Basin." It demonstrates ways to practice environmentally sustainable inland navigation, and regular "Joint Statement Meetings" are held every year to exchange best practices and focus on new developments.

Another discussion process is being held in the agricultural sector with the aim of developing a similar guidance document on sustainable, profitable farming practices that also protect waterbodies from nutrient pollution. The Danube countries are encouraged to integrate methods into the document, which will carefully balance the economic, ecological, and social aspects of agriculture, thereby strengthening the profitability of farmers while preserving ecosystems.

To better understand the impact of drought and how to prevent it in the future, the "2015 Droughts in the Danube River Basin Report" was developed to summarize the main impacts of drought, with an overview of measures taken by the Danube countries. Based on the analysis and discussions, lessons and conclusions have been found for the entire Danube basin.

With climate change having such a large impact on waterbodies, the ICPDR updated its Climate Change Adaptation Strategy in 2018. The Strategy outlines climate change scenarios and how they might impact waterbodies. It also goes a step further by providing an overview of potential adaptation measures that can be adopted basin-wide, along with actions that are already underway at a national level throughout the Danube countries.

To help reduce the impact and frequency of floods, the programs outlined in the Danube River Basin Management Plan and the Danube Flood Risk Management Plan highlight the areas of coordination between the two plans. Restoring rivers, floodplains, and natural water retention measures are likely to have the biggest impact on both reducing floods and restoring the natural environment.

Looking Ahead

The ICPDR's activities for cooperating with different sectors with interests in the Danube region's waterbodies have already made great progress: guiding documents and workshops allowing for the exchange of experience – all pointing the way towards a water conservation strategy that provides solutions that are in everyone's interest. The future of sustainability in the Danube River Basin will see a strengthening of this partnership, with regular meetings, more analysis, and new innovations, all focused on preserving waterbodies for the next generations.

Danube countries highlight the cross-cutting character of water management and the need for integration of all relevant sectors including flood risk management, inland navigation, hydropower development, agriculture, and climate change adaptation.



11. GETTING EVERYONE INVOLVED

Public Participation is the Key to Saving the Danube River Basin

Doing the work is only the first part of the job. Involving the public in conferences, workshops, or field trips – as well as providing regular information through magazines and websites – is essential for sustainable water conservation. As a result of the ICPDR's work, public participation is increasing throughout the Danube River Basin, as those living in the region sign up to be a part of the solution.

Meeting the Challenge

More than 81 million people call the Danube River Basin their home, so restoring and preserving its waters simply cannot happen without everyone getting involved. The ICPDR's many experts are leading the way, but because everyday people make everyday choices about how to use, restore, and protect the environment, it's also up to them to make sure that water conservation policies work. An important goal of the ICPDR is to make sure people are well-informed, involved, and feel a sense of ownership and responsibility for the Danube and its waters.

With such a diverse and widespread audience, the ICPDR's Public Participation Expert Group's main task is to translate the ICDPR's work in a manageable and comprehensive way. This is accomplished by using a wide range of communication tools that reach the largest number of people with as wide an impact as possible. If you have celebrated Danube Day with your neighbours, sent your children on a field trip to the river, or flipped through a magazine article about cleaning up the waterways, then you've already seen public participation at work!

Where Things Stand

The three main objectives for public participation in efforts to restore the Danube are to:

- **inform**, meaning spreading the word about current work,
- **consult**, or asking for input from the people who will be most affected by these measures, and
- **involve**, which means making sure that people from all areas – ordinary people, businesses, etc. – have a say and are actively included in the decision-making process.

To achieve this, the ICDPR has established community outreach events, publications, educational resources, graphics, videos and partnerships to encourage involvement.

Success Stories

Released every four months, Danube Watch is the official magazine of the ICPDR. It reports on current issues affecting the Danube Basin, and the various creative ways these challenges are met. With dozens of issues online, it is an important channel for informing people through in-depth stories, art and photographs. Danube Watch can be found on the ICDPR website, which also includes news on the latest developments, brochures and reports.



© Danube Day/ belle & sass

Danube Day is the ICPDR's most widely known communication event, and is a unique celebration stretching across 14 countries on 29 June each year. The launch of Danube Day in 2004 marked a significant milestone in the development of awareness-raising activities, as it mobilizes not only stakeholders, but society in general. A popular offshoot of Danube Day is the Danube Art Master, a competition which invites schools to organize a field trip to the Danube – or one of its tributaries – and create works of art.

The ICPDR has made the sturgeon a flagship species for migratory fish conservation, and in 2016, the sturgeon was turned into a key visual to raise awareness of its role as part of the European natural and cultural heritage. This is just part of a wide array of communication measures on sturgeons. The key visual is also available as a GIF file and appears on the ICPDR webpage.



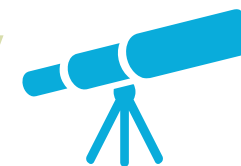
Another good example is Zagreb, Croatia where in 2015, over 80 people from a broad range of backgrounds including academia, the public sector, NGOs and business came together for the "Voice of the Danube" consultation workshop. All participants worked on draft plans for river basin management and flood protection measures regardless of their professional background, creating remarkably valuable input on two key elements of environmental protection for the region.

Looking Ahead

From day one, the ICPDR has been committed to involving as many people as possible in its decision-making, because this leads to greater public understanding, support, and ownership for the work being done to protect the previous resources we all share. Building on the successful projects already in place will continue to keep people informed, involved, and motivated far into the future.

Public participation is giving everyone in the Danube River Basin a chance to get on board!

12. LOOKING AHEAD



Building the Danube River Basin's Future

With so much progress underway in the region, it's important to take stock of what's next in the massive effort to restore the waterbodies of the Danube River Basin to good quality and conditions for habitats. Continuing the existing cooperation between countries, sectors, and everyday citizens is essential, and so is the expansion of successful projects that are already making a difference. Here's where we stand today and what we need to accomplish in coming years. This is where the International Commission for the Protection of the Danube River (ICPDR)

Organic Pollution

To achieve sustainable wastewater management in the Danube River Basin, some of the most important issues to overcome are securing financing infrastructure projects, setting tariffs, and ensuring affordability. In addition, the technological aspects of wastewater infrastructure and services need to be improved as well as the maintenance or rehabilitation of existing infrastructure. Improved wastewater management is already making a measurable impact, and further improving the technology, funding, and operation will make the effects that much greater across the region. At this rate, levels of organic pollution are set to decrease significantly in the years to come.

Nutrient Pollution

Combating pollution from nutrients will take a continued joint effort between farmers and scientific experts, passing on essential knowledge, improving practices, and upgrading treatment plants with more modern technology. In addition, further efforts are needed raise awareness of the link between agricultural practices and biodiversity, as well as to better align the goals of the water and agricultural sectors. In order to decouple nutrient pollution and water scarcity from agricultural development, targeted actions should be developed and agri-environmental measures should be made more attractive.

Hazardous Substance Pollution

Although the ICPDR's strategy to reduce pollution from hazardous substances is underway, additional investigations are needed to close knowledge gaps on the sources and pathways of hazardous substance emissions. With more information, the next steps will be to more comprehensively evaluate the measures taken so far and help the whole region implement the practices that work best. In addition, further work will be needed to build capacity to improve safety management at industrial facilities, especially in the mineral processing, energy, and chemical industries.

Hydromorphological Alterations

As the Danube countries work to address river continuity and habitat improvement, they face mainly financial and administrative challenges. Often, limited land availability and a shortage of know-how hinder the implementation of efficient solutions. While in some areas, long-lasting or unlimited permits impede changes in environmental requirements. It will take improved collaboration across interests and increased knowledge to help return the rivers to near-natural conditions in the future.

Groundwater

As research closes the data gaps needed to properly assess groundwater restoration progress, we have much to celebrate so far. However, the most critical obstacle to achieving good conditions for groundwater bodies is the overexploitation of water resources, and encouraging private and industrial consumers to use water more efficiently is essential. The focus should be on raising public awareness for

environmentally-friendly, economical, efficient, and safe water uses, as well as on strengthening the environmental consciousness of the public using social media, informational materials, and targeted guidance documents.

Monitoring

One of the main challenges to face in the coming years is the need to harmonize monitoring practices across the Danube countries to improve the available data. While monitoring and assessment of water status have improved since 2009, some gaps still exist. In particular, a significant gap exists in the analysis of priority substances. To ensure fully compliant monitoring, further improvement is needed in terms of method development, capacity building, and equipment enhancement. The remaining gaps must continue to be addressed and improved, and the next Joint Danube Survey will help identify specific problems to solve.

Sturgeon

Continued success in sturgeon conservation lies in raising awareness, support, and financial resources among stakeholders from different fields who can come together on creative solutions. It will take co-ordinated efforts to restore habitats and re-open migration routes – as well as combat overfishing – to give sturgeons a fighting chance of survival.

Financing

With gaps in financial coverage for water restoration projects still a pressing issue throughout the region, Danube countries are seeing a greater need for EU funding instruments with more simplified applications and requirements. Subsidy investments are still needed, however. A greater emphasis on financing measures from EU funds will help a great deal, as well as securing funding for non-EU Member States.

Integration

Future success depends on strengthening partnerships between different sectors with a vested interest in the Danube's waterbodies. More interaction, more analysis, and new technology will help in this regard. The Guiding Principles on Sustainable Hydropower Development in particular require participation from the hydropower sector, and new measures for navigation or flood protection need close cooperation with the sectors concerned. However, by exchanging experience with all stakeholders, we can work towards solutions that everyone can benefit from.

Participation

The ICPDR has always supported public participation in its decision making, and that's because success depends on it. Involving the public leads to broad public support for our policies and that effort will continue in coming years. From forming policy, to implementing measures, to evaluating impact, the ICPDR depends on stakeholders through all activities.

Even before the first Danube River Basin Management Plan in 2009, all Danube countries – both those who are obligated to fulfil EU legislation and those non-EU Member States who are not legally required to do so – committed their resources and ingenuity to solve a problem that can't be solved alone. Transnational waterbodies need lots of champions, and past successes show that today's challenges will be met with the same collaborative spirit. The goal of cleaner, healthier, and safer water for future generations is within reach as we all do our part.



International Commission
for the Protection
of the Danube River

Internationale Kommission
zum Schutz der Donau

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