

DANUBE WATCH

THE MAGAZINE FOR THE DANUBE RIVER · WWW.ICPDR.ORG 1/2018

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**GLETSCHERSTAND
GLACIERPOSITION
2010**

ICPDR **IKSD**

International Commission
for the Protection
of the Danube River

Internationale Kommission
zum Schutz der Donau

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Dear readers,

The global community has agreed on the Sustainable Development Goals (SDGs) as a framework for tackling the unprecedented challenges that we are facing today, including our changing climate. Climate change requires us to rethink our approach and to better plan, design and coordinate our actions. The scale of the challenges and the urgency of the threats we are currently facing dictate that strong collaborative efforts are essential if we are to respond to these problems effectively. Countries cannot deal with the consequences of climate change on their own.

Only joint efforts and coordinated planning can effectively prevent the unintended impacts of climate change between neighboring countries and avoid maladaptation. This spirit of cooperation, both across borders and sectors, has been a defining feature of UNECE's work for over seventy years, bringing countries and stakeholders together to find shared solutions to common problems.

Cooperation on water is a case in point. The Convention on the Protection and Use of Transboundary Watercourses and International Lakes (Water Convention), serviced by the UNECE, provides a practical framework for the sustainable management of shared water resources. The ICPDR has been putting these principles of coopera-

tion into action at basin level for 20 years now, providing a powerful illustration of the value and benefits of effective transboundary cooperation.

Due to be adopted in December 2018, the ICPDR's new Climate Adaptation Strategy is a clear demonstration of how such cooperation can help in the response to complex emerging challenges. I appreciate that the the nexus approach adopted by the revised strategy will prove to be successful in bringing all users of water resources from all sectors closer together in their efforts to find cross-sectoral solutions.

The ICPDR's revised Climate Change Adaptation Strategy places particular emphasis on building resilience through capacity building, transboundary cooperation, and benefit-sharing. In doing so, it is implementing in an exemplary manner the principles and approaches to climate change adaptation that the Water Convention has been promoting since 2006. I therefore hope that the revised strategy will inspire and drive action not only in the Danube River Basin, but also far beyond it.

I would like to reiterate the commitment of UNECE and the secretariat of the Water Convention to its continued successful cooperation with the ICPDR, promoting ICPDR experiences through the Convention's platform to motivate and spur action to increase resilience and sustainability in transboundary basins worldwide.

Olga Algayerova is Executive Secretary of the United Nations Economic Commission for Europe (UNECE)

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Danube Watch is the official magazine of ICPDR, the International Commission for the Protection of the Danube River. Danube Watch enhances regional cooperation and information sharing on sustainable water management and environmental protection in the Danube River Basin. It reports on current issues affecting the Danube Basin, and on action taken to deal with challenges in the river basin. Striving for scientific accuracy while remaining concise, clear and readable, it is produced for the wide range of people who are actively involved in the Danube River Basin and are working to improve its environment.

The ICPDR accepts no responsibility or liability whatsoever with regard to information or opinions of the authors of the articles in this issue.

News & Events

8th World Water Forum in Brazil: the ICPDR contributes to a number of stimulating forum discussions on the theme: “Sharing Water”

Tuesday 20 and 21 March saw the ICPDR take the opportunity to provide essential input during three different sessions at the 8th World Water Forum in Rio de Janeiro (Brazil). The theme of the forum “Sharing Water” stimulated in-depth discussions concerning sustainability processes and the United Nations Sustainable Development Goals (SDGs), along with additional water-related targets and the Paris Climate Agreement. The ICPDR was able to contribute to the debate by providing real-world examples of regional processes in the Danube River Basin and the Black Sea.

ICPDR 2018 President Helge Wendenburg chaired a session titled “European Ecosystems: Bridging Systems and Services,” in which he highlighted the ICPDR’s experiences across a broad spectrum of issues, including managing and restoring ecosystems for water services, biodiversity, water and land use, ensuring water quality from ridge to reef, along with natural and engineered hydrological systems in Europe.

A keynote address by 2017 ICPDR President Peter Gammeltoft was followed by commentaries from the ICPDR Heads of Delegation from Bulgaria (Ms Atanaska Nikolova) and Slovenia (Mr Mitja Bricelj). Ms Nikolova also spoke about the legal and institutional framework of the cooperation between the ICPDR and the Black Sea Commission. These talks helped to provide participants with a comprehensive overview of successful ICPDR case studies and contained key lessons, messages and recommendations for global dissemination.

ICPDR Executive Secretary Ivan Zavadsky illustrated other successful examples and case studies during an additional session. This session highlighted the dynamics and various regional experiences in transboundary cooperation, ranging from initial goal-setting activities to final results and successes.



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For more information, visit:
<http://www.worldwaterforum8.org>



Another session focused more closely on the economic development of hydrographic basins and the safety of hydrographic infrastructure. During this session, ICPDR President Wendenburg presented ICPDR activities, as well as its success in addressing flood risks, accident prevention control, and the Accident Emergency Warning System (AEWS).

The 8th World Water Forum provided the ICPDR representatives with a golden opportunity to present both perspectives and experiences of the Danube River Basin as an inspiration for other regions to successfully achieve their aims.

Vienna: World Wetlands Day 2018 – Wetlands for a Sustainable Urban Future



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For more information, visit:

<http://www.icpdr.org/main/ICPDR-worldwetlands-day2018>

Established to raise awareness of the value of wetlands for humanity and the planet, World Wetlands Day has been held annually on 2 February since 1997. The theme of this year's WWD was the sustainable ecological function of wetlands in major cities and urban agglomerations.

Wetlands are a great deal more than just a source of natural beauty and a recreational destination for local communities. They also serve a wide variety of other important roles and functions that may not be obvious at first glance. For this reason, WWD 2018 highlighted the need for the effective conservation of urban wetlands to facilitate sustainable urbanization.

Wetlands play a vital role for cities and the whole community. They serve as a source of drinking water, with their vegetation filtering domestic and industrial waste and improving water quality. However, their most important role in urban areas is to act as crucial retention areas during flood events, thereby demonstrating just how essential they are to the safety and protection of the basin and its inhabitants.

The ICPDR has made considerable efforts to facilitate and enhance the protection, restoration and creation of new wetlands in the Danube River Basin. Like all of the ICPDR's core objectives, measures to be taken are based on the Danube River Protection Convention of 1994, which were reflected in the First Danube River Basin Management Plan (DRBMP) and further emphasized in its 2015 Update.

Germany takes over ICPDR Presidency for 2018 from the European Union

On 24 January 2018, an event at the House of the European Union celebrated Germany's accession to the annual Presidency of the ICPDR. During his speech, the incoming ICPDR President Helge Wendenburg set three main priorities for his term of office.

Mr Wendenburg's first objective is to finalize the updated ICPDR Climate Change Adaptation Strategy by the end of 2018. This strategy lays the foundation for a common, Danube Basin-wide understanding of the future impacts of climate change on water resources and the adaptation of suitable measures.

The second priority of the German Presidency is the continued implementation of the existing plans and preparation for the next phase of the EU Water Framework Directive (WFD) and Flood Directive (FD).

The third priority of Mr Wendenburg's tenure will be to strengthen the integrated approach of the ICPDR and the basin-wide exchange of knowledge and experiences. A series of workshops and bilateral capacity-building activities will take place to facilitate this, dealing with specific issues concerning the various challenges of implementing the WFD and the FD experienced by countries in the Danube Basin.

Mr Wendenburg concluded his inauguration speech by expressing his appreciation for the outgoing ICPDR Presidency and his predecessor Peter Gammeltoft for his excellent work as President in 2017.



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For more information, visit:

<http://www.icpdr.org/main/germany-presidency-2018>



Elisabeth Köstinger, the Austrian Federal Minister of Sustainability and Tourism (BMNT), also attended the handover ceremony and emphasized Austria's commitment to the ICPDR, stressing that international cooperation is essential because water related challenges do not stop at borders.

ICPDR convenes workshop to tackle transboundary climate change issues

Belgrade played host to the ICPDR Climate Change Adaptation Workshop on 27-28 March. The workshop was hosted by the Jaroslav Černi Institute for the Development of Water Resources and was attended by 80 participants from a wide variety of institutions based in the Danube countries, all of which were eager to offer their valuable input and advice.



The workshop focused on the update of the ICPDR's "Strategy on Adaptation to Climate Change" and its conclusions, which were finalised by the Ludwig Maximilian University (LMU) in February 2018. Lively discussions over the two days of the workshop drew the following conclusions:

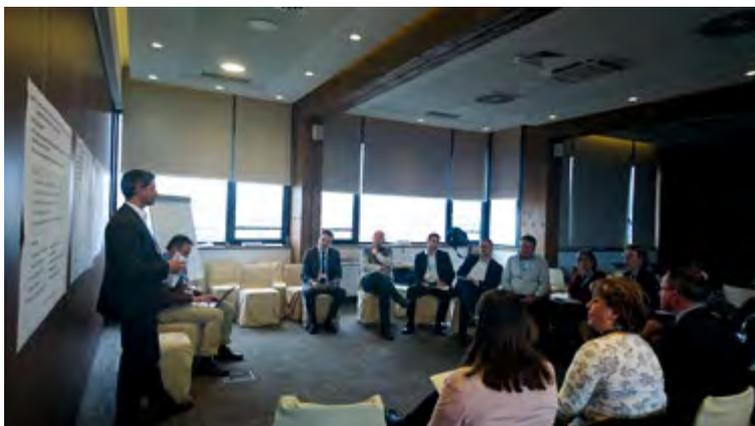
- ◆ most of the findings and predictions regarding climate change effects have become more certain. This applies in particular to seasonality in precipitation, runoff, droughts, floods, low flows, agriculture, forestry and ecosystems
- ◆ climate change in the Danube River Basin is affecting all regions and all aspects of life, with the differences in impacts between sub-catchment areas set to increase
- ◆ dry regions such as the Lower Danube River Basin are expected to become drier, whereas wet regions, such as the alpine areas, will get wetter, but with a high degree of variability within specific landscapes

- ◆ seasonality of precipitation will increase, with a strong decrease in summer precipitation especially in the south-eastern areas of the Danube River Basin
- ◆ weather and hydrological extremes (droughts, heat waves and floods) will increase with a higher degree of certainty

The workshop focused on the update and the broader implementation of the original strategy, while seeking to include and incorporate voices from all over the Danube River Basin by addressing experiences with weather extremes and impacts on different water-related sectors. The discussions that took place during the workshop were extremely fruitful and produced a number of recommendations and suggestions for the update of the Adaptation Strategy. The main take home message was the realization that groundwater is a precious resource in adapting to droughts, and that the supply of water and its quality are vital aspects of the Climate Change Adaptation Strategy for the Danube River Basin.

Participants:

the International Sava River Basin Commission, the Carpathian Convention, the Danube Commission, the ICPDR Secretariat, the European Commission, the Global Water Partnership in Central and Eastern Europe (GWP CEE), the United Nations Environment Programme (UNEP), the EU Strategy for the Danube Region (EUSDR) and the World Wildlife Fund for Nature (WWF)



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Sustaining the Danube Across Climate Frontiers

About a year ago while traveling in Asia, we met with a deputy energy minister to talk about water and climate adaptation issues. “Why have you come? We don’t really care about climate emissions in this country. We don’t really care about the environment.” We replied that we weren’t there to talk about those very issues. He was puzzled. We said, “You’re building a large coal-fired power plant. How do you plan to cool it?” “With water from a canal”, he replied.

“That water doesn’t actually come from a canal. It comes from a river. And that river is altering rapidly, because of climate impacts. Five years ago, you had a massive drought that affected more than 30 million farmers. When the next, worse drought comes and the farmers want their water, will you still be able to generate energy? Are you prepared to make some hard choices during a crisis? And do you know how to avoid a crisis?” He leaned back: “Now I know why you are here.”

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In the past decade, climate change has shifted from an environmental concern to a fundamental economic and development security issue. How do we ensure that assets and infrastructure will perform under novel climate conditions? Can our cities, farms, healthcare, environmental, and energy systems cope with extreme events? Do national and local plans for development make sense given the range of futures we may be facing? Are we prepared — or preparing — for the range of difficult choices that lie ahead?

Climate change is not equally relevant or important to all decisions and issues. However, as the energy minister came to understand, sometimes climate change is critical, or even severely critical. Sorting out when climate change is relevant, how it might be relevant, and how to respond are the decisions we must prepare for today as water professionals.

The Challenge of Water Resilience

AGWA (the Alliance for Global Water Adaptation) was founded in 2010 in Sweden by a small group of water professionals from governments, development banks, professional societies, think tanks, NGOs, and businesses.

It was co-chaired by an economist with the World Bank and a policy specialist from the Stockholm International Water Institute (SIWI) and led by a freshwater scientist. Our network includes almost 1200 water professionals worldwide. Collectively, we see evidence that shifts in the water cycle are already here, but climate science has little confidence to offer in terms of predictions about the speed, form, and intensity of future impacts when we need a strong quantitative framework, such as in engineering, economics, planning, and finance. We can also see that some types

of projects, especially infrastructure and ecosystems, are highly exposed to climate impacts. In both cases, long lifetimes and low tolerance for failure mean that climate change is usually a very important consideration — both for existing and new projects.

Should we respond by ignoring uncertain impacts, add a larger safety margin, average a mix of climate projections, or embrace the range of uncertainties for the future and prepare for a wider range of possibilities?

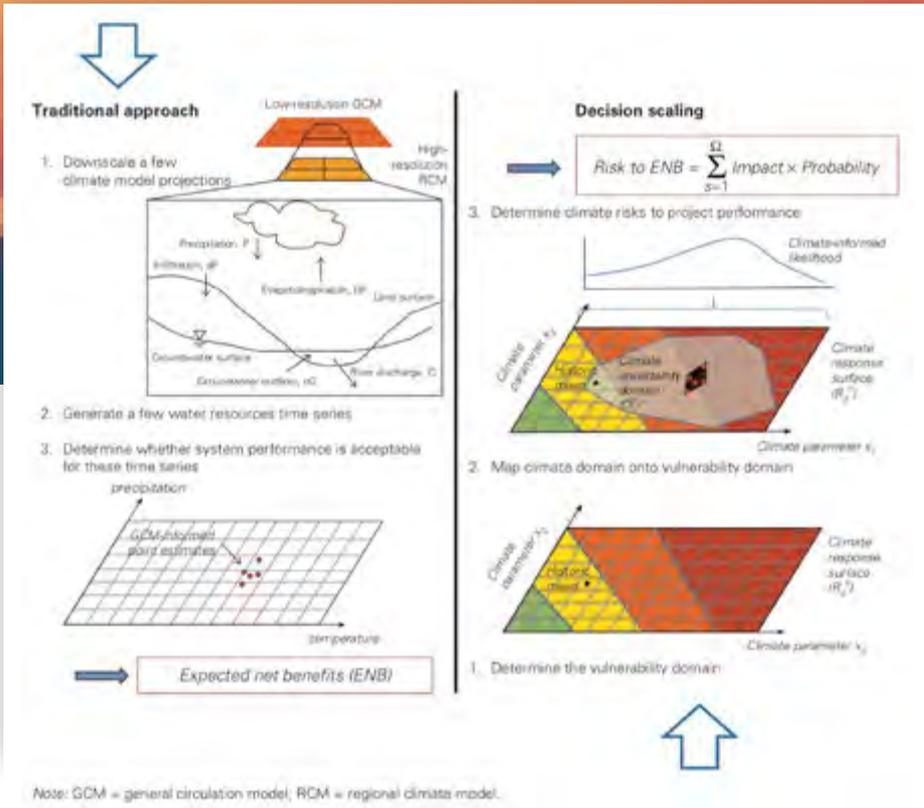
Flexibility as an adaptation strategy refers to maintaining options as conditions evolve and to prevent being trapped in a strategy that may be difficult to reverse

At AGWA, we see the state of the art in resilient water management shifting away from approaches that optimize a single cli-

mate future (sometimes called top-down exposed) towards methods that emphasize robustness and/or flexibility, which are more generally called bottom-up risk assessment.

Fostering Resilience from the Bottom Up

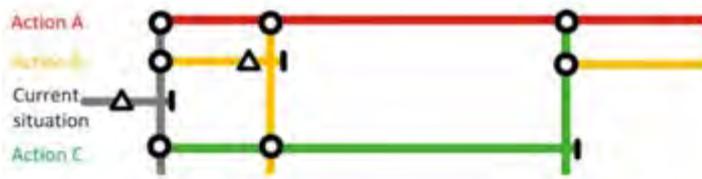
In general, bottom-up methods share the assumption that we should assess risk by looking at the inherent “breaking points” of the system or project in question. For agriculture, that breaking point may be a level of yield produced per hectare. For a utility, the number of households served without failure per unit of time. Performance below this point is considered unacceptable. A model is then generated that can test when climate-relevant conditions might violate that breaking point and how credible these conditions might be, such as a wetter or dryer future.



Decision scaling

Comparison of decision scaling with top-down approaches to assessing climate risk. Credit: Ray, Patrick A.; Brown, Casey M. 2015. *Confronting Climate Uncertainty in Water Resources Planning and Project Design: The Decision Tree Framework*. Washington, DC: World Bank. ©World Bank.

Adaptation pathways is essentially a formal methodology for implementing flexible solutions in the face of complexity and uncertainty. The figures shows a comparison of alternative decision making and action pathways (horizontal lines), with decision "tipping points" that act as triggering points in time to transfer stations between decision pathways; potential movement between pathways is shown through vertical lines. Tipping points reflect reaching a level of certainty that the chosen pathway needs to be re-considered, such as from changes in flood frequency. Some pathways such as Action B may not have function in all conditions, requiring a transfer between pathways. Credit: Marjolijn Haasnoot and Deltares



Robustness and flexibility define the two strategies for responding to credible climate futures. Robustness means planning for a broad spectrum of possible futures; not just a wetter or dryer future but, for instance, both a wetter and a dryer future. Beginning around 2009, a methodology called decision scaling was developed to implement robust solutions. Casey Brown at the University of Massachusetts, Amherst, has been instrumental in innovating and applying decision scaling to cities, utilities, transboundary water bodies, energy systems, and planning processes. With support from the World Bank, in 2015 he and Patrick Ray (University of Cincinnati) created a stepwise support system for applying decision scaling to a wide range of water projects for loan officers (Ray & Brown 2015).

A specific methodology called adaptation pathways developed by Marjolijn Haasnoot at Deltares in the Netherlands has

been widely applied to situations where complexity, cost, and uncertainty make selection of a single strategy challenging and risky.

As with decision scaling, adaptation pathways emphasize the need for clear performance indicators. Both approaches lend themselves to practical engagement with diverse stakeholders, including the identification of ecological variables such as fisheries, endangered species, or water quality as "virtual" stakeholders. A variety of new applications of these methodologies have recently been published, or will soon be available, including a UNESCO publication oriented towards water managers called Collaboration Risk Informed Decision Analysis (CRIDA), which offers decision support for hydropower and water utilities and the application of new resilience criteria for green and grey water infrastructure financed through the climate and green bonds market.

A Resilient Danube Basin?

Despite being new concepts, these methods are being explored regionally in the Dniester River by the UNECE, the US Army Corps of Engineers, and the governments of Ukraine and Moldova to target flood control.

These methods offer several opportunities to the Danube region: basin-scale risk and opportunity assessment, national scale sectoral prioritization, and application to individual water projects. Given the dense interconnections across political and institutional boundaries, the need for a shared and operational vision of resilience is essential for ensuring a sustainable Danube in the 21st century.

Read more:

<https://openknowledge.worldbank.org/handle/10986/22544>



Presidency 2018: Germany – Adaptation, implementation and integration



Germany has taken over the ICPDR Presidency for 2018 and taken up the challenge of strengthening the ICPDR's message on climate change adaptation, paving the way for the next generation of management plans and sustainable cross-sectoral cooperation and knowledge transfer.

Until recently, Helge Wendenburg was President of the International Commission for the Protection of the Elbe River. Now ICPDR President, he is relocating to the Danube River Basin with a clear mandate for the ICPDR.

“ Danube Watch: You were Elbe President until 2017. How does it feel to move

from the Elbe to the most international river basin in the world? What differences in approach do you envisage?

When the Agreement on the International Commission for the Protection of the Elbe River (ICPER) was signed on 8 October 1990 it was the first international treaty signed by Germany after its reunification. From the very beginning we have enjoyed close and trustful cooperation with the Czech Republic. More than 99% of the Elbe River Basin is located in Germany and the Czech Republic, with less than 1% in Austria and Poland. In the Elbe River Basin our work is therefore characterized by a focus on a mainly bilateral level with the upstream-downstream relationship between the two countries. The ICPER is therefore quite different from the ICPDR, which serves as a coordination platform between the 15 contracting parties. In addition, the fact that five countries in the Danube River Basin are Non-EU-Member States is very significant for the overall approach of the ICPDR. If you compare the situation today to the early days of the ICPDR when just Germany and Austria were EU-Member States, it becomes obvious how important the role of the ICPDR was – and still is – to the EU accession process with regard to water management. This particular role of the EU for the ICPDR was again underlined and confirmed by the EU Presidency last year and my predecessor Peter Gammeltoft.

Danube Watch: You have a reputation of being highly committed with a high level of expertise. How do you intend to utilize these attributes in your work with us?

To be honest, I can't really judge what people say about me. All I can say is that I feel very honoured to serve as the ICPDR President and that I hope to be able to support the ICPDR in moving things forward. Having started my career at the District Government of Brunswick, before moving on to the Ministry of Environment in Lower Saxony and then later to the Federal Ministry of the Environment, I've gained an insight into the practical implementation of water management at a local level, as well as into the needs and challenges of coordination at regional, national and international level. No matter at which level you

are working, if you want to achieve truly integrated water resource management, you need to involve all relevant stakeholders to find sustainable solutions. I see this as being one of the strengths of the ICPDR, with public participation and dialogue with stakeholders as key elements of its activities.

Danube Watch: One of your three main priorities is the promotion of the ICPDR's adaptation strategy to climate change. What actions do you foresee as necessary to achieve this? Could this help to stimulate discussion at a global level?

The historic Paris Agreement under the UN Framework Convention on Climate Change (UN FCCC) in 2015, along with the latest Conference of the Parties (COP 23) held in Bonn, underline the urgency of taking further steps towards both the reduction of greenhouse gas emissions and timely adaptation to climate change. When the ICPDR adopted its Strategy on Adaptation to Climate Change in 2012 it was one of the first river basin commissions worldwide to respond to climate change with its own adaptation strategy.

One cornerstone of the ICPDR Adaptation Strategy is its knowledge-base, which was created following a comprehensive study of the Danube, elaborated and now updated by Prof. Mauser and his team at the Ludwig-Maximilian-University (LMU) Munich. In March 2018 the ICPDR organized a Workshop on Adaptation to Climate Change in Belgrade. This workshop served as a platform to present and discuss the results of the updated study and, at the same time, marked the transition from study to strategy, allowing us to draw initial conclusions on the major issues for the updated strategy.

Our aim is to finalize the updated ICPDR Adaptation Strategy by the end of 2018 with a focus on impacts and measures, which are of particular importance for the Danube River Basin and its sub-basins. I would like to mention, for example, the increasing number of flash floods and drought events in the Danube River Basin. The updated strategy will serve to provide us with important guidance when we update the Danube River Basin Management Plan (DRBM Plan) and the Danube Flood Risk Management Plan (DFRM Plan) in 2021.



Danube Watch: *Your second priority is the further implementation of the existing plans and preparation of their updates in 2021. What challenges do you expect to encounter? What are the opportunities?*

We have made considerable progress since the Water Framework Directive and the Flood Directive entered into force in 2000 and 2007 respectively. In general, the approaches and instruments are tried and tested now and we can see the first results. Nevertheless, the remaining challenges are huge. We know that we need the necessary human and financial resources for additional measures, but we also realize that we need more time; not only to plan and implement measures, but also to prove that these measures have a lasting effect.

Our aim is to generate understanding and support for our work, as well as for the needs of Integrated Water Resource Management.

Danube Watch: *You have made sustainable cross-sectoral cooperation and knowledge transfer – one of the underpinning pillars of the management plans – the third priority of your presidency. Are there any specific areas that you believe deserve more attention than others and what are they?*

The ICPDR has a long tradition in reaching out to other policy areas and integrating water management issues in these sectors. The “Joint Statement on Navigation and Environment”, the “Guiding Principles on Sustainable Hydropower” and the “Strategy on Adaptation to Climate Change” are successful ex-

amples of the ICPDR’s integrated approach. The ongoing work on a “Guidance Document for Sustainable Agriculture and Land Management”, the Sediment Project and the Floodplains Project, along with the preparatory work for a “Danube Hydrological Information System”, clearly show that we intend to take the next steps towards truly integrated water resource management.

By the end of 2018, we will have produced an Interim Report on the Implementation of the second DRBM Plan. This will summarize the progress made and highlight the remaining challenges. With this Interim Report, we intend to reach a broader public and further increase the visibility of the ICPDR by focusing on ten key messages.

I would also like to mention the “ICPDR Sturgeon Strategy”, which is a comprehensive overview document on sturgeon activities and the role of ICPDR. I would not say that one specific area deserves more attention than any other, but there is certainly a close interdependency between agriculture and water, thus making agriculture one of our most important partners.

In addition, I would like to continue and, wherever possible, strengthen the exchange of experiences between our countries. There will be a series of workshops, organized by our Expert and Task Groups, dedicated to these specific issues in the implementation of the Water Framework Directive and the Floods Directive which have already been identified as a problem for several of our countries. In my opinion, these workshops are another example of the spirit of solidarity which characterizes the ICPDR as the “Danube Family”. These workshops as well as ongoing bilateral capacity building activities will facilitate technical exchange and knowledge transfer, both of which are of particular value in a basin comprising of EU- and Non-EU-Member States. “

The ICPDR'S Climate Change Adaptation Strategy

It was at the Danube Ministerial Conference in 2010 that ministers concluded that the impacts of climate change were accelerating and set to pose a significant threat to the basin if ongoing measures to reduce greenhouse gas emissions were not complemented by climate adaptation measures. These conclusions resulted in the ICPDR being tasked with becoming one of the first major transboundary river basins worldwide to initiate the development of a climate adaptation strategy. Based on a subsequent scientific study on Climate Change in the Danube River Basin, the adaptation strategy was adopted in 2012.

History of the strategy

Germany was nominated as the Lead Country for this activity, with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety supporting a meta-study to provide the foundations for a common, basin-wide understanding of the future impacts of climate change on water resources.

According to forecasts, air temperature in the Danube Delta will increase by 1-1.5° C, leading to more frequent heatwaves and milder winters. Water temperature will rise by 2°C, dramatically affecting fish stocks because of algae growth and reduced oxygen levels in the water. The water level in the Black Sea will rise by up to 0.5m by 2050 and small rivers will have 5-25% less water, especially in the summer.

The study was carried out by Prof. Dr. Wolfram Mauser and his team at the Ludwig Maximilian University in Munich and involved the analysis of all available information on climate change and adaptation measures relevant to the Danube River Basin (DRB).

The results of the study formed the basis for the development of the Danube Climate Adaptation Strategy, along with a catalogue of suitable adaptation measures.

Expected Climate Change Impacts

The study established that impacts on water related sectors were being triggered by changes in temperature and precipitation. A number of factors are set to affect the basin in the years to come, with temperature changes year after year. Due to the differences in climate influencing factors among the basin's regions, including altitude, topography and proximity to the Black Sea, future trends foresee the highest temperature increases in the south-east regions of the DRB.

Annual precipitation is expected to change in many countries on both a seasonal and regional basis, resulting in an increase in rainfall in the north and a decrease in the south. Lower levels of precipitation in summer and higher levels in winter in most areas are to be expected in the future. Extreme events, such as flooding and widespread droughts will become commonplace, although there are no clear forecasts for changes in flood magnitude and frequency.

An increase in water temperature and increased changes in water quality are also to be expected, resulting in changes to ecosystems and the biodiversity of both aquatic and terrestrial flora and fauna. However, a number of positive effects have also been projected, including a reduction in the number of navigational closures caused by ice and longer vegetation periods.



The Alpine region has shown an increase in annual average temperature of +2°C since 1900, which is by far more than the average global increase. This makes growing of some grape varieties and high quality fruits (apricots and sweet cherries) now not only possible, but also profitable.

© Roswitha Stolz

Adaptation Measures

Possible adaptation measures for water management were identified by the study and include:

- ◆ intensified monitoring activities to assess climate change impacts; including the implementation of forecasting and warning systems and further research to close knowledge gaps
- ◆ ecosystem-based measures; including the implementation of a green infrastructure to connect bio-geographic regions and habitats, along with the protection and restoration of water-retention areas
- ◆ behavioral / managerial measures; including support for education, capacity-building, knowledge transfer and the promotion of water-saving activities
- ◆ technological measures, e.g. the improvement of infrastructure, such as efficient irrigation systems for agriculture and the construction and modification of dams and reservoirs to safeguard drinking water supplies
- ◆ policy approaches, e.g. the support of an institutional framework to coordinate flood risk management activities

Following the study, the ICPDR and its contracting parties began to implement the strategy's measures with the aim of making the strategy fully operational in time for the Update of the Danube River Basin Management Plan and the 1st Danube Flood Risk Management Plan in 2015.

2015- 2021

The strategy timetable ran to schedule and the most important tools for implementing climate change adaptation measures

were integrated into the original plans, and finalized and adopted in December 2015. Addressing the six-year water management period until 2021, the adaptation and upgrading of monitoring programmes is ongoing and current plans include water management measures, which have been approved by the ICPDR's Expert and Task Groups.

The current ICPDR Climate Change Adaptation Strategy highlights the need for the creation of an investigative monitoring programme. This strategy embraces the establishment of effective long-term monitoring facilities to identify climate change signals and the subsequent implementation of all necessary measures to ensure the success of the strategy. The Danube riparian countries have selected candidate sites for climate change impact monitoring and are currently utilizing data and evaluations.

Different parameters for monitoring have also been agreed within the framework of the Danube Transnational Monitoring Network (TNMN) to investigate climate change impacts on water and air temperature, discharge, water levels, pH and oxygen.

Political support for further work on climate change adaptation has also been secured. In February 2016, the Danube Declaration was adopted at a ministerial meeting organised by the ICPDR. An update of the ICPDR's scientific knowledge base and approaches to climate change adaptation is planned for later this year.

Leading the way for other river basins.

The ICPDR's climate change strategy now plays an integral role in both the current and future plans of all of riparian countries in the basin. Other neighboring river commissions have also been undertaking simi-

lar endeavors for a number of years now. These include the Rhine, Sava, Dniester, Neman and Meuse.

The Sava River Basin Commission (ISRBC) is a prime example of an authority making the issue a priority, having announced its latest proposals for adaptation to climate change in October 2017. Shared by six countries, the Sava is the Danube's third longest tributary and its largest tributary by discharge. A coherent strategy for climate change adaptation is therefore of the utmost importance for the region.

Comprehensive recent studies form the basis of the Sava strategy now being developed as part of a project supported by the French Ministry of Ecological and Inclusive Transition, the Office for Water (IOWater) and the United Nations Economic Commission for Europe (UNECE). The project aims to define pathways for the development of water related adaptation measures and linkages to other sectors including navigation, hydro-power, agriculture, tourism and environmental protection. The next logical step for the project will be to develop a full climate adaptation strategy for the basin based on acquired knowledge and experience.

The Sava approach is consistent with the provisions of the ICPDR'S Climate Change Adaptation Strategy for the Danube River. Such an approach and the transboundary cooperation and exchange of information it generates will help to ensure good quality, sustainable water resources for generations to come, not only for the DRB but also its neighbors.

Saving the Danube Sturgeon: the ICPDR Sturgeon Strategy

Sturgeons are a unique species of fish whose origins can be traced back over 200 million years. Having undergone considerably little morphological change during this vast expanse of time, they are a remarkable evolutionary success story: dinosaurs became extinct yet sturgeons continued to thrive. Despite their longevity, today sturgeons are considered to be one of the most endangered species in the world.



On the brink of extinction

According to the International Union for Conservation of Nature (IUCN) over 85% of sturgeon species are classified as being at risk of extinction, thereby making them more critically endangered than any other group of species. Threats to their survival are numerous, the most serious being over-exploitation and poaching (exacerbated by poor fishery management and insufficient legal enforcement of fishing bans) and blocked migration routes through dams. The loss or degradation of habitats, and pollution are also major problems that are cause for serious concern.

With their long reproductive cycles and extensive migratory patterns, sturgeons are extremely sensitive to environmental pressures, making them valuable indicators for healthy rivers. The ICPDR has long realised the importance of this unique fish and endorses sturgeons native to the Danube as a flagship species. This commitment was emphasized on the occasion of the Danube Ministerial Conference in February 2016 where the ICPDR adopted sturgeons as a flagship species and reiterated at the annual Ordinary Meeting in Vienna in December 2017 with the announcement of the adoption of the Sturgeon Strategy.

The objective of this initiative is to channel synergies into one coherent strategy that will strengthen efforts to ensure the survival and recovery of sturgeons in the Danube River Basin. The principal aims of the strategy are:

Key measures

Key measures for 'Sturgeon 2020' include the setting up of a pilot ex-situ facility for migratory species and in-situ monitoring of habitats and population behaviour along the Danube and its major tributaries. In addition, cooperation with contracting fish farms will facilitate the creation of an inventory of captive sturgeons. The establishment of national sturgeon conservation networks to foster the implementation of 'Sturgeon 2020' at national levels is also envisaged.

Specific measures

Measures to be undertaken by Danube countries by the year 2021 are intended to ensure both up and downstream migration of fish and other fauna. This includes ensuring the integrity and viability of migration routes, the existence of appropriate spawning grounds as well as appropriate ecology and water quality along migration routes and at spawning and nursery grounds.

The Danube River Basin Management Plans (DRBMP) developed under the EU Water Framework Directive (WFD) re-

- ♦ to raise awareness of the sturgeon's plight
- ♦ to promote existing and future projects, initiatives and EU Directives to enhance environmental conditions for the sturgeon,
- ♦ to develop specific solutions to the specific problems that the sturgeon is currently facing.

The strategy is part of an ongoing initiative to promote action to be taken both within and outside of the mandate of the ICPDR. Cooperation with experts and stakeholders throughout Europe is considered a priority for the success of the strategy. The Danube Sturgeon Task Force (DSTF) was developed by the ICPDR jointly with the EU Strategy for the Danube Region (EUSDR) in 2012 with exactly these objectives in mind, and has since been striving to achieve the objectives of the current strategy by promoting the implementation of the 'Sturgeon 2020' programme.

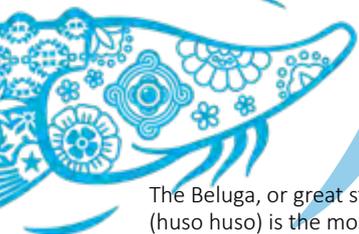
Based on the Sturgeon Action Plan adopted under the Bern Convention in 2005, the objectives of 'Sturgeon 2020' are not only to improve the plight of the beleaguered sturgeon, but also to contribute to and improve social stability of the Middle and Lower stretches of the Danube. This involves improving the economic situation of communities which had previously benefitted financially from sturgeon fishing activities.

quire the ongoing improvement of environmental conditions for all flora and fauna in the Danube region. The sturgeon has naturally benefitted from the EU legal framework and ICPDR policies but is currently facing two additional problems that threaten its very survival, both of which require specific measures to be taken:

1. Restoring migration routes

One of the largest engineering projects ever undertaken in Europe, the Iron Gate I and II hydroelectric dams clearly define the border between Romania and Serbia.

Danube STURGEON



The Beluga, or great sturgeon (*huso huso*) is the most famous member of the species, primarily due to the caviar trade. This impressive anadromous fish can grow to a length of seven meters and live up to 118 years of age.



© Benedikt Mandl



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Whilst ensuring safe and efficient navigation and an ample supply of reliable and sustainable energy for the region, this massive man-made structure today represents the biggest single obstacle to migrating fish in the Danube. Sturgeons are currently confined to the Lower Danube, the 850 km long stretch of the river between the Black Sea and the Iron Gates. The dams effectively block all access for migrating fish to the middle reaches of the Danube and the tributaries of the Drava, Sava and Tisza rivers, all of which are vital spawning and nursery grounds for migratory fish.

In order to address this issue, the ICPDR has facilitated the development of terms of reference for a feasibility study to analyze the options for enabling fish migration through the dams. Making the dams passable would recreate access to 800 km of the sturgeon's traditional habitat and spawning grounds in the Middle Danube, thus greatly increasing their current freshwater range and significantly enhancing the chances of population recovery. If the measures resulting from this feasibility study are successful, similar measures will also be applied to the Gabčíkovo Dam, downstream from Bratislava, thereby allowing access to migrating fish to the Upper Danube.

2. Fighting over-exploitation

Although most sturgeon caviar today comes from aquaculture facilities, caviar from systematic poaching is still managing to find its way onto the market. A 2013 WWF study determined that illegal fishing activities and the caviar trade was a severe threat to the future of Danube sturgeons. Jutta Jahrl, a conservation expert with the World Wildlife Fund for Nature (WWF) stated at the time that "Romania and Bulgaria are home to the only viable wild sturgeon populations left in the European Union, but unless the sophisticated illegal fishing is stopped, these fish are doomed!"

In order for the strategy to be successful, measures need to be taken that are clearly outside of the mandate and expertise of the ICPDR. The ICPDR will therefore continue to support the already established network of DSTF partners to focus on the sustainable protection of lower Danube sturgeons. These partners will continue their work to ensure that fishing communities are encouraged to develop alternative income sources in order to reduce their dependency on this formerly prestigious, but now illegal activity. Law enforcement agencies will also be supported in their efforts to build the capacity required to pursue their fight against poaching, smuggling and illegal trade.

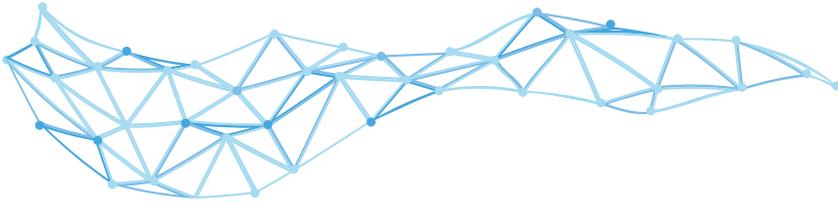
The final strand of the strategy is to promote public awareness of the plight of the sturgeon, using clear, simple everyday language. The annual Danube Day is a good example of how such a strategy can be implemented and will continue to play an important communication role with the slogan "Save our Danube Sturgeon".

A first follow-up step to promote the strategy and stimulate activities is the organization of a European Sturgeon Conference under the upcoming Austrian EU Presidency, which will take place in July 2018 in Vienna. The event will provide an opportunity to review the state-of-play and discuss all concrete actions necessary.

Similar efforts currently being undertaken throughout Europe are beginning to show the first signs of success, indicating that there is yet hope for the sturgeon. The ICPDR's Sturgeon Strategy can therefore only be good news for the long-term future of the Danube's most iconic species.

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DAREnet



Danube River Region Resilience Exchange network

A practitioner network to strengthen flood resilience in the Danube region

The Danube River Region Resilience Exchange network (DAREnet) is an EU H2020 project which began in September 2017 and is set to run until the end of August 2022. Its main objective is to support flood management practitioners across the EU Danube River region.



© DAREnet

Different stakeholders from a number of disciplines, including policy, industry and research, will be approached to deepen and broaden their collaboration in the fields of research, development and innovation (RDI) related to civil protection. DAREnet's prime objective is to build an international community of practitioners, operating in a network of civil protection organizations. Practitioners are already working together to identify and analyze relevant innovation gaps and then translate these gaps into a coherent joint innovation strategy that will improve flood resilience synergies in all riparian countries.

A key project objective is to form flood management practitioners networks in the region to advance flood resilience.

This can include flood management planning at basin level with harmonized risk assessment, the extension of the coverage of the European Flood Awareness System (EFAS) system to the whole Danube river basin, or the strengthening of operational cooperation and improvement of the interoperability of assets.

The project will seek to find solutions to enhance flood disaster mitigation at all levels of intervention. These include identifying key challenges and measures to be taken at both local and member state (MS) level with direct bi-/multi-lateral assistance between neighboring countries.

Another key objective for DAREnet is the creation of a regularly updated RDI Roadmap highlighting innovation oppor-

Participants include agencies ministries, universities and SMEs, all of which are active in the fields of civil protection, safety and crisis management. The total budget of the project is 3,500,000 Euro and is fully funded within the Horizon 2020 research and innovation programme under grant agreement No. 740750.

Six pillars

DAREnet has six pillars to support the mission's objectives:

- ◆ **Collaborative:** enabling innovation as a collective grass-root process steered by practitioners
- ◆ **Continuous:** encompassing all the countries of the Danube River Region
- ◆ **Inclusive:** enabling an equal dialogue between all kinds of practitioners
- ◆ **Open:** integrating input from external key-stakeholders from academia and industry, as well as other flood risk regions
- ◆ **Solidarity:** in the spirit of the Principle of Solidarity promoted by the ICPDR
- ◆ **Sustainable:** setting a framework for continuous, long-term collaboration long after the project ends

Project partners:

Federal Agency for Technical Relief Germany, ICPDR, Red Cross Austria, International Security and Emergency Management Institute Slovakia, Hungarian Civil Protection Society Hungary, National Protection and rescue Directorate Croatia, Sector for emergency Management, MOI Serbia, APELL National Center for Disaster Management Romania, Directorate General Fire Safety and Civil Protection, MOI Bulgaria, ITTI Poland, University of Belgrade Serbia, German Aerospace Center Germany, Stad Geel Belgium, ARTTIC France



Projects like DAREnet offer great opportunities to practitioners to not only network and exchange ideas, but also communicate their needs and directly contribute to future initiatives searching for better solutions. In this way, resilience towards floods can be improved in an efficient and sustainable way.

© BPOL



Left: © BPOL, right: © Ellen Krukenberg

tunities to cope with new flood management challenges linked to environmental and societal changes in the Danube River Basin. The Roadmap will be the result of the systematic assessment and prioritization of promising innovations, including standardization, to enable the development of common capabilities. The RDI Roadmap will also form the basis for concrete innovation initiatives, which are practitioner-driven and “bottom-up”, thereby building a unique portfolio of joint innovation concepts for the Danube River Basin.

In order to achieve a sustainable impact, DAREnet will draw upon synergies from the modules and facilities of the EU Civil Protection Mechanism (EUCPM) and the regional strategies for flood prevention and risk management of the ICPDR and the EU Strategy for the Danube Region

(EUSDR). DAREnet intends to promote the RDI Roadmap and Portfolio to political key-stakeholders at national, regional and European levels and will also develop institutional options to ensure the continuity of the DAREnet innovation process long after the project has come to an end.

The DAREnet consortium will form the backbone of a transnational, multi-disciplinary network. One organization from each MS involved in the project will act as a front-end partner (DAREnet National Contact; DNC) for its respective national network of practitioners, policy makers, researchers, academics and stakeholders from industry sectors. These DNCs will coordinate input and output in collaboration with the rest of the DAREnet consortium, to and from the correspondents in their respective national networks. Creating the

environment for a more articulated and coordinated uptake of innovative solutions among practitioners from different disciplines who already often find themselves working together to deal with major crises is seen as yet another of the project’s priorities. The creation of synergies with already established European, national and sub-national networks of practitioners is intended to provide a safer, more secure environment for the people living in the Danube River Basin.

Read more:
<http://dareneproject.eu/>

Christian J. Illing is the Project Coordinator of the DAREnet project. He is employed at the Staff Unit at the Headquarter of the German Federal Agency for Technical Relief.

The strategic relevance of the DriDanube project in the Danube region

Dried up bed of Selenec stream, 2012, Slovakia, © GWP CEE

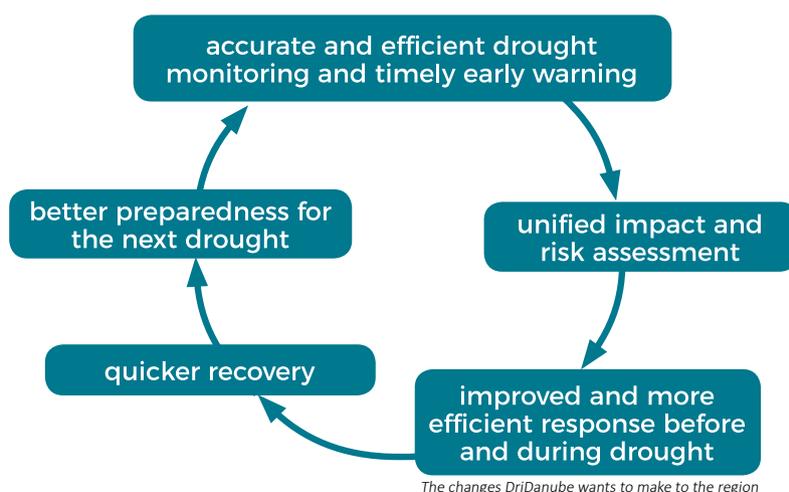
The DriDanube project – Drought Risk in the Danube Region – is the first drought-related project to be supported by the Danube Transnational Programme with the objective of bringing together 23 partners from ten countries for a period running from January 2017 until June 2019. It aims to increase the capacity of the Danube region to adapt to climatic variability by managing drought related risks. Its main objective is to support a shift in the Danube region from reactive drought measures, dealing mainly with losses and damage, to a more proactive strategy. The primary aim of the project is to engage the main stakeholders, raise awareness of drought issues and to develop and upgrade new

and currently existing approaches for better drought monitoring. Early warning, risk and impact assessment, reaching out

Drought management in the region is currently inadequate and operates in a purely reactive mode. Cooperation among key stakeholders is therefore sadly lacking with formal legislation scattered and mostly nonexistent. Drought response is poorly coordinated and there is no effective cooperation between the various sectors.

The DriDanube strategy aims to address these challenges by providing clear guidance for overcoming the gaps in the drought decision-making processes and encouraging broader

commitments to integrate drought management into existing legal frameworks. However, it can only work, if political support is ensured.



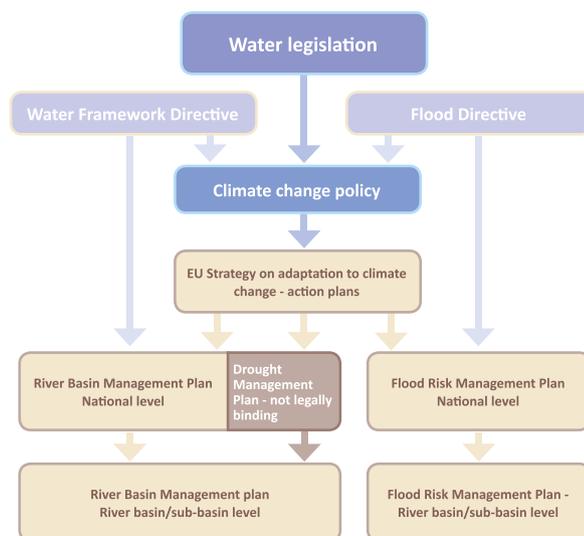
at policy level and making changes to the overall policy framework of drought management are also important components of the project.

Legal frameworks for drought management

Existing legal frameworks address the challenge of water scarcity and droughts (Water Framework Directive, EU 2007 Communication, Civil Protection Mechanism, etc.) but the majority of countries in the Danube region have yet to draft legislation specifically targeting drought issues.

The main policy instrument for drought management still remains the Water Framework Directive (WFD) and an “EU Drought Directive” doesn’t currently exist. Although the WFD does contain several provisions for dealing with the quantitative aspects of water scarcity and drought problems, legally binding requirements focusing specifically on solving drought issues are not included in the Directive.

Despite this fact, the WFD is still a flexible instrument, enabling the integration of drought issues within the context of integrated water management. In accordance with Article 4 of the WFD, the preventive and mitigating measures needed to reduce drought impacts can and should be included in river basin management plans (RBMPs). Furthermore, Article 13 (5) of the WFD strongly recommends that drought management plans also be included, but this is not obligatory. RBMPs are a natural environment for the implementation of drought management and a



Integrated water management – planning process in the context of the Water Framework Directive (source: Guidelines for preparation of the Drought Management Plans).

special guidance document has therefore been developed as part of the [Integrated Drought Management Programme in the CEE](#). The preparation of the [Drought Management Plan as part of the RBMP](#) includes climate change adaptation strategies for drought and water scarcity as an integral part of other measures.

For the majority of the Danube countries droughts are still not considered as SWMI (Significant Water Management Issues) in their River Basin Management Plans at national level. Following the last two significant droughts in the region, in 2015 and 2017, a number of countries have made significant progress towards a more systematic

and integrated approach towards drought management; a recent example of this can be seen in Slovakia, which presented a draft for its Drought Action Plan in October 2017.

Read more:
<http://www.interreg-danube.eu/news-and-events/project-news/1145>



Contribution to the ICPDR's mission

Following the serious drought events in the Danube region in 2015 and in 2017, the ICPDR made the decision to place greater emphasis on drought issues, and the "DRBM Plan – Update 2015" has a special chapter dedicated to water scarcity and droughts in the region. Even though water scarcity and drought was not considered a basin-wide issue at the time, the ICPDR Ministerial Declaration 2016 asked the ICPDR to maintain its activities on expanding the knowledge and facilitating the exchange of information on best practice examples and progress in research.

In 2015, the ICPDR published the "2015 Droughts in the Danube River Basin Report" which presents the main characteristics of the meteorological and hydrological

situation during 2015 and summarizes the main impacts on water-related sectors, including an overview of measures taken by the respective Danube countries. Analysis and discussions lessons learned and conclusions for the Danube basin and at national level are summarized in the final chapter of the Report.

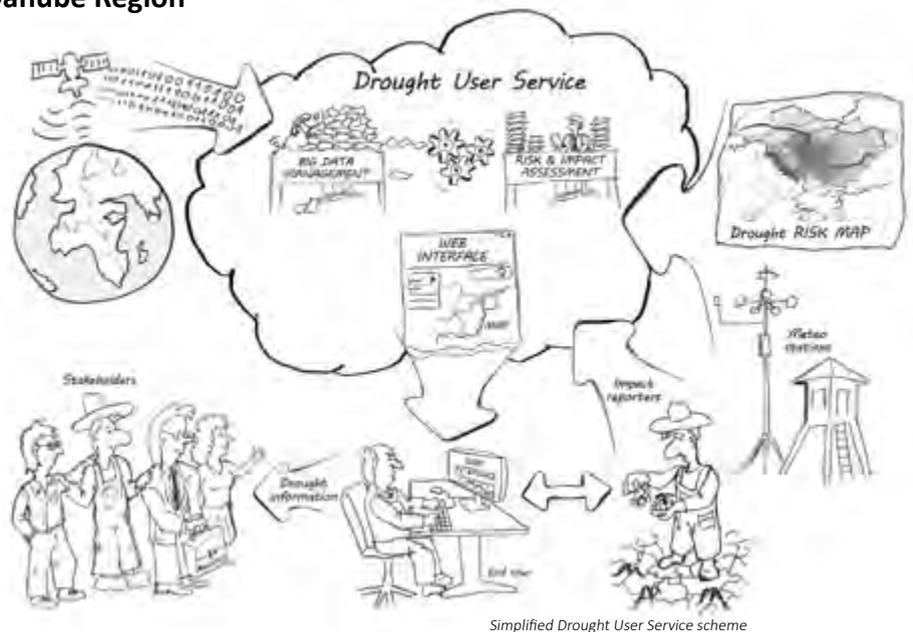
The ICPDR recognizes the importance of the outcomes of DriDanube for its own activities and has joined the project partnership as an Associated Strategic Partner. The ICPDR's involvement will enhance the exchange of knowledge and information with water management authorities and relevant stakeholders in the Danube region and will also increase technical capacities. It will help to elaborate more targeted wa-

ter management policies, taking into account water scarcity and drought phenomena. The results will be collated and used as inputs for further strengthened River Basin Management Plans – the 3rd DRBMP and the 2nd Danube Flood Risk Management Plan (DFRMP) – within the framework of the EU WFD and other relevant areas of water management policy.

In terms of activities on the Danube at a basin-wide level, it is foreseen that the issue of droughts and their impacts will play a significant role in the framework of the updated [ICPDR Strategy on Adaptation to Climate Change](#) planned for the end of 2018.

Contribution to EU Strategy for the Danube Region

The most important results of DriDanube are expected to be improved drought management and better cooperation among the different sectors impacted by droughts. Drought is no longer primarily associated solely with the loss or reduction of agricultural production. Today the occurrence of drought is also connected with significant impacts on energy, transportation, tourism, biodiversity and many other sectors, all of which are equally important for the whole Danube region. Climate change models predict an increase in temperatures, uneven distribution of rainfall and more extreme weather events. DriDanube will therefore contribute through closer cooperation among relevant institutions and sectors in the region, with strong political support, to ensure a better prepared and more resilient Danube Region.



For more information visit the project website:
www.interreg-danube.eu/dridanube



Sabina Bokal is Programme manager of the Integrated Drought Management Programme in CEE at the Global Water Partnership (GWP CEE)

Andreja Sušnik is representative for the DriDanube project Lead Partner at the Slovenian Environmental Agency



Ice management

Freezing weather conditions in the winter months have been a fact of life on the Danube since time immemorial, but the months of January and February 2017 saw many countries in the Danube Basin and its tributaries facing an especially bleak situation. Ice drifts appeared and aggregated into ice jams along the entire length of the Danube. Fortunately, contingency measures ensured that no casualties were reported during last year's event and damage and disruption were kept to a minimum. The event did however highlight the need for the basin-wide development of technical and human resources for sustainable and coordinated ice-management.

Critical situations caused by ice events can result in ice jams and even ice floods. Ice jams occur on rivers when floating ice accumulates at either a natural or man-made feature which impedes its progress downstream. Sometimes called ice dams, these jams can significantly reduce the river's flow and cause flooding due to the backwater effect. Ice management has therefore become an integral part of flood protection on the Danube. For this reason measures to tackle ice related problems were comprehensively developed and integrated into ICPDR Sub-Basin Level Flood Action Plans in 2009.

Basic features of river ice

The development of ice on rivers is a complex process influenced by air and water temperature. However, other disturbing factors also have an effect. These can include the concentration of chemical substances, groundwater inflow, velocity of the stream, geomorphological shape of the riverbed etc. Due to the limited range of tools available for monitoring ice-related data on the Danube and its tributaries, a streamlined classification system is used. This classification is based on the presence and status of ice movement on the river

surface and consist of just two categories: ice drift and ice cover. The classification of the different stages of ice formation is currently not uniform in the Danube River Basin, with different national coding systems in use throughout the region.

Ice drift: this expression is used to describe ice floating on the surface of a river in the form of ice sheets. An ice drift can be calm, moving slowly downstream until it gradually stops at a downstream obstacle, but it can also be turbulent,

colliding and tumbling with other ice sheets (flocs).

Ice cover: this term is used to describe any fixed ice formation on the river surface. It may be compacted ice of a uniform thickness which is normally found in relatively calm waters, stopped ice drift composed of uniformly distributed flocs and frazil, or piled up ice and ice barriers of considerable thickness, depending on the hydraulic conditions at the time the ice cover was formed.

Potential effects of the ice phenomena

Ice on rivers is a direct consequence of weather conditions, primarily sub-zero air temperatures, and the problems of dealing with ice events are confounded by the fact that cold weather spells are unpredictable, occurring at different times from year to year and with different durations and degrees of severity.

In late winter, as air temperatures begin to rise above freezing point, river ice begins to melt. It can disintegrate with little jamming or significant rise in water levels, but in many cases the ice may begin to move and form ice jams. Spring breakup jams are usually very destructive because of the large quantities of ice present. In addition to causing sudden flooding, the ice

itself may collide with structures and cause damage.

Ice drift and ice cover can also lead to navigational closures and damage to water regulation structures or bridges. The movement of floating ice can have an adverse impact on man-made structures, natural habitats on the riverbed, riverbanks and floodplains. Driftwood and floating debris accelerate the cumulative process of ice jams. If the movement of ice is obstructed, ice jams can occur, leading to elevated flood water levels.

Mitigation measures

Special equipment is needed to deal with river ice, especially with human resources

and performance capacity often limited during the winter months. Some examples of measures to avoid or mitigate ice jams on rivers are listed below:

Thermal shield: moveable parts on structures, such as sluice gates, are kept warm by means of an internal heating element which keeps its temperature above freezing point. Its effect is limited to securing the operability of the structure it protects.

Oscillation of the water level: it is possible to constantly lift-and-drop the water level in problematic areas in order to shred ice plates and avoid the formation of full surface ice coverage. The effect of this solution is however limited and difficult to con-



trol. Intensified ice plate movement can also endanger the operation and stability of the structure in question.

Intervention from the riverbank with machinery: excavators or long cranes can be used to fight ice formation on smaller streams, working from banks, bridge pavements or solid structures. This method involves an element of risk and the riverbanks are usually difficult to access, particularly in Protected Areas.

Blasting with explosives: in former times this was a standard technique for fragmenting large ice plates. The placement

of the explosive is carried out using divers or by precision throwing or dropping. This is very dangerous and special permission is required. Seismic effect and potential damage to the riverbed or surrounding structures also need to be taken into account.

Gunfire, bombardment: this is a method of last resort carried out by the army when the waterway is otherwise inaccessible. It carries the same risks as blasting and its effectiveness can be limited; if the section downstream of the jam is not ice free, the ice destroyed will remain in place.

Icebreaker ships: On larger rivers one of the most important tasks is to limit the size and movement of ice plates and at the same time ensure that the deep channel is kept open for navigation. Special icebreaker ships with reinforced hulls and other appropriate equipment are used for this purpose. Although icebreaker deployment is completely random and dependent on weather conditions, with their use often not being required for several winters at a time, costs for regular maintenance of these ships and their skilled crews still need to be covered on an annual basis.

Solutions

The ICPDR's first Flood Risk Management Plan in the Danube River Basin District (DFRMP) was endorsed by the Danube Ministers in 2016. The plan includes the project proposal 'DANube river basin ICE conveyance investigation and icy flood management' (DANICE). The principle objective of this plan is to create the 'Danube Basin Ice Management Plan', which will provide long-term ice-management measures for the Danube River Basin.

The project will enable the implementation of real-time monitoring and forecasting for ice formation and its conveyance in the basin. The project will also deliver a national and basin-wide operative resource management and mitigation plan for ice floods and other situations. Harmonization of ice management planning methods and recommendations for standardization throughout the basin are also an integral part of the proposal.

DANICE is the logical follow-up to the so-called 'DEVICE Danube' preparatory collaborative project between Hungary, Serbia and Slovakia, which was submitted to the Danube Transnational Programme (DTP) Seed Money Facility (SMF) 1st call in

December 2017. The primary objective of "DEVICE Danube" is to lay the groundwork and establish partnerships for DANICE.

The 'Danube River Basin Enhanced Flood Forecasting Cooperation' (DAREFFORT) project is another initiative and was submitted to the 2nd call of the Danube Transnational Programme in June 2017. It was selected for subsidy by the Monitoring Committee in May 2018 and kicked off on 1 June 2018. The project will deliver real-time monitoring and forecasting of national water levels and share ice-related information throughout the basin. The key objective of this project will be to further develop existing systems in a comprehensive and compatible way. The project's partners will collaborate to formulate policy recommendations to be submitted to the ICPDR in support of the development of the Danube Hydrological Information System (DanubeHIS).

The implementation of these two projects will result in the establishment of a flexible and sustainable system for data exchange. Their implementation will provide enhanced ice management in the Danube River Basin and ensure that river

authorities are able to cope with all types of extreme weather events, as and when they occur. Both projects have been made possible due to the active support of the EU Strategy for the Danube Region Priority Area 5 (EUSDR PA5) coordination team.

The ICPDR has also published an 'Ice Report', compiled by its Flood Protection Expert Group (FP EG) and the Public Participation Expert Group (PP EG). The report contains a comprehensive overview of ice features, past ice events on the Danube, lessons learnt and recommendations for the future. The objective of this document is to disseminate up to date information and stimulate an exchange of ideas and experiences to ensure that the river is able to cope with all types of extreme weather events as and when they occur in these times of global climate change.

■ **Marina Babic Mladenovic** is the Executive Director of the Jaroslav Cerni Water Institute in Belgrade. She is a member of the ICPDR Flood Protection Expert Group.

■ **Károly Gombás** works at the North-Transdanubian Water Directorate in Győr. He is the Chairperson of the ICPDR Flood Protection Expert Group.

Adapting to the challenges of climate change: a voice to be heard

Dr Roswitha Stolz has dedicated her academic career at the Department of Geography (Chair of Geography and Remote Sensing) at the Ludwig Maximilian University, Munich (LMU) to the pursuit of ensuring clean and sustainable water resources. She was an important member of the Regional Assessment of Global Change Impacts (GLOWA-Danube) project from 2001 until 2011 and has been involved since 2016 as a scientist in the ICPDR Climate Change Adaptation Strategy. We caught up with her recently to ask her about her work and aspirations.



“ **What is your personal relationship to the Danube River? When did you first become involved in safeguarding its future?**

I grew up in southern Bavaria on the Danube, which has always been seen as the region’s “border”. The first time I experienced the Danube was through rowing, when we went down the Danube from Passau to Vienna in a rowing boat. This was an outstanding experience, because in a small boat you get so much closer to the river than you can on land; not just to its beauty, but also to its problems and vulnerability.

I first got involved in the future of the Upper Danube River Basin during the GLOWA-Danube project. The project was launched by the German Ministry for Education and Research (BMBF) as part of the Global Change of the Water Cycle (GLOWA) initiative. GLOWA was the first time a project had been specifically aimed at systematically exploring integrative and transdisciplinary scientific approaches to identify decision alterations for regional adaptation to climate change. GLOWA Danube was just one of many projects, all dealing with different catchments in Africa, the Middle East and Europe.

GLOWA-Danube was the first project to pursue the ambitious goal of fully exploring the interactions between nature and society in the context of global change (climate, demography, economy etc.).

The ICPDR is making a great deal of effort in trying to bring the public on board regarding its work. How do you as a university scientist and senior lecturer see your role in bringing the river

and its well-being to your students? How successful are you in achieving this?

Hydrology is an important part of Physical Geography.

One of the major goals in teaching hydrology is to make the students understand that water is not just caring about administrative borders. In hydrology we have to think in terms of the catchment scale. In a catchment, a large number of parameters and factors interact to determine the hydrological cycle. At first glance, the formula for the water balance looks very simple, but as soon as students start to deal with quantifying the different terms, they also start to understand the complexity. I use the Danube (especially the upper Danube) as an example. It’s always helpful to deal with an area which is on your “doorstep”. The biggest success in familiarising the students with the Danube and its well-being are fieldtrips; a recent ten-day fieldtrip along the Bavarian and Austrian stretch of the Danube was especially successful in helping the students to understand the river and its systems.

You are heavily involved in the ICPDR Climate Change Adaptation Strategy, how do you feel about leading such a pioneering project?

For me it is a very inspiring task, but also a major challenge. Of course, it’s not only me working on this project. We are a team at the LMU and we work together very closely with the experts from the ICPDR. I also find it very challenging because this project is different from the research projects I have been involved in up to now. But that’s what makes it so exciting. The work is aimed at giving countries, regions, and even groups of citizens, support on how to adapt to the challenges of climate change.



PEOPLE
OF THE **DANUBE**

In the interview series "People of the Danube", Danube Watch presents personal portraits of individuals who are passionate about the Danube Basin and its waters.

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What do you foresee as the greatest challenges facing the Danube River Basin in the short, medium and long term?

Climate change is not simply a problem for the distant future. It is already taking place. The increasing frequency of extreme events, especially the strong seasonality of precipitation (wetter winters and dryer summers), will be a major challenge for the near future. In the long term, dealing with securing water availability, water quality and transboundary cooperation are just some of the new challenges the countries bordering the Danube will face. As mentioned before, water is not just about political or administrative boundaries. Dialogue and cooperation between riparian, upstream and downstream regions across borders are also crucial.

Maybe the concept of "benefit sharing" borrowed from the Nagoya-protocol (biological diversity) expresses this best. Water resources have to be allocated in a fair and equitable way.

What do you personally feel the ICPDR Climate Change Adaptation Strategy can achieve and how optimistic are you?

I am a born optimist. For me the ICPDR Strategy is an important instrument for supporting decision makers in the implementation of adaptation measures. But it is precisely there that I see a problem. The country experts in the ICPDR all agree on the necessity of the strategy, but it has to be set into political action. Maybe this is an uncertainty factor.

Returning to the previous questions: One of the challenges the strategy is facing is that it needs to be made so appealing and comprehensive that each country is able to make use of it. “



Foldout to learn more about temperature trends in the Danube River Basin.

Further information can be found in the Revision and Update of the Danube Study "Integrating and editing new scientific results in climate change research and resulting impacts on water availability to revise the existing adaptation strategies in the Danube River Basin"

[http://www.icpdr.org/flowpaper/app/services/view.php?doc=climate_change_adaptation_-_update_danube_study_final_report_20180607.pdf&format=pdf&page=\[page\]&subfolder=default/files/nodes/documents/](http://www.icpdr.org/flowpaper/app/services/view.php?doc=climate_change_adaptation_-_update_danube_study_final_report_20180607.pdf&format=pdf&page=[page]&subfolder=default/files/nodes/documents/)



Flood Hazard and Flooding Scenarios



LEGEND

Flood Hazard Areas (FHA)

FHA $\geq 100\text{km}^2$

FHA $< 100\text{km}^2$, on river stretches $\geq 50\text{km}$

FHA $< 100\text{km}^2$, on river stretches $< 50\text{km}$

■ No FHA data provided

■ Danube River Basin District

— Danube River

— Tributaries (with catchment area $> 4,000\text{ km}^2$)

■ Lake water bodies (with surface area $> 100\text{ km}^2$)

■ Transitional water bodies

■ Coastal water bodies

— Canals

— National borders

MEDIUM probability



LOW probability



Preliminary FHA data



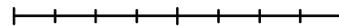
Cities:

● 100,000 - 250,000 inhabitants

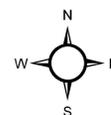
● 250,000 - 1,000,000 inhabitants

● $> 1,000,000$ inhabitants

0 50 100 200 km



Scale: 1 : 4,500,000



(Scale 1: 6,000,000 in A4 landscape paper format)

FHA data for the Danube floodplain in BA, RO and RS was taken from the Danube Floodrisk Project. FHA data for Velika Morava floodplain in RS was taken from the SOPPAS 1 project. FHA data for SI was provided for 11 out of 21 relevant flood hazard areas (based on watershed size and national importance criteria).

This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, ME, MD, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data and ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission was used.



project.

ata from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the mission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

www.icpdr.org

ICPDR IKSD

International Commission for the Protection of the Danube River
Internationale Kommission zum Schutz der Donau



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ICPDR Presidency Handover 2018

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