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### Research Cooperation in the Danube River Basin: The International Association for Danube Research (IAD)

#### Transboundary scientific investigations of the Danube by IAD

The International Association for Danube Research (IAD) was founded in 1956 by the Austrian hydrobiologist Reinhard Liepolt and colleagues under the umbrella of the Societas Internationalis Limnologiae (SIL).<sup>1</sup> Liepolt's goal was to promote transboundary exchange in applied and fundamental research in limnology and river management across the 'Iron Curtain'. Back in the 1950s, cooperation among researchers of the different Danube riparian states was essential to discuss, compare, and harmonise chemical and biological surveys. Increasing pollution was considered a major challenge of the future. Based on extensive field samplings and data collection during a joint Danube survey in 1960 and 1961, the monograph "Limnologie der Donau" (Limnology of the Danube) was published (Liepolt, 1967). This book is still a precious source of fundamental background information about the river, and much of it can be used nowadays for historical comparisons. It covers geology, hydrology, biology, and the economic role of the Danube River. Only recently, a comprehensive update of the river's chemistry,

<sup>1</sup> See: www.limnology.org



Figure 1: Participants of the Danube Excursion during the  $44^{\text{th}}$  IAD Conference in Krems, Austria, February 2023. The IAD logo on the top right was created in 1999 (© Katrin Teubner).

biology, culture, human impacts, and economy was published in the book "Rivers of Europe" (Sommerwerk et al., 2022). Here, ten major Danube tributaries, as well as the Danube Delta, were considered in detail.

Within a few years after its foundation, the IAD had successfully established itself as a lively network of scientists concerned by the ecological and limnological status of the Danube. Cooperation was facilitated by the organisational structure and various activities. In order to cover the wide array of limnological topics as efficiently as possible, expert groups were established. The initial groups focused on water chemistry and physics, (eco-)toxicology, microbiology and hygiene, different animal and plant groups, and also on radiology. The topics of the expert groups changed over time, reflecting major research trends in the field. The most recent new groups focus on environmental history, sustainable development, invasive alien species, floodplain ecology, and the delta.

Since 1956, the IAD has organised International Conferences to promote exchange between scientists working in the Danube Region. Up to now, 44 events have taken place in eleven Danube countries, including Moldova and Ukraine. The last conference was planned to be hosted in autumn 2022 in Kyiv, Ukraine. Due to the Russian attack, the Karl-Landsteiner Universität in Krems, Austria, arranged the event (Figure 1). Since 1999, the association has published its bi-annual journal Danube News. All these activities and current information can be gathered at the webpage www.danube-iad. eu. An extensive outline of the IAD's history and performance is presented in a special issue of Danube News 40 (Haidvogl and Cyffka, 2019).

Today, the IAD encompasses 14 member countries and 12 expert groups, emerging from the field of limnology and currently covering many fields of interdisciplinary river research.

#### A new IAD era at the turn of the century

The fundamental political and socio-economic changes in 1989/1990 also affected the IAD. The accession of numerous Danube countries to the European Union and the subsequent obligation to implement the EU nature and water legislation modified the focus of IAD activities. As a scientific association that has acted in the Danube Region for decades, the IAD has been able to provide active scientific input to regional and basin-wide water management authorities and policymakers, as well as administrations.

In the context of new environmental challenges emerging at the end of the 20<sup>th</sup> century, the scientific agenda of the IAD was adopted. While in the 1970s organic and nutrient pollution combined with eutrophication was the major issue, the hydrological and morphological processes and their changes due to human uses and related infrastructure became more and more important. For example, sediment transport, erosion, and accumulation as key elements of fluvial dynamics determine biotic habitat creation. River morphology and unimpaired ecological connectivity within the aquatic network, as well as with the surrounding terrestrial systems, are of crucial importance for aquatic organisms. Descriptions of aquatic systems were largely replaced by research focused on the functions and mechanisms of populations and their interrelation with abiotic parameters and human river uses. This necessitated intensifying inter- and transdisciplinary research.

Moreover, in river research in the 1990s, the catchment-based perspective became dominant and, together with other riverine concepts, provided the basis for river basin management applied nowadays in politics (Bloesch, 2005). This emphasised and initiated a paradigm change from sectorial and regional thinking to a holistic view of river systems. The International Commission for the Protection of the Danube River (ICPDR), founded in 1998 to implement the Convention on the Protection of the Danube River (signed in 1994), was established as the intergovernmental body coordinating the elaboration of such a basin-wide river management approach. The IAD was one of the first NGOs with observer status cooperating with the expert groups of ICPDR. After the adoption of the EU Water Framework Directive and the EU Floods Directive, the ICPDR became the coordination platform also for the implementation of these directives in the Danube River Basin District, cooperating with the riparian countries for the elaboration of the Danube River Basin Management Plan and the Danube Flood Risk Management Plan. Since 2001, regular expeditions along the whole Danube River and its main tributaries have been organised under ICPDR coordination every six years: The Joint Danube Survey (2007, 2013, 2019, 2025 in preparation), where IAD scientists contribute actively to field and laboratory analyses. Such joint investigations along the whole river course have the advantage of using harmonised methodologies, ensuring high data comparability and reliability. However, they also have their constraints, in particular by capturing snap-shot results that can hardly be extrapolated to all specific situations along the river system, and they are limited to seasonal/annual fluctuations and therefore reflect only a part of the high biodiversity comprised by the Danube River system.

According to the IAD, the rating of the Danube's ecological status and the most urgent river management challenges reflect the (mostly long-term) interactions between the environmental conditions of different river sections and human interventions over the centuries (see e.g. Schmid et al., 2023). In contrast to rivers of Western Europe, the Danube still mirrors the previous differing political ideologies of liberal-democratic and socialist or communist countries. Against this background, what Jürg Bloesch concluded in 1999 is still true: in the Upper Danube, mostly clean water flows through heavily modified channels, while in the Middle and Lower Danube, polluted water flows in more intact channels (Bloesch, 1999).

#### Politics meets science: the IAD acts as an intermediary

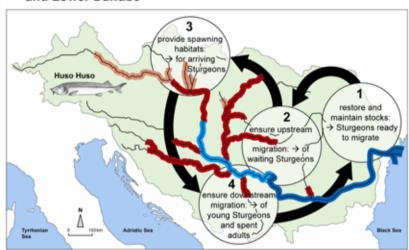
In 2011, a new political platform was created in the Danube area – the EU Strategy for the Danube Region (EUSDR) – which provides a comprehensive framework for the integration of sectorial policies. In the EUSDR, the IAD is closely working with the Priority Areas PA06 (Biodiversity) and PA04 (Water Quality), designing and implementing environmental projects in the Danube Region. Additionally, cooperation with other international NGOs, such as WWF and the Danube Environmental Forum, was intensified.

The last decade has brought new water issues to the scientific and political agenda of the IAD. The hydromorphological conditions are still a major concern, but again questions of water quality came to the fore. Now, pollution comes more and more from newly emerging and dangerous/toxic substances, such as heavy metals, pesticides, pharmaceuticals, endocrine disruptors, persistent organic pollutants, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, oil, plastic, and a combination thereof. Enhanced travelling and transport of goods fostered the spread of alien invasive species. The Danube is thus seen as the main gateway of alien species to Europe, which can threaten native species to extinction in the whole Danube River Basin (Trichkova et al., 2017). The distribution of macrophytes is well documented across the whole Danube River Basin and mirrors well various stressors of ecosystem degradation (Janauer et al., 2018). Global warming will not only affect the temperature of rivers, with a direct impact on the biota but also the hydrology.

Along with the expertise the IAD can provide for applied water management challenges, the association currently prioritises six general scientific topics: water quality monitoring and mapping, macrophyte research and inventories, sturgeon conservation (Figure 2), floodplain restoration, microbial ecology and the spread of invasive alien species. Also, the application of genetic methods came into use (e.g. for sturgeon identification, enzymatic biomarkers, and environmental DNA surveys as a tool to assess the ecological status of fish and other organisms).

The environmental impacts resulting from human uses, which intensified at an unprecedented pace after World War II, have also determined the practical activities of the IAD. For example, the association cooperated with the ICPDR expert groups for the elaboration of the reports "Sustainable Hydropower Development in the Danube Basin" and "Manual on Good Practices in Sustainable Waterway Planning (Platina)". The so-called project "ISPA 1", named after the European funds from the Instrument for Structural Policies for Pre-Accession (ISPA) and re-named finally to "Danube 1", was especially important because it interfered with sturgeon migration at the Bala Branch bifurcation in the Lower Danube. Sturgeons, one of the flagship species in the Danube River, are threatened and close to extinction (Sandu et al., 2013). In this respect, the IAD was amongst the founders of the Danube Sturgeon Task Force (DSTF), which became an indispensable partner of the ICPDR and one key task force of the EUSDR PA06. In addition, the project ISPA 2 (re-named "Fast Danube"), which aims to remove the bottlenecks for navigation in the Lower Danube, conflicts with protected Natura 2000 areas known as hotspots of biodiversity.

The researcher network of IAD also proved to be successful in initiating and often coordinating projects funded by EU programmes such as the Danube Transnational Program (DTP). Major recent examples are "Managing and restoring aquatic ecological corridors for migratory fish species in the Danube River Basin" (MEASURES), which aimed to create ecological corridors by identifying key habitats and initiating protection measures along the Danube and its main tributaries. In order to improve transnational water management and flood risk prevention while maximising the benAction Plan for the Conservation of Sturgeons (Acipenseridae) in the Danube River Basin



# Aim: to close the natural Sturgeon life-cycle → needs joint and simultaneous actions in the Upper, Middle and Lower Danube

Figure 2: The protection and improvement of the critically endangered Danube sturgeon populations have been an important research topic of the IAD for decades, uniting scientists from all Danube countries. The figure visualises the ecological connectivity that sturgeons as anadromous species migrating between the Black Sea and the Danube require for spawning. Only if the life cycle is closed can sturgeons establish self-sustaining populations with natural reproduction (© Jürg Bloesch; Bloesch 2009).

efits for biodiversity conservation, the project "Reducing the flood risk through floodplain restoration along the Danube River and tributaries" (DANUBE Floodplain) was initiated involving IAD members and expert groups. In the last funding phase of the DTP period 2014-2020, the project "Improving water quality in the Danube River and its tributaries by integrative floodplain management based on Ecosystem Services" (IDES) built on DANUBE Floodplain. IDES added water quality targets to floodplain restoration and suggested ways to improve water quality by developing integrative floodplain management based on Ecosystem Services. Another example of regional cross-state research in the Danube basin is the "Vogelwarte Madárvárta 2" project, which focused mainly on birds on Lake Neusiedl and Seewinkel. An overview of many of these mentioned projects is presented in DN45 (Cyffka and Haidvogl, 2022).

#### Addressing recent challenges and future cooperation in IAD

For centuries, navigation, hydropower use, flood protection, wastewater discharge, and land development with respective infrastructure have been major direct drivers in changing the Danube ecosystem. Currently, solving conflicts between human uses and their adverse effects on ecological conditions is the most pressing challenge. This needs efforts to preserve and restore the ecosystem whenever possible while securing human well-being. New scientific developments help conceptualise rivers as a socio-ecological system focusing on interactions, system development, and feedback processes (Hein et al., 2021). In that way, not only river networks as such have to be perceived as connected systems embedded in the landscape. They also connect people living along the rivers, and they are inextricably bound to their practices and cultures. Countries shape legal and administrative frameworks and often identities. However, rivers do not follow such societal constructions. They are rather driven by environmental structures and processes.

Public participation in environmental projects is based on the Aarhus Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, which was signed in 1998 and came into force in 2001. As with other conventions, the Aarhus Convention is only poorly implemented by politicians. Local stakeholders should be involved at a very early stage of a project, i.e., before the start of detailed planning. The IAD could help develop methods and procedures for such cooperation, e.g., by a new expert group on Sustainable Development and Public Participation. We plead to tackle the causes of problems rather than apply common end-of-pipe solutions.

In recent years, when the importance of specific landscape cultural aspects and traditions came to the fore, the IAD went public beyond elaborating on scientific core topics of environmental issues. Within the framework of EUSDR PA06, the IAD shaped the development of the Danube Landscape: Task Force (DL: TF). DL: TF comprises an international and interdisciplinary network of experts from all Danube and Black Sea regions to cover both the diversity of the region and the scientific complexity of cultural landscape research (Figure 3; Kutzenberger, 2022).

The IAD has aimed to raise public awareness of maintaining aquatic biodiversity in human society and started to devote more action to young generations through dedicated courses, such as master and doctoral programmes, but also to pupils of various ages. A sponsorship programme for young scientists was created aiming to enhance the participation of students and young researchers in the IAD's conferences and activities. Furthermore, the IAD has created material for education, such as the multilingual



Figure 3: Sharing experience between botanical gardens Linz and Novi Sad. Participants of the 3<sup>rd</sup> Danube Landscapes: Task Force Conference 2022, dedicated to the topic "Implementing the European Landscape Convention" (© Harald Kutzenberger).

translation of a children's book about sturgeon development in the Danube River (Sandu et al., 2020).

Keeping an ecological focus while admitting that ecosystems and humans are inextricably linked, the main long-term goals of the IAD are (1) conservation and rehabilitation of aquatic ecosystems (i.e., of the ecological function of the Danube), acknowledging that many human interventions have caused irreversible damage; (2) integral water protection and sustainable use of the Danube Region. In this respect, basic conceptual research and applied research are combined; (3) to raise further public awareness of keeping ecological integrity throughout the Danube River basin, connecting cultural landscapes and people living along the river; (4) to support young researchers and facilitate cooperation within the Danube River Basin.

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### Abstracts

Nadija Afanasieva, Sophia Beiter, Mykhailo Omelchenko

#### Back to Spring: Towards a New European Security Architecture

On 24 February 2022, Russia launched a full-scale invasion of Ukraine. What Putin's regime ignorantly believed to pull off as a 'small victorious war' turned out into the largest conflict Europe has seen since World War II in scale, intensity, number of casualties and destruction. In light of the planned counteroffensive of Ukraine, this paper aims to conceptualise a new post-war security architecture in the region. The authors identify economic and political tasks for Ukraine, the EU and the US to guarantee the long-term integrity of Ukraine and to contribute to regional and global stability. The basis for future scenarios is the analysis of the major policy shift regarding the West's attitude to dealing with the Russian aggression in Ukraine. An evolution from mere sanctioning policy against Russia to full-scale military support for Ukraine is observed and explained in-depth from hard and soft power approaches. Ukraine's military and leadership managed to reestablish a reliable and competent image of Ukraine through remarkable institutional resilience and victories on the battlefield. They also utilised a smart soft power strategy drawing on emotional and value attachments of Western elites and the public to sustain long-term support for Ukraine.

Gertrud Haidvogl, Jürg Bloesch, Bernd Cyffka, Thomas Hein, Cristina Sandu, Katrin Teubner

## Research Cooperation in the Danube River Basin: The International Association for Danube Research (IAD)

The International Association for Danube Research (IAD) was founded in 1956 to promote transboundary exchange in limnology and river management across the 'Iron Curtain'. This was a necessity to tackle environmental problems, focusing first on pollution. After the political and socio-economic changes in 1989/1990, the IAD concentrated gradually on hydromorphology. As a scientific association that has acted in the Danube Region for decades, IAD could provide scientific input to management authorities, policymakers, and administrations. IAD scientists have contributed to activities of the International Commission for the Protection of the Danube River (ICPDR) and the EU Strategy for the Danube Region (EUSDR), and they were involved in or led transnational projects funded by EU programmes.

Scientific progress in lake and river ecology has shaped the IAD's targets and scientific agenda. Keeping an ecological focus while admitting that ecosystems and humans are inextricably linked determines the future long-term goals of the IAD: conservation and rehabilitation of aquatic ecosystems; integral water protection, and sustainability; raising public awareness; and facilitating cooperation within the Danube River Basin, especially among young researchers.

Ulrich Schneckener, Sebastian Schäffer

## Russia's War and Europe's Changing Security Order: Time for a "Greater European Council"?

After the destruction of the European security architecture by the unprovoked and unjustified full-scale invasion of Ukraine by the Russian Federation, a new format of cooperation in Europe is needed. While reflecting on different proposals made over the past year and the concept of a European Political Community (EPC) introduced by French President Emmanuel Macron, we explore the concept of a Greater European Council (GEC) as a new way forward. Especially with the historic decision to grant candidate status to Ukraine and Moldova, we believe that the institutions in Brussels need to change their policies and routine procedures. The EU's decision to pursue a Wider Europe approach with the EPC can only be seen as the first step in providing the necessary answers to the changing geopolitical and security environment. With this article, we want to contribute to the question of how to build and institutionalise stronger ties between EU and non-EU states and also shed light on the enlargement issue.

#### Teresa Stummer

### The Working Community of the Danube Regions: A Long History of Interregional Dialogue and Overcoming Dividing Lines with the Hope of a Peaceful Europe

The Working Community of the Danube Regions was founded over 30 years ago in Lower Austria. Since its foundation, the members of the working group have been pursuing a common vision for the Danube Region and the prosperity of its inhabitants. The following article will provide an overview of the development of the cooperation, from the first steps to the current problems the Working Community is working on. It also focuses on the challenges that arise when working together in cooperation with many different stakeholders from a very diverse group. The aim is to build up interregional friendships on which to rely in times of crisis and to contribute to problem-solving as bridge builders.

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