



## INTERNATIONAL ASSOCIATION FOR DANUBE RESEARCH

### Scientific Report 2020

In 2020 the IAD activity was focused on aquatic research studies in the Danube River Basin and on strengthening dialogue with stakeholders and decision makers to promote nature conservation. However, the covid pandemic slowed down part of the activities due to physical distancing, lockdown and limited travel possibilities (both at national and international level): in some cases, project implementation was delayed, field trips were postponed, workshops, conferences and teaching activities were moved online. The IAD conference, originally planned for June 2020, has been postponed and will be held in virtual format in June 2021. The IAD homepage was updated and contains all relevant information - [www.danube-iad.eu](http://www.danube-iad.eu)

#### Science – Policy interactions

The interaction with national authorities, the International Commission for the Protection of the Danube Region (ICPDR) and the EU Strategy for the Danube Region (EUSDR) continued also in 2020. Scientific input was provided to several ICPDR Expert Groups and topics: River Basin Management, Pressures and Measures, Monitoring and Assessment, Hydromorphology, Microbiology, Invasive Alien Species (IAS) and Sturgeon conservation. The sediment balance alteration became a sub-topic of Hydromorphological alterations - a Significant Water Management Issue in the Danube Basin. The cooperation with ICPDR took place also in the frame of the feasibility study to re-establish fish passage at Iron Gates (We Pass) and the project aiming to establish ecological corridors for migratory fish species along the Danube River and its main tributaries (MEASURES). After the successful participation to the sampling campaign during the Joint Danube Survey 2019 (JDS 4), the activity of IAD experts concerning the investigation of aquatic communities, microbiology, eDNA sampling of fish, invasive alien species, microplastics content in the guts of two fish species continued also in 2020 with sample analysis, data interpretation, publications and report preparation. In Croatia and Slovakia, IAD members actively support the national authorities for the implementation of the EU Water Framework Directive.

In the frame of the EU Strategy for the Danube Region, IAD contributes mostly via the Danube Sturgeon Task Force (DSTF) and the Danube network for Invasive Alien Species (DIAS), the activities being carried out through 4 EUSDR flagship projects: Sturgeon 2020 (EUSDR PA 6), Danube: Future (EUSDR PA 7), DREAM (EUSDR PA 7), DANUBIUS RI (EUSDR PA 7). Since 2020, a new Task Force was initiated by IAD in the frame of EUSDR PA 6 Biodiversity - Danube:Landscapes. Furthermore, IAD members attracted several projects funded by the Danube Transnational Program (MEASURES, Danube Sediment, Danube Floodplains, IDES), fostering the implementation of the EUSDR Action Plan.

For the Danube sturgeons, IAD supported the organization of a high level meeting at the European Parliament, to attract further political support for their conservation, especially in the Black Sea, where, despite the ban on sturgeon fishery, they are victims of fishery by-catch and illegal traffic. Establishment of marine sanctuaries was proposed as a key tool to revive the fish/sturgeon populations in the Black Sea.

The connection with UNESCO International Hydrological Program (governmental organization) was strengthened in 2020, IAD members participating to several virtual meetings to exchange knowledge and present aquatic ecology topics.

#### Project implementation

Projects are an important tool for the implementation of EU environmental policies and nature conservation actions in the Danube Basin. The IAD experts are actively involved in research projects contributing to fill in knowledge gaps in several fields, such as ecological richness of macrophytes in floodplain water bodies, competition between macrophytes groups in lentic waters, microplastics contamination, reasons for not

achieving good ecological status by some waterbodies, climate change impact on aquatic communities, impact of land use and flood management on river ecosystem services, investigation of faecal pollution and antimicrobial resistance along the Danube River, sediment management, floodplain restoration, survey of invasive alien species, etc. In Hungary, a novel concept for land use design and conservation planning of large floodplain rivers was tested, with the aim to develop effective spatial prioritization tools to maintain the multifunctionality of these threatened ecosystems. A historical comparison of macrophyte development in the Neusiedler See between 1998 – 2020 was launched.

IAD members contribute also to the implementation of two European research infrastructure projects (ESFRI): (1) the development of the eLTER (“Long-Term Ecological Research”) and (2) the development of “Upper Danube Super Site” in “DANUBIUS” RI. As part of the CEEPUS-Network EcoManAqua, the cooperation with the University of Ljubljana was strengthened. In addition, University of Zagreb became a member of this network. The Interdisciplinary Danube: Future Summer School dedicated to sustainable development in the Danube Region, planned to be held in 2020 in Romania, had to be postponed due to covid lockdown.

The most important projects carried out in 2020 with significant contribution of IAD experts are presented in Annex 1.

### **Editorial activities and publications**

Dissemination of scientific information to experts, policy stakeholders and the wide public is another important part of IAD activity.

The IAD Bulletin, Danube News, with two issues published every year, is a key communication tool of the scientific information towards the wide public. The issues published in 2020 (DN 41 and DN 42) are available for download on the IAD website.

Two major books were published in 2020: “Human Impact on Danube Watershed Biodiversity in the XXI Century” in Springer Nature (<https://www.springer.com/gp/book/9783030372415>) and a special compilation of Acta Zoologica Bulgarica dedicated to Invasive Alien Species (<http://acta-zoologica-bulgarica.eu/december-2020/>).

The involvement of IAD members in the editorial boards of international projects, peer-reviewed journals and magazines, such as UNESCO Global Water Pathogens Project (GWPP), Water Science and Technology: Water Supply, Auen Magazine (Floodplain Magazine), etc. continued also in 2020.

Numerous scientific articles emerging from the research activities carried out in the Danube Basin were published also this year. A selection of the most relevant titles (books and book chapters, scientific articles and reports) is available in Annex 2 and on the IAD website, with links included for download.

### **Other activities**

In 2020, IAD members participated to several scientific forums and conferences to exchange knowledge and disseminate project results to stakeholders. A detailed list is presented in Annex 3.

The IAD members are involved also in **education activities**, such as coordination of PhD programs and master theses in the affiliated universities, environmental education activities and presentations on nature conservation topics during public events. A postgraduate training course for ecologists and landscape planners with a special focus on integrated environmental planning in municipalities was launched in 2020, training six young scientists with different backgrounds in environmental management, agro-ecology and landscape planning. Also, a master thesis on integrated environmental planning was developed in cooperation with Lednice University (CZ).

As part of the environmental education activity, an illustrated e-book depicting the adventures of a little sturgeon in the river and sea was elaborated for children of 8-13 years old and translated in 9 Danube languages. The book is available for free download on the IAD website (educational issues).

## Projects

- Adequate management of invasive species in Romania, in accordance with EU Regulation 1143/2014 on the prevention and management of the introduction and spread of invasive alien species
- Assessment of the contribution of ships to the general microbial faecal pollution levels in the Danube River
- Climate-induced restructuring of the hydrobionts communities and their impact on ecological state and biological productivity of the transboundary with EC rivers of Ukraine
- Climatically promoted homogenization of aquatic invertebrates tested on three model lotic systems and historical data
- Conservation of freshwater mussels: a pan-European approach (CONFREMU)
- COST Action – The European Aquatic Animal Tracking Network
- Danube Sediment Management - Restoration of the Sediment Balance in the Danube River
- Demining, restoration and protection of forest and forestland in protected and Natura 2000 sites in Danube-Drava regions (NATURAVITA)
- Developing concepts for cross-project comparisons of river restoration measures at the national scale and concepts for the mitigation of climate change impacts on the water cycle
- Development of a method for assessing the ecological potential of Heavily modified water bodies (HMWB) based on fish communities
- Development of a practicable procedure for a biocoenotic assessment of floodplains (BioAu)
- Drinking water: multidisciplinary assessment of secure supply from the source to the consumers
- Ecological plasticity of recently spreading Ponto-Caspian fish species in the Danube River Basin
- Effect of macrophytes on C-N-P-Si fluxes - an integrated model approach” (FLASHMOB)
- Establishment of the national monitoring system for invasive alien species in Croatia
- Facilitating fish migration and conservation at the Iron Gates (We Pass)
- Faecal pollution routes of antibiotic resistance along the whole Danube River
- Forecast and prevention of negative effects of climate change on the ecological status, potential and biodiversity of hydro ecosystems of Ukraine
- Freshwater fish monitoring in the Sarvaška bara, the Bjelobrdska bara and the Boros Drava;
- Functioning of vertebrate metacommunities in dynamic riverine landscapes: an innovative approach using eDNA metabarcoding (RIMECO)
- FUTURE DANUBE
- Habitat monitoring in the Sarvaška and the Bjelobrdska bara
- Identification, assessment, sharing and dissemination of best practices for the human management of invasive alien species (EU IAS Vertebrates)
- Improving water quality in the Danube River and its tributaries by integrative floodplain management based on ecosystem services (IDES)
- Increasing understanding of alien species through citizen science: Approaches to citizen science, data management and standards
- Interreg Agrinature Austria – Hungary
- Interreg City Nature Austria – Slovakia
- Invasive alien species: improvement of understanding and communication
- Investigating and developing restoration measures, e.g., by improving our understanding of the interplay between structure and function of restored river systems.
- LIFE City River
- LIFE Recovery of the Mediterranean trout (*Salmo macrostigma*) (NAT SALMO)
- Managing and restoring aquatic EcologicAl corridors for migratory fiSh species in the danUbe RivEr baSin (MEASURES)
- Masterplan for Preservation and Consolidation of Biodiversity along the Bavarian Danube
- Mechanisms of interaction of hydrobiocenoses and formation of biodiversity of transitional waters of the lower reaches of the Danube

- Migrating birds in the wetland Neusiedlersee (VOGELWARTE MADÁRVÁRTA 2).
- Monitoring of endangered flora and habitats in pilot areas the Biljski rit and the Zmajevački dunavac
- Monitoring of endangered flora and habitats in selected Natura2000 areas in Osijek-Baranja, Vukovar-Srijem, Brod-Posavina, Požega-Slavonia and Virovitica-Podravina counties
- Monitoring of endangered flora, aquatic and wetland habitats in Nature Park Kopački rit;
- Monitoring of fish fauna in pilot areas the Biljski rit and the Zmajevački dunavac.
- Monitoring of freshwater fisheries in 2020, Group A: Fishing area Drava-Danube.
- Monitoring of selected elements in surface waters II – Fish communities
- New environmental risks in the Danube and its drainage - assessment of their effect on some elements of aquatic biota and potential impact on recreational fisheries
- Periphytic microphytes on natural substrates - the diversity and interaction with planktonic communities
- Potential threats to environmental and economic sustainability in the Danube and Black Sea region: Danube River as invasive alien species corridor
- Preserving Sava River Basin Habitats through Transnational Management of Invasive Alien Species (Sava TIES)
- Protecting the environment and reducing the risk of adverse events and natural disasters - Working Programme I.7. Biodiversity, ecosystem functions and quality of living environment.
- Reducing the flood risk through floodplain restoration along the Danube River and tributaries (DanubeFloodplain)
- Securing biodiversity, functional integrity and ecosystem services in DRYing rivER networks (DRYVER)
- State and perspectives of citizen science for invasive alien species in Bulgaria
- Stream drying and biodiversity of running waters: the impact of natural conditions and anthropogenic alterations
- Study and assessment of ecological status of the Bulgarian sector of the Danube River in the frame of the Joint Danube Survey (JDS4) in 2019 (2020 phase - data analysis, reporting, publication)
- Support instrument for decision making in Persistent Organic Pollutants (POP) management. Case study: Mures Catchment Area
- Supporting a sustainable management of river systems, e.g., by contributing to solutions to reconcile conservation and exploitation of river systems.
- The structure of winter plankton and periphyton communities in the Danubian floodplain
- Use of novel Eurasian parasites to control North American dreissenid populations
- Validation of bioindication methods as tools for sustainable management of intermittent streams in Central European region, their transfer into the practice
- Wise water management for the conservation of alluvial forest habitats along River Drava

## Scientific publications

### Books

- Bănăduc D., Curtean-Bănăduc A., Pedrotti F., Cianfaglione K., Akeroyd J. (Eds). 2020. Human Impact on Danube Watershed Biodiversity in the XXI Century. Geobotany Studies (Basics, Methods and Case Studies). Springer, p. 327-358. DOI: 10.1007/978-3-030-37242-2\_16.
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### Book chapters

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### Scientific reports

- Trichkova T., Todorov M., Botev I., Kenderov M. & Hubenov Z. 2020. Study and assessment of ecological status of the Bulgarian sector of the Danube River in the frame of the Joint Danube Survey (JDS4) in 2019. Task: Invasive Alien Species. Report, IBER-BAS, Sofia, 31 p.
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### Children e-books

- Sandu, C., Vahtar, M., Miekisz, E. 2020. *The Adventures of Starry, the Brave Sturgeon*. Available in EN, DE, SI, SK, HU, HR, RS, RO, BG, UA. [https://www.danube-iad.eu/index.php?item=educational\\_issues](https://www.danube-iad.eu/index.php?item=educational_issues)

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### Scientific events/presentations

Using historical documents to investigate alien species. Increasing understanding of invasion dynamics through citizen science - COST Workshop, 17-19.02.2020, Prague, Czech Republic.

How can sturgeon conservation bring benefit to Black Sea fishery? Presentation European Parliament, PECH Committee meeting, 19.02.2020, Brussels, Belgium

Wasserlinien - die flüssigen Formen der Stadt. Vortragsreihe der Österreichischen Gesellschaft für Architektur, 4.09.2020, Vienna, Austria

NEOBIOTA 2020 – 11th International Conference on Biological Invasions: The Human Role in Biological Invasions – a case of Dr Jekyll and Mr Hyde? 15–18.09.2020, Vodice, Croatia, <http://www.neobiota2020.biol.pmf.hr/>

9<sup>th</sup> Symposium “Kopački Rit, Past, Present, Future 2020” Tikveš, Croatia, 25.09.2020 <https://pp-kopacki-rit.hr/wp-content/uploads/2020/09/Zbornik-Jucer-danas-sutra.pdf>

Public baths on the Danube in 19th century Vienna – Rivers, water engineering and urban design. Designing Hygiea, 1.10.2020, Vienna, Austria.

Gewässer als Ressource und Risiko – Die Transformation der Wasserstadt Wien in der frühen Neuzeit. Vortragsreihe des Instituts für die Erforschung der Frühen Neuzeit, Universität Wien, 14.10.2020, Vienna, Austria

State versus Peasants? The Forest Transition in Late Habsburg Austria. Natural Resource Exploitation in Late Habsburg Empire, 19-20.11.2020, Online Workshop

Wien und die Wiener Gewässer – eine historische Spurensuche. European Researchers' Night, 27.11.2020, Vienna, Austria

Georeferencing historical maps: Vienna's Danube landscape and Danube navigation maps. The Conference of European National Librarians, Webinar in the framework of the CENL Danube collections “The Danube. A Journey into the Past”, 10.12.2020, Online webinar