



INTERNATIONAL ASSOCIATION FOR DANUBE RESEARCH

Scientific Report 2022

In 2022, the IAD activity remained focused on limnological studies in the Danube River Basin, as well as on awareness raising, strengthening the dialogue with stakeholders and decision makers concerning the importance of aquatic biodiversity and nature conservation. The elaboration of a Danube book under IAD coordination, launched at the end of 2021, entitled “Danube River and Western Black Sea Coast: Complex Transboundary Management” was fostered during 2022. Moreover, as the scientific life gradually returned to normal after the covid crisis, the IAD members were involved in a high number of projects and authored numerous scientific reports and publications. Due to the war in Ukraine, the plans to organize the 44th IAD conference in September 2022 in Kiev were cancelled, the conference being hosted few months later, in February 2023, in Krems, Austria. More information is available on the IAD homepage – www.danube-iad.eu.

Science – Policy interactions

IAD scientific support for the 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 2022. At national level, IAD members contributed to the implementation of the EU environmental policies in several Danube countries. At international level, IAD experts provided input to several ICPDR Expert Groups and topics such as: River Basin Management, Pressures and Measures, Monitoring and Assessment, Hydromorphology, Microbiology, Invasive Alien Species (IAS) and Sturgeon conservation. After the publication of the Danube River Basin Management Plan, IAD, in cooperation with other environmental NGOs, provided preliminary input for the preparation of the Biodiversity chapter for the next river basin management plan (2027) and for the planning of the next Joint Danube Survey (2025). The cooperation with ICPDR took place also in the frame of several projects, such as We Pass 2, aiming to restore fish migration at the Iron Gate dams, and MEASURES, targeting the establishment of ecological corridors for migratory fish species along the Danube River and its main tributaries. IAD continued to contribute to the implementation of the EU Strategy for the Danube Region Action Plan via the Danube Sturgeon Task Force (DSTF), the Danube network for Invasive Alien Species (DIAS), and the Danube: Landscapes Task Force. Several important projects funded by the Danube Transnational Program such as MEASURES, IDES, Tid(y)Up were carried out.

Project implementation

In 2022, the IAD experts were actively involved in numerous international research projects funded by the European Commission, Horizon 2020, Danube Transnational Program, LIFE Program, as well as in national projects supported by Danube countries authorities and European funding programs.

The projects aimed to foster the implementation of water related policies and fill some knowledge gaps in fields such as water quality improvement, assessment and reduction of plastic contamination, strategic planning of revitalization projects, sustainable management of river systems, ecological restoration of freshwater-related ecosystems, evaluation of vertebrate communities dynamics in large Danube

floodplains using e-DNA methods, biological control of invasive alien species, antimicrobial resistance in the Danube River and major tributaries, assessment of ecological status of intermittent streams based on different biotic components, biological diversity and ecological status of the Danube River and adjacent wetlands, integrative floodplain management, conservation of aquatic endangered species, supporting biodiversity conservation in urban areas, use of citizen science for environmental conservation, preservation and consolidation of biodiversity along the Bavarian Danube, impact of land use and flood management on river ecosystem services, survey and human management of invasive alien species, improvement of the hydrological conditions in the aquatic habitats of the Danube Delta Biosphere Reserve, tackling hazardous substances pollution in the Danube River Basin, wastewater based epidemiology, etc. In 2022, the CEEPUS network EcoManAqua continued to develop educational activities with the contribution of several IAD members.

The most important projects carried out in 2022 with 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 a constant part of IAD activity. The two new issues of the IAD Bulletin, Danube News, published in 2022 (DN 45 and DN 46) are available for download on the IAD website.

The IAD experts contribute to several 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).

Numerous book chapters and scientific articles emerging from the research activities carried out in the Danube Basin were published also this year. In addition, several brochures translated in the different languages of the Danube countries regarding the management of vertebrate invasive alien species of EU concern, incorporating animal welfare were published and disseminated to the relevant stakeholders and wide public. A selection of the most relevant titles (book chapters, scientific articles and reports) is available in Annex 2.

Other activities

In 2022, the IAD members supported the organization and participated in numerous scientific forums, events and conferences to exchange knowledge and disseminate project results to stakeholders: Aquatic Biodiversity International Conference (Sibiu, Romania), the conference of Limnological Societies from Slovakia and Czech Republic (Limnospol, Bratislava-Devin), the International Conference on Riparian Ecosystems (Bratislava, Slovakia), Lobau Symposium (Vienna, Austria), Balkan Botanical Congress (Athens, Greece), Joint ESENIAS and DIAS Scientific Conference (Antalya, Turkey), FEMS Conference (Belgrade, Serbia), World Water Congress of the International Water Association (Copenhagen, Denmark), Conference of the European Committee of the Regions (Brussels, Belgium), etc. A detailed list of these events 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.

Projects

- Analysis of the potential for sustainable use of vegetation specific to the Danube-Danube Delta-Black Sea system
- A quantitative concept to study human-derived antibiotic resistance in rivers along the human wastewater path (RIVAR)
- Antimicrobial resistance in the Danube River and selected tributaries
- Aquatic invasive alien species – risk assessment and management, impact on trophic structure and ecosystem functioning, integrated management related to restoration and sustainability of aquatic ecosystems
- Assessing susceptibility of rivers to eutrophication using remote sensing and catchment modelling
- Assessment of ecological status of intermittent streams according different biotic components
- Biological Control of Dreissenid Mussels: Use of novel Eurasian parasites to control North American dreissenid populations
- Biological diversity and ecological status of the Danube River and adjacent wetlands, optimal use of their ecosystem functions and services, sustainable development and achieving good ecological status
- Climatically promoted homogenization of aquatic invertebrates tested on three model lotic systems and historical data
- Conducting biological analyses before, during and after the implementation of the activities to remove silt, cut reeds and build a western canal in Srebarna Nature Reserve
- Conservation of freshwater mussels on the Balkan Peninsula
- Consultations and development of Action plans on priority pathways for unintentional introduction and spread of invasive alien species of concern to the European Union according to Art. 13 of Regulation (EU) No 1143/2014
- Continuous monitoring activities within the Neajlov and Braila Islands LTSER sites
- Contribution to eDNA-fish survey during JDS4
- Developing a climate-smart land use system on reclaimed wetlands of the Hungarian Plain
- Development of ‘Strategy for protection of biodiversity of Sofia Municipality for 2030 and Action plan for protection of biodiversity of Sofia Municipality for 2030’
- Development of the Migratory Fish Monitoring Station - Isaccea (ANADROM)
- Development of an integrated management for pilot areas in the Romanian sector of the Danube, influenced by climate change and anthropogenic interventions, by applying complex investigation methodologies (geophysical, remote sensing, sedimentological, morphological, biological)
- Development of national thematic maps (geological/geophysical/biological) scale 1:50,000 of the Romanian continental plateau of the Black Sea
- DTP Follow the Plastic from source to the sea: Tisza-Danube integrated action plan to eliminate plastic pollution of rivers (Tid(y)Up)
- DTP Improving water quality in the Danube river and its tributaries by integrative floodplain management based on Ecosystem Services (IDES)

- DTP Managing and restoring aquatic ecological corridors for migrating fish species in the Danube River basin (MEASURES)
- Dynamik bei der Gewässer- und Auenentwicklung (Dynamics in watercourse and floodplain development) DynAu
- EC DG ENV Invasive alien species: improvement of understanding and communication
- EC IUCN Identification, assessment, sharing and dissemination of best practices for the humane management of invasive alien species (EU IAS Vertebrates)
- Ecological plasticity of recently spreading Ponto-Caspian fish species in the Danube River Basin
- Ensuring a favorable conservation status to save from extinction the European mink population from Romania - *Mustela lutreola* (species of community interest, critically endangered) (SAVE E-MINK-RO)
- ERASMUS + Program Educational capacity strengthening for risk management of non-native aquatic species in Western Balkans (Albania, Bosnia and Herzegovina and Montenegro) (RiskMan)
- Geological, geochemical and sedimentological research to evaluate the influence of natural and anthropogenic factors on water quality, benthic fauna and sediment distribution in coastal lakes, with a view to the sustainable management of their natural resources
- H2020 COST Action CA17122 Increasing understanding of alien species through citizen science (Alien CSI)
- H2020 COST Action CA18239 „Conservation of freshwater mussels: a pan-European approach” (CONFREMU)
- H2020 Advancing Black Sea Research and Innovation to Co-Develop Blue Growth within Resilient Ecosystems (BRIDGE-BS)
- H2020 Citizen-science metrics and instruments to support the science of nature-based solutions (MICS)
- H2020 MARine COastal BiODiversity Long-term Observations (MarcoBolo)
- H2020 Modelling RESTORation of wEtlands for Carbon pathways, Climate Change mitigation and adaptation, ecosystem services, and biodiversity, Co-benefits (Restore4C)
- H2020 Multiscale Observation Networks for Optical monitoring of Coastal waters, Lakes and Estuaries (MONOCLE)
- H2020 – Restarting the Economy in Support of Environment, through Technology (RESET)
- H2020 Restoration of Wetland Complexes as Life Supporting Systems in the Danube Basin (Restore4Life)
- H2020: Mainstreaming Ecological Restoration of freshwater-related ecosystems in a Landscape context: INnovation, upscaling and transformation (MERLIN)
- H2020: Securing biodiversity, functional integrity and ecosystem services in DRYing rivER networks (DRYVER)
- H2020 - Managing Resilient Nexus Systems Through Participatory Systems Dynamics Modelling (REXUS)
- Horizon Europe - Supporting Stakeholders for Adaptive, Resilient and Sustainable Water Management (Stars4Water)
- Importance and protection of floodplains as an environment for the fulfilment of the landscape eco-stabilisation function
- Increasing understanding of alien species through citizen science: Approaches to citizen science, data management and standards
- Integrated research and sustainable solutions to protect and restore Lower Danube Basin and coastal Black Sea ecosystems (ResPonSE)

- Integration of Aquatic Nematodes into the catalogue “Fauna Aquatica Austriaca“
- LIFE City River
- LIFE CONTrolling TEMPerature and Oxygen in rivers with diversion power plants (CONTEMPO₂)
- LIFE+ Integrated application of innovative water management methods at river basin by
- Linking climate warming to increasing invertebrate species richness in running waters: from historical data to experiments
- Making the Iron Gate Dams passable for Danube Sturgeon – We Pass 2
- Masterplan for Preservation and Consolidation of Biodiversity along the Bavarian Danube
- Measures to ensure a favorable status for the protection and conservation of endangered habitats and species in the RBDD
- Mechanisms of biodiversity formation of fish and other aquatic organisms in ecotone zones of river systems as a basis for developing scientific principles for the conservation of native flora and fauna in the context of intensification of the invasion of alien species
- Meta ecosystem dynamics in Riverine Landscapes (MERI)
- Monitoring of Ecological Processes and Control of Restoration Measures in Floodplains (MONDAU II)
- Monitoring of the state of aquatic ecosystems in the zone of impact, restoration and operation of deep-sea passage (according to hydrobiological indicators)
- Multidisciplinary research to improve knowledge on the interaction between climate change and anthropogenic pressures and its effects on the Black Sea ecosystem
- Multidisciplinary research on the effects of anthropogenic interventions on the Danube Delta and the coastal area and possibilities for environmental rehabilitation
- Pilot activities to control the population of the American spiny-cheek crayfish *Faxonius limosus* in the Protected Area of the National Ecological Network NATURA 2000 BG0000518 ‘Vartopski Dol’ in Bulgaria
- Potential threats to environmental and economic sustainability in the Danube and Black Sea region: Danube River as invasive alien species corridor
- Predicting future trends in health-related microbiological water quality of rivers in a vastly changing world (FUTURE DANUBE)
- Protecting the environment and reducing the risk of adverse events and natural disasters in Bulgaria
- Recovery of Mediterranean trout: a question of biodiversity (NATSALMO)
- Research for the assessment of the current state of deltaic aquatic ecosystems based on specific environmental indicators (hydro-morphological, physical-chemical and biological) and mapping of plan-spatial changes of wetlands in key points within the deltaic areas.
- Review of the Management Plan and Regulation of the Danube Delta Biosphere Reserve
- Selection and dissemination of antibiotic resistance genes from wastewater treatment plants into the aquatic environment and clinical reservoirs.
- Spectral measurement of phototactic responses and electroretinograms of arthropods, with special regard to the conservation of night-swarming mayflies and pest management.
- State and perspectives of citizen science for invasive alien species in Bulgaria
- Strategic Assessments supporting the long-term conservation of natural values of community interest as well as the national implementation of the EU Biodiversity Strategy 2020
- Strategic project for improving the hydrological conditions in the natural aquatic habitats of the Danube Delta Biosphere Reserve for the conservation of biodiversity and fish resources - Dunavăț-Dranov, Razim-Sinoie Lake Complexes; Sinoie-Istria Area; Lake Murighiol

- Strategic project for the improvement of hydrological conditions in aquatic northern habitats from RBDD for the preservation of biodiversity and fishery resources - Complexes Șontea-Furtuna, Matrița-Merhei, Somova Parcheș
- Strategic project for the improvement of hydrological conditions in the natural aquatic habitats of the Danube Delta Biosphere Reserve for the conservation of biodiversity and fish resources - Lake Complexes Gorgova-Uzlina, Rosu-Puiu
- Tackling hazardous substances pollution in the Danube River Basin by Measuring, Modelling-based Management and Capacity building (Danube Hazard m3c)
- The Advanced Community Project for the eLTER Research Infrastructure.
- The aquatic circuit of antibacterial biocides – integrated approach for the assessment and management of risks associated with antibio-resistance (BIOCIDE).
- The eLTER Preparatory Phase Project (eLTER PPP),
- UN Ocean Decade Program - The Estuarine Ecological Knowledge Network (EEKN)
- Vertebrate eDNA survey of selected floodplains along the Danube – *Emys orbicularis*
- Wastewater Based Epidemiology (WBE)
- Water treatment from sources contaminated with nitrates and chlorinated organic compounds using integrated processes of catalytic reduction/ oxidation and biofiltration – DENOX

Scientific publications**Books and book chapters**

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Conferences, workshops, events

- BRIDGE-BS Online training, January 2022
- BRIDGE-BS Workshop, February 2022, Constanta, Romania
- River Restoration Northwest, 7-11 February 2022 Stevenson, Washington/USA
- Annual Meeting ICPDR Task Group HYMO, 16 March 2022
- Tag der Hydrologie (Day of Hydrology), 22-23 March 2022, Munich, Germany
- Auenökologischer Workshop (Floodplain Ecological Workshop), 24-25 March 2022, Duisburg-Essen, Germany
- 1st International Conference on Riparian Ecosystems (RIPA), 6-7 April 2022, Bratislava, Slovakia
- 17th Steering Group Meeting Priority Area 6 EU Strategy for the Danube Region, 7 April 2022
- Vortragsreihe der Österreichischen Gesellschaft für Mittelalterarchäologie, 27 April 2022, Vienna, Austria
- Lobau Symposium, 27-28 April 2022, Vienna, Austria
- Annual Meeting ICPDR Expert Group River Basin Management 5 May 2022
- BRIDGE-BS Workshop. Communications and Dissemination Activities, 12 May 2022
- ERASMUS visit at University of Novi Sad/Serbia, 12-13 May 2022
- Floodplain Research Workshop, 7-8 June 2022, Baja, Hungary
- Discussion Forum 'For nature free of invasive alien plants', 10 June 2022, Plovdiv, Bulgaria
- Conference of the Slovak and Czech Limnological Societies Limnospol, 20-24 June 2022, Bratislava, Slovakia
- ICPDR 20th Standing Working Group (StWG) Meeting, 21-22 June 2022, Bucharest, Romania
- Heritage Science Café - Heritage Science Austria Platform, 27 June 2022, Vienna, Austria.
- FEMS Conference, June 30 - July 3, 2022, Belgrade, Serbia
- Vortragsreihe Hydrogeologie von Wien, Wiener Gewässer Management, 1 July 2022, Vienna, Austria
- Stadterkundung des Wien Museums, 22 July 2022, Vienna, Austria.
- 8th Aquatic Biodiversity International Conference, 20–22 September 2022, Sibiu, Romania
- 8th Balkan Botanical Congress, 4–8 July 2022, Athens, Greece
- Conference on the management of vertebrate invasive alien species of Union concern, incorporating animal welfare, 12 July 2022, Brussels, Belgium
- 21st International Sedimentological Congress, August 22-26 August 2022, Beijing, China.
- World Water Congress of the International Water Association, 11-15 September 2022, Copenhagen, Denmark
- 10th International Conference on Geomorphology. 12-16 September 2022, Coimbra Portugal

- Environmental Dimension of Antimicrobial Resistance (EDAR6) conference, 22-28 September 2022, Gothenburg, Sweden.
- 29th Conference of the Working Group Sustainability / Soil Protection of the Working Community of the Danube Regions. 27-28 September 2022, Tulln, Austria
- Disturbance on the Danube: State, Infrastructure and the Environment. 29-30 September 2022, Bucharest
- Thaya in Bewegung, 6-7 October 2022, Poštorná/Reintal, Czech Republic.
- STARS4Water Kick-off Meeting", 18-21 October 2022, Delft, The Netherlands.
- Lower Danube First Stakeholders Focus Group, 31 October 2022, Potelu, Romania.
- Lower Danube First Stakeholders Workshop, 1 November 2022, Craiova, Romania.
- Managing Resilient nexus Systems through Participatory Systems Dynamics Modeling - 3rd Plenary Meeting, 2-4 November, 2022, Craiova, Romania.
- BRIDGE BS, Workshop WP9, INDIGO MED, 9 November 2022
- Joint ESENIAS and DIAS Scientific Conference 2022 and 11th ESENIAS Workshop ‘Invasive alien species under conditions of global crisis’, 13–15 November 2022, Antalya, Turkey
- Final Conference of IDES Project, Bucharest/Romania, 16-17 November 2022
- Annual Meeting of German Working Group on Hydrology, 24-25 November 2022, Eichstätt-Ingolstadt, Germany
- Conference of the European Committee of the Regions “Freshwater fishes in the context of the EU Biodiversity Strategy”. 24-25 November 2022, Brussels, Belgium
- Danube Conference “Growing Together or Drifting Apart? Regional contributions to a continental struggle”, 29 November 2022, Krems, Austria,
- Realizing cross-border and region-wide cooperation, 12 December 2022, Slovenia.
- Skills for Science-Policy Interface. Capacity Building on the needed skills to work at the interface of science and policy, 14 December 2022, Slovenia.
- BRIDGE-BS Workshop WP9, Turkish Marine Research Foundation, December 13, 2022.
- 24th ICPDR Ordinary Meeting, 13-14 December 2022, Vienna, Austria
- DANUBE INFORMATION SERVICES CONFERENCE DISC '22 - Innovative Solutions for a good navigation status– INNOways4WW”, 14th – 15th December, 2022
- Horizon Europe Brokerage Event for Cluster 6 - Calls 2023, December 19, 2022.