



INTERNATIONAL ASSOCIATION FOR DANUBE RESEARCH

Scientific Report 2024

In 2024, the IAD members were involved in numerous limnological research projects in the Danube River Basin, training of young students and sustained dialogue with stakeholders and decision-makers. The elaboration of the Danube book coordinated by IAD entitled “Danube River and Western Black Sea Coast: Complex Transboundary Management” continued, its publication being expected in spring 2025. Many IAD members participated in the successful submission and implementation of scientific projects, as well as in the publication of scientific reports and articles. For the first time, IAD as a scientific NGO joined as a partner three proposals to Horizon Europe calls dedicated to the Danube River Basin – all projects were successful and their implementation will start in 2025. The organization of the 45th IAD conference to be held in Sofia, Bulgaria from 9-12 April 2025, started in autumn 2024. More information is available on the IAD homepage – www.danube-iad.eu.

Science – Policy interactions

As in previous years, IAD continued to provide scientific support to national authorities, the International Commission for the Protection of the Danube Region (ICPDR) and the EU Strategy for the Danube Region (EUSDR). In particular, IAD members provided input to several ICPDR Expert Groups on topics such as: River Basin Management, Pressures and Measures, Biodiversity Conservation, Monitoring and Assessment, Hydromorphology, Microbiology, Invasive Alien Species (IAS) and Sturgeon conservation, and participated in the revision process of the Joint Statement for Navigation (to be finalized in 2025). The cooperation with ICPDR also took place in the frame of several projects, such as We Pass 2 (finalized in 2024), while cooperation in Horizon Europe projects such as Danube4all and DALIA is ongoing. In addition, IAD actively contributes to the preparation of the Joint Danube Survey 5 of the ICPDR, which applies standardized sampling and evaluation methods across all Danube countries to ensure comparability of results, by coordinating several investigations of biological quality elements (macrozoobenthos and fish, including sturgeons) and eDNA analyses. IAD continued to contribute to the implementation of the EU Strategy for the Danube Region through the Danube Sturgeon Task Force (DSTF), the Danube network for Invasive Alien Species (DIAS), and the Danube: Landscapes Task Force.

Project implementation

In 2024, the IAD experts were actively involved in the elaboration and implementation of numerous research projects funded by the European Commission, Horizon 2020, Horizon Europe, the INTERREG Danube Transnational Program, LIFE Program, as well as in national projects supported by the Danube countries authorities and European funding programs. Part of these projects were submitted and accepted for funding in 2024, but their implementation will start in 2025, and hence, they will be presented in the next year’s report.

The projects implemented in 2024 contribute to advance knowledge in key topics specific to the Danube-Black Sea Region as well as to other large river systems, such as assessment of the ecological status of water bodies based on different biological quality elements, exploring hydrological dynamics in water courses and floodplain development, creating a water balance model for the DRB, exploring innovative solutions for restoring the sediment balance in the DRB, restoration of aquatic ecosystems to increase resilience to climate

change, ecosystem-based governance, microbial pollution, biogeochemical cycling of environmental DNA in lakes, implementation of river basin management plan in selected sub-basins, investigating climate change impact on aquatic biodiversity, supporting connectivity restoration by creating fish passages at large dams, investigating the presence and uptake of microplastics in biota, long-term changes occurred at ecosystem level under the current anthropogenic challenges, etc.

Furthermore, IAD members actively contributed to EU Horizon project applications. One notable example is the proposal DANSER (*DANube SEdiment Restoration: Towards Deployment and Upscaling of Sustainable Sediment Management Across the Danube River Basin*), which was submitted in 2023 and approved in 2024. This marks the first time IAD has been an official full project partner in EU Horizon project. Additionally, two other proposals under the EU Horizon initiatives - SWIM (*Sustainable Water and Integrated Management of Fish Migration and Their Habitats in the Danube River Basin and NW Black Sea*) and SoS2LearnDRB (*Source to Sea: Leveraging Community Knowledge and Action for Restoring the Danube River Basin and the Black Sea Region*) - were both submitted and approved in 2024. IAD is a project partner also here, and they are set to begin in 2025. Across these three Horizon projects, IAD, together with its members, is focusing on sustainable sediment management in the Danube, migratory fish conservation, and knowledge transfer. In all three, IAD primarily leads dissemination efforts across the Danube River Basin (DRB), aligning closely with its mission.

The most important projects carried out in 2024 with the support of IAD experts are presented in Annex 1.

Editorial activities and publications

Awareness raising on environmental problems in the Danube Region and dissemination of scientific information to experts, policymakers and the general public are a constant part of IAD activity. The two new issues of the IAD Bulletin, Danube News, published in 2024 (DN 49 and DN 50) are available for download on the IAD website. The Transylvanian Review of Systematical and Ecological Research, supported by IAD, continued its series “The Wetlands Biodiversity” with three new issues (26.1, 26.2 and 26.3).

Numerous book chapters and scientific articles emerging from the projects and research activities carried out in the Danube Basin were published also this year. A selection of the most relevant titles (book chapters, and scientific articles) is available in Annex 2.

Education activities

Many IAD members are involved in education activities, such as lectures for undergraduates, coordination of PhD programs and master theses in the affiliated universities, environmental education activities and presentations on nature conservation and environmental protection during public events. A particular focus is placed on doctoral programs ensuring a transdisciplinary approach to current environmental challenges, such as e.g. the BOKU Doctoral Programme “Human-River-System in the 21st century”. As part of knowledge-sharing and public dissemination activities, several citizen science events were organized by DIAS in Bulgaria, Romania and Serbia.

An IAD summer school was organized at the end of August in the Danube Delta, where 20 students from Romania, Austria, Bulgaria, Hungary, Serbia and Ukraine focused on plastic pollution, wetland biodiversity and nature conservation; a special emphasis was placed on reed management and landscape development as strategies for mitigating the impact of climate change (a summary of this event was published in Danube News 50). The Young Danube Research, a networking event for PhD students from four universities, took place at the University of Vienna in November 2024, where 19 PhD students from 8

countries presented their projects, discussing possible synergies. The hand-out is available on IAD-Website (https://www.danube-iad.eu/docs/Handout_IAD_summer_school-Description_and_Time_table-V-KT.pdf)

Other activities

In 2024, the IAD members organized different scientific events and participated to different forums, symposia and conferences to exchange knowledge and disseminate project results to stakeholders. The Aquatic Biodiversity International Conference, supported by IAD, was organized in September in Romania, while the River Basins and the IWA Large Wastewater Treatment Plants conferences were organized in Hungary. A detailed list of these events and the presentations held is provided in Annex 3.

Projects

- Andrea Funk: Vertebrate eDNA survey of selected floodplains along the Danube – *Emys orbicularis*
- AqualNFRA (Infrastructure for Marine and Inland Water Research, <https://aquainfra.eu/>)
- 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
- Assessment of the ecological status of intermittent streams according to 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 in Bulgaria, optimal use of their ecosystem functions and services, sustainable development and achieving good ecological status
- Conservation of freshwater mussels on the Balkan Peninsula
- Continuous monitoring activities within the Danube Delta long term ecological research site.
- CONtrolling TEMPerature and Oxygen in rivers with diversion power plants (CONTEMPO₂)
- Danube4All (Restoration of the Danube River Basin for ecosystems and people from mountains to coast, <https://www.danube4allproject.eu/>; Funds: Horizon Europe)
- DANUBIUS-RI ERIC (International Centre for Advanced Studies on River-Sea Systems)
- Dynamics in watercourse and floodplain development (DynAu)
- Faecal pollution routes of antibiotic resistance along the Danube River
- Functioning of vertebrate metacommunities in dynamic riverine landscapes: an innovative approach using eDNA metabarcoding (RIMECO)
- Global measure of biodiversity by understanding biogeochemical cycling of environmental DNA in lakes (LeDNA)
- H2020 COST Action “Conservation of freshwater mussels: a pan-European approach” (CONFREMU)
- H2020 COST Action “The eLTER Preparatory Phase Project” (eLTER PPP).
- H2020 COST Action Applications for zoospore parasites in aquatic systems – ParAqua
- 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 Science for evidence-based and sustainable decisions about natural capital (SELINA).
- H2020. The Advanced Community Project for the eLTER Research Infrastructure.
- H2020: Securing biodiversity, functional integrity and ecosystem services in DRYing rivER networks (DRYVER)
- Horizon Europe - Danube Region Water Lighthouse Action – Restoration of fresh and transitional water ecosystems (DALIA).
- Horizon Europe - ECOSystem-based governance with DANube lighthouse Living Lab for sustainable Innovation processes (EcoDaLLi)
- Horizon Europe – Innovative sediment management in the Danube River Basin (INNOSED)
- Horizon Europe - Restoration of the Danube River Basin waters for ecosystems and people from mountains to coast (DANUBE4all)
- Horizon Europe - Restoration of Wetland Complexes as Life Supporting Systems in the Danube Basin (Restore4Life)
- i-CONN (Interdisciplinary Connectivity <https://iconn.network/>; Marie Curie International Training Network (ITN) with two PhDs working on geomorphological and ecological connectivity in the Danube Basin),

- Importance and protection of floodplains as an environment for the fulfilment of the landscape eco-stabilisation function
- Industrialization of the Danube as a dynamic socio-natural site: river morphology, floodplain use and long-term legacies, 1780-1940 (IDAN)
- Industrialized Riverine Landscapes - How extremes, infrastructure and resource demands transform socio-ecohydrological systems
- Integrated research and sustainable solutions to protect and restore Lower Danube Basin and coastal Black Sea ecosystems (ResPonSE)
- Interreg Danube Transnational Program - Danube Sediment Q2
- Interreg Danube Transnational Program – Development of a harmonized water balance modeling system for the Danube River Basin (Danube Water Balance)
- Interreg Danube Transnational Program - Initiating bottom-up management solutions to reduce plastic waste in the Danube Basin – Aquatic Plastic (AQPLA)
- LIFE City River
- LIFE CONTrolling TEMPerature and Oxygen in rivers with diversion power plants (CONTEMPO₂)
- LIFE Living Rivers. Implementation of the river basin management plan in selected river sub-basins in Slovakia.
- 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
- Meta ecosystem dynamics in Riverine Landscapes (MERI)
- Microphytes in sediments of the floodplain lakes – the influence on cyanobacterial plankton
- Microplastics in surface waters - identification, quantification and pathway analysis
- Monitoring of the distribution of invasive alien species of Union concern in Bulgaria
- Phytoplankton biodiversity and dynamic in the floodplain of Kopački rit – long-term changes
- Potential threats to environmental and economic sustainability in the Danube and Black Sea region: Danube River as invasive alien species corridor
- Practical test of the biocenotic floodplain status assessment as a basis for the evaluation of restoration measures (BioAu)
- Protecting the environment and reducing the risk of adverse events and natural disasters. Task 4. Development of Bulgarian national system for early detection and warning of invasive alien species
- Protecting the environment and reducing the risk of adverse events and natural disasters. Subtask I.7.4–3. Influence of the global climate changes on the fish species of resource significance in river ecosystems impacted by hydromorphological pressures in Bulgaria
- Providing data from hydrobiological monitoring of surface waters and sampling of biota in Bulgaria
- Restore4Life (Restoration of wetland complexes as life supporting systems in the Danube basin), <https://restore4life.eu/>; Funds: Horizon Europe),
- Technical and Scientific Support in Relation to the Implementation of Regulation 1143/2014 on Invasive Alien Species
- the Christian Doppler Laboratory MERI (Meta ecosystem dynamics in Riverine Landscapes, <https://cdl-meri.boku.ac.at>), a 7-years research project funded by the Austrian Christian-Doppler-Society; RIMECO - Riverine vertebrate metacommunities using eDNA, I 5006, funded by FWF (<https://www.fwf.ac.at/forschungsradar/10.55776/I5006>), Grant-DOI 10.55776/I5006.
- the H2020-funded project MERLIN (Mainstreaming Ecological Restoration of freshwater-related ecosystems in a Landscape context: INnovation, upscaling and transformation, <https://project-merlin.eu/>),
- the Horizon Europe project NaturaConnect (Building a resilient ecological network of conserved areas across Europe for nature and people, <https://naturaconnect.eu/>),
- Using bacteria as bioindicators for biological status assessment

Scientific publications

Books and book chapters

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Simic, V., Simic, S., Pesic, V., 2024. Ecological sustainability of fish resources of inland waters of Western Balkans. Fish & Fisheries Series (FIFI Volume 43), Springer, 707 p.

Scientific articles (selected)

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Conferences, workshops, events, presentations

- 2-12 February 2024: 44th Conference „River Restoration Northwest“, Stevenson/ Washington, USA
- 14 February 2024: Meeting DanubeParks, County of Neuburg-Schrobenhausen, City of Ingolstadt, Floodplain Institute Neuburg, Germany
- 22–23 February 2024: Wks Budapest - Environmental History of an Urban Area, Budapest, Hungary
- 12-14 March 2024: IPBES Capacity Building Workshop, Sofia, Bulgaria
- 12-17 March 2024: 13th Floodplain Ecological Workshop, Birmensdorf, Switzerland
- 4-6 April 2024: XIII Congress of Microbiologists of Serbia, Belgrade
- 9 April, 2024: Waters 2040: Climate Change and Resilient Water Management in the Danube Catchment. 3rd Austrian Participation Day.
- 30 April 2024: EcoDaLLi – Danube & Black Sea Lighthouse Task Forces – Kick-Off Meeting
- 2-3 May 2024: Assessing the Fluvial Anthropocene. Agency, Materiality and Culture in Eastern European Hydroscaapes, Leipzig, Germany
- 13 May 2024: Water. City. Vienna: An Environmental History of Vienna and the Danube, Brno, Czech Republic
- 13-16 May 2024: Conference of the Austrian Society for Hygiene, Microbiology and Preventive Medicine (ÖGHMP), Salzburg, Austria
- 13-17 May 2024: „Deltas & Wetlands” International Symposium Tulcea, Romania
- 26-31 May 2024: Environmental Dimension of Antimicrobial Resistance (EDAR-7), Montreal, Canada
- 23 May – 2 June 2024: BioBlitz survey on IAS in the Danube Region (Bulgaria, Romania, Serbia)
- 6 June 2024: Environmental History Today Webinar. Roundtable “Publishing Water Histories”.
- 25 June 2024: 22nd ICPDR Standing Working Group Meeting, online
- 4-5 July 2024: Hungarian Hydrological Society (MHT) annual assembly, Szolnok, Hungary
- 25-26 July 2024: IPCC61 Satellite Science Conference ‘Climate risks in the Black Sea region’, Sofia, Bulgaria
- 11-15 August 2024: International Water Association World Water Congress, Toronto, Canada
- 18 August 2024: BioBlitz ‘Yantra River – collecting IAS with scientists from IBER-BAS’
- 20-24 September 2024: 9th Aquatic Biodiversity International Conference (ABIC 9), Sibiu, Romania
- 26 September 2024: BioBlitz survey on IAS during Danube River Walk, Romania
- 6-9 November 2024, Zoologycon, Bucharest, Romania

- 13-14 November 2024: EU-Project “DanubeSediment_Q2”, Meeting of Associated Strategic Partners in Budapest, Hungary
- 26-29 2024: Joint ESENIAS and DIAS Scientific Conference and 13th ESENIAS Workshop ‘Invasive alien species impact and management in agriculture, forestry and aquaculture’, Menemen, Izmir, Türkiye
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