



INTERNATIONAL ASSOCIATION FOR DANUBE RESEARCH

Scientific Report 2019

The activity of the IAD was focused on research activities aiming to fill in some of the existing knowledge gaps in aquatic sciences in the Danube River Basin and on fostering the dialogue with key decision makers and stakeholders of the Danube Region to promote environmental conservation.

The IAD homepage was updated and contain all relevant information - www.danube-iad.eu

Science – Policy interactions

The dialogue with policy makers took place mainly in the frame of the cooperation with national authorities, the International Commission for the Protection of the Danube River (ICPDR) and the EU Strategy for the Danube Region (EUSDR). Additionally, in 2019 cooperation with a member of the European Parliament was initiated to promote sturgeon conservation higher on the political agenda. Also, discussions with the intergovernmental UNESCO International Hydrological Program (UNESCO – IHP) were launched to strengthen cooperation between limnological and hydrological research in the Danube Region.

Scientific input was provided to several ICPDR Expert Groups and topics such as River Basin Management, Pressures and Measures, Monitoring and Assessment, Hydromorphology, Microbiology, Invasive Alien Species (IAS), Sturgeon conservation, and for the elaboration of the ICPDR Sustainable Agriculture Guidance Document. Two sediment guidelines finalized in 2019 (the Danube Sediment Management Guidance and the Sediment Manual for Stakeholders), provide recommendations on reducing the adverse impacts of the disturbed sediment balance on the ecological status and flood risk along the river. The IAD experts continued also their cooperation with ICPDR 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).

During the ICPDR Joint Danube Survey 2019 (JDS 4), IAD experts coordinated or participated in several activities such as investigation of aquatic communities, sampling and research on fecal pollution sources and antimicrobial resistance, eDNA sampling of fish, invasive alien species, analyses of microplastics in the guts of two invasive fish species, etc. Additionally, in collaboration with the European Commission's Joint Research Centre (JRC), an extended list with IAS of regional concern for the Danube River Basin has been developed and added to the smartphone application 'Invasive Alien Species Europe'. The updated app was tested during JDS 4 in Bulgaria, Serbia and Hungary. In Croatia, the IAD team supports the development of the national classification system for water quality assessment according to 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 involvement of IAD members in 4 EUSDR flagship projects continued also in 2019: Sturgeon 2020 (EUSDR PA 6), Danube: Future (EUSDR PA 7), DREAM (EUSDR PA 7), DANUBIUS (EUSDR PA 7, a pan-European research infrastructure project). In the frame of Danube: Future project, an active dialogue with Danube Rectors Conference (DRC) was launched since 2018. The organization of a joint IAD - DRC

international summer school devoted to sustainable development of the Danube Region was discussed.

Through their activities, the IAD members contributed also in 2019 to the implementation of the EU environmental directives and international conventions devoted to biodiversity conservation, such as Water Framework Directive, Birds and Habitats Directives, Bonn Convention, Bern Convention, Convention on the Biological Diversity, mainly by project implementation and participation to the reporting under the EU directives and conventions.

Project implementation

Projects are an important tool for the implementation of EU environmental policies and nature conservation actions. Therefore, the IAD members are actively involved in the development and implementation of different scientific projects in the Danube Region, providing sound information for the management of the Danube River Basin. Such results include e.g. the preparation of migratory fish habitat maps and database, manual for genetic conservation and broodstock facility of Danube sturgeon species, scientific support for restocking activities, environmental-DNA analyses, telemetry study of migratory fish, investigation of human impact on fish populations, investigation of faecal pollution and antimicrobial resistance along the Danube River, sediment management, floodplain restoration, survey of invasive alien species, etc. Results of the 3 decades long monitoring of epiphytic diatoms were synthesized in the Szigetköz Region of the Danube (Hungary), highlighting the minimum flow requirement for a good ecological potential in the branch system. A novel conservation method was tested to prevent mass swarms of mayflies to perish at illuminated bridges by using a spectrally optimized light system. IAD members contribute also to the implementation of two European research infrastructure projects (ESFRI): (1) the development of the eLTER ("Long-Term Ecological Research") research infrastructure and (2) the development of several supersites in DANUBIUS RI.

Additional cooperation is developed with the support of the Academies of Sciences from the Danube countries or of bilateral programs between the research organizations. As part of the CEEPUS-Network EcoManAqua (including IAD members from five countries), which provides funding for student and teacher exchange, e.g. the cooperation between the University of Ljubljana and BOKU Vienna was continued, two students being supported for one-month short-term stay in Vienna. Also, a summer school devoted to the Biodiversity in the Danubian floodplains in Croatia is under preparation. Plans to develop cross-border cooperation on macrophytes distribution in the Danube River Basin are under discussion.

The most important projects carried out in 2019 with significant contribution of IAD experts are presented on the IAD homepage (www.danube-iad.eu).

Editorial activities and publications

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

The IAD Bulletin, Danube News, with two issues published every year, represent an important communication tool of the scientific information towards the wide public. In 2019, besides presenting short articles on significant achievements in the aquatic research carried out in the Danube Basin, relevant aspects of the IAD history (https://www.danube-iad.eu/index.php?item=about_us) since its establishment in 1956 were presented. The issues published in 2019 (DN 39 and DN 40) are available for download on the IAD website.

Besides conference volumes, two major books were published in 2019 by IAD experts: (1) Water City Vienna: An Environmental History (free to download at <https://boku.ac.at/wau/ihg/downloads>), and

(2) Biodiversity of the Bulgarian-Romanian Section of the Lower Danube (<https://novapublishers.com/shop/biodiversity-of-the-bulgarian-romanian-section-of-the-lower-danube/>).

Several IAD experts are involved 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.

Scientific articles emerging from the research activities carried out in the Danube Basin have been published also in 2019. A selection of the most relevant titles (articles, books, proceedings) are available on the IAD website, with links included for download.

Other activities

In 2019, IAD contributed to the organization of several major conferences and workshops:

- The 6th Biennial Symposium of the International Society of River Science “Riverine landscapes as coupled socio-ecological systems, Vienna, Austria
- The 20th Health-related Water Microbiology, Symposium of the International Water Association (IWA), Vienna, Austria
- The 27th International Symposium “Deltas and Wetlands”, Tulcea, Romania
- 4DELTA - Stakeholders dialogue on sustainable development. strategies, lessons, opportunities, case studies, Tulcea, Romania
- Joint ESENIAS and DIAS Scientific Conference ‘Species, ecosystems and areas of conservation concern under threat from the invasive alien species’, Ohrid, Republic of North Macedonia
- Sixth Croatian Botanical Symposium, Zagreb, Croatia
- 8th Symposium “Kopački Rit, Past, Present, Future 2019”, Tikveš, Croatia
- Green academy “Sustainable usage of biological resources: Citizen science and invasive alien species in the Danube region”. Ruse, Bulgaria
- Annual conference of the Slovak Ichthyological Society, Bratislava, Slovakia
- Conference “Perspectives of hydro-ecological research in the context of environmental issues and social challenges”, Kiev, Ukraine
- Workshop on Floodplain ecology, Vienna, Austria
- Workshop of Macrophytes EG on Kopački Rit Nature Park, Suza, Croatia

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. Since 2018, IAD in cooperation with ICRO Slovenia was also involved in developing e-learning education tools on riverine environment, addressed to children and teachers, the electronic materials being freely available for download (<https://water-detective.net/>). A training program organized by the IAD SDPP EG supports six young scientists to acquire skills in developing integrated environmental municipality projects, while other training programs provide support for mapping Natura2000 species and habitats.

International exchanges with universities and research organizations outside the Danube Region were fostered in 2019. A group of students in medieval water history from Ohio Wesleyan University (US) visited BOKU University Vienna to exchange on the environmental history of the Danube and its tributaries in Vienna area. As part of a larger project in Poland, surveys on hydrology, fish, wetlands and aquatic macrophytes, as well as _drone images and eDNA assessment, were carried out in the Biebrza National Park (NE-Poland). Methodology-support on macrophytes survey was provided to a BSc student working on Upper Rhine River floodplains.

Through the Young Scientist Travel Grants (YSTG), IAD **supports travel costs** for students to attend conferences or visit partner institutions.

Projects with IAD participation 2019

- Managing and restoring aquatic ecological corridors for migratory fish species in the Danube River Basin (MEASURES)
- Facilitating fish migration and conservation at the Iron Gates (WePass)
- Developing an E-learning tool for Environmental Education for Primary and Secondary School in the Lower Danube Region (ELEDAN)
- Restoration of sterlet populations in the Austrian Danube (LIFE Sterlet)
- Danube Sediment Management – Restoration of the Sediment Balance in the Danube River (DanubeSediment)
- Reducing the flood risk through floodplain restoration along the Danube River and tributaries (DanubeFloodplain)
- Sediment research and management at the Danube River II (SEDDON II)
- Integrated Solutions for Bed Load Management (ISOBEL)
- Fishfriendly Innovative Technologies for Hydropower (FIThydro)
- Masterplan for Preservation and Consolidation of Biodiversity along the Bavarian Danube
- Pilot projekt „CityRiver” at Donauworth
- Cross-habitat linkages between stream and riparian habitats (CROSSLINK)
- Integrated platform for land and water monitoring based on remote and in situ measurements (RISE)
- Selection and dissemination of antibiotic resistance genes from wastewater treatment plants into the aquatic environment and clinical reservoirs
- Drinking water: multidisciplinary assessment of secure supply from the source to the consumers
- Biodiversity and Ecosystem Services across EU policies (AQUACROSS)
- Sustainable oceans: our collective responsibility, our common interest (ResponSEable)
- Public FLOOD Emergency and Awareness SERVICE (FloodServ)
- Smart Toolbox for Engaging Citizens into a People-Centric Observation Web (SCENT)
- Climate change and European aquatic RESources (CERES)
- Integrated transnational policies and practical solutions for an environmentally friendly inland water transport system in the Danube region (Green Danube)
- Bridging the Danube Protected Areas towards a Danube Habitat Corridor (DANUBEparksCONNECTED)
- Support project to establish the Romanian components of pan-European infrastructure project DANUBIUS RI (DANS)
- Land Use/Cover Area frame statistical Survey (LUCAS)
- Danube Urban Brand - a regional network building through tourism and education to strengthen the danube cultural identity and solidarity – DANUrB
- High Resolution Seabed Mapping II (EMODNET)
- Potential threats to environmental and economic sustainability in the Danube and Black Sea region: Danube River as invasive alien species corridor
- Increasing understanding of alien species through citizen science (COST Action Alien CSI)
- Investigation and assessment of ecological status of the Bulgarian section of the Danube River in the frame of the Joint Danube Survey in 2019 (JDS 4)

- Bulgarian National report on invasive alien species according to Article 24 (1) of the EU Regulation No 1143/2014 on the prevention and management of the introduction and spread of invasive alien species
- Protecting the environment and reducing the risk of adverse events and natural disasters. Development of a national system for early detection and warning of invasive alien species in Bulgaria.
- 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.
- Establishment of the national monitoring system for invasive alien species in Croatia: mapping selected alien and invasive alien plant species in priority areas, and creation, revision and testing of the monitoring programmes
- Analysis of biological methods of ecological status assessment for phytobenthos, macrophytes and macrozoobenthos in the European intercalibration river types of the Pannonian ecoregion. Analysis of the influence of environmental factors and anthropogenic pressures on biological quality elements
- The structure of winter plankton and periphyton communities in the Danubian floodplain
- Periphytic microphytes on natural substrates - the diversity and interaction with planktonic communities
- The influence of mass cyanobacterial development on phytoplankton communities
- City Nature Bratislava - Vienna, INTERREG project SK – AT
- Agrinatur DonauAuen National Park, INTERREG AT – HU
- Support instrument for decision making in Persistent Organic Pollution management. Case study: Mures Catchment Area, Romania (SIDPOP)
- The environmental history of Vienna and its waters.
- Understanding faecal pollution sources as propagation pathways of antimicrobial resistance in the Danube River: Establishing a quantitative whole river approach
- Microbiological survey of rivers in Montenegro
- Karst survey of microbiological communities
- Risks identification and possibility of support of landscape natural functions in landscape protected areas influenced by climate change
- Stream drying and biodiversity of running waters: the impact of natural conditions and anthropogenic alterations
- Validation of bioindication methods as tools for sustainable management of intermittent streams in Central European region, their transfer into the practice
- Predicting the hazards of non-native fish and crayfish
- Protecting Our Most Endangered Biotopes – Wetlands and Steppes – by the Land Trusts, Activity: Hydrogeological Conditions Study of Selected Meadow Bogs in Jihlava Surroundings
- Monitoring of water quality and biota before and after the implementation of nature-based measures in the river and its catchment
- Optimization of automatic irrigation system for pre-treated wastewater land application - the measure for decreasing risk of drought and surface waters eutrophication
- Evaluation of Nature-based solutions, Catalogue of Measures
- Support for bilateral cooperation of Czech Republic – Austria on transnational waters

- Participation of Slovak team to the Joint Danube Survey 2019 (JDS 4)
- Invasibility of communities and invasiveness of species: analysis of fish communities in Slovakia, models and predictions of their changes
- Monitoring of selected elements in surface waters II – Fish communities
- Microplastics in Switzerland waters
- Strategic planning of revitalization projects in Switzerland until the year 2035
- Participation of the Ukrainian team to the Joint Danube Survey 4.
- Hydro-ecological survey of the Lower Danube and the Ukrainian side of the Danube Delta
- Hydro-ecological investigation of the Ukrainian part of the Upper Tisza and its tributaries
- Water Initiative Plus for Eastern Partnership Countries
- Improving Environmental Monitoring in the Black Sea. Selected Measures.