



Im EU-LIFE Projekt "Flusserlebnis Isar" renaturierter Flussabschnitt der Isar in Landau (© Tim Borgs, 2020)

CONTENT

Danube News
No. 49

RESEARCH

The Amazon of Europe: Past and future of the Five-country Biosphere Reserve Mura-Drava-Danube p. 2

J. Maier, A. Mohl, K. Böck

Islands as a Web of Life - Humans and Nonhumans in the Middle of the Danube p. 7

St. Dorondel

NEWS & NOTES

The SOS-Water Project p. 10

S. Artuso, T. Kahil, E. Politti

Danube Congress Ingolstadt p. 11

Ch. Margraf

3rd Austrian National Participation Day Waters 2040 p. 13

G. Haidvogel, Th. Hein

International Symposium 'Deltas & Wetlands' at DDNI, Tulcea, May 2024 p. 13

B. Cyffka, E. Bratfanov

New book announcement: The Danube River and The Western Black Sea Coast: Complex Transboundary Management p. 14

The Amazon of Europe: Past and future of the Five-country Biosphere Reserve Mura-Drava-Danube

Jasmin Maier, Arno Mohl, Kerstin Böck

WWF-Austria, Vienna; e-mail: jasmin.maier@wwf.at, arno.mohl@wwf.at, kerstin.boeck@wwf.at

DOI: 10.5281/zenodo.11108211

Abstract

With its rich biodiversity, the world's first Five-country Biosphere Reserve Mura-Drava-Danube is not only Europe's largest protected river habitat, but also stands as an example of transboundary cooperation. Historically shielded during the Cold War, it is now a haven for biodiversity, serving as a critical habitat for more than 5,000 species, including the white-tailed eagle and black stork, playing a vital role in regional ecosystems and supporting the well-being of local communities.

In the face of challenges such as habitat destruction, the climate crisis and declining biodiversity, international projects aim to ensure the resilience of this unique habitat by promoting sustainable management and implementing restoration efforts.

Introduction

Stretching over 700 kilometres and covering 930,000 hectares across Austria, Slovenia, Hungary, Croatia and Serbia, the 'Amazon of Europe' is home to an extraordinary riverine landscape formed by the Mura, Drava and Danube rivers. This extensive, near-natural river area is home to a wide range of diverse and rare species and thus represents one of the most valuable contiguous river landscapes in Central Europe (Mohl et al. 2020).

In September 2021, this unique area received global recognition from UNESCO as the world's first five-country biosphere reserve, making it also the largest connected river-protected area in Europe. This landmark designation of the UNESCO Five-country Biosphere Reserve Mura-Drava-Danube (Transboundary biosphere reserve - TBR MDD) represents a significant accomplishment in transboundary river protection on a global scale. It serves as a model for international cooperation in environmental protection and highlights the significance of joint efforts between nations to safeguard our planet's invaluable ecosystems.

The story of the TBR MDD underscores the commitment of the countries involved to conserve their unique natural heritage and provides a guiding framework for similar conservation efforts for other riverine areas in the future.

The journey to unity

The Danube, along with its tributaries, has served as a significant historical trade corridor in Europe, connecting diverse cultural and natural realms. During the Cold War, its role as

a commercial pathway diminished as it runs between the opposing blocs of the Warsaw Pact and NATO, with neutral Austria and Yugoslavia in the middle. This led to reduced human interference along its borders (Austria-Forum 2020). Unintentional neglect allowed segments of the Danube, Drava, and Mura rivers to develop naturally, creating a rich ecosystem of islands, steep clay and sandbanks, water channels and riparian forests that are home to a number of rare species (Mohl et al. 2009; Schneider-Jacoby 2012; Schneider-Jacoby & Mohl 2012).

The fall of the Iron Curtain in 1989 led to significant political changes in Europe, opening up previously closed areas along the Mura, Drava and Danube rivers. This increased access also brought increased threats and led to large-scale plans for river regulation, gravel extraction and new hydroelectric power plants. These transformations would have caused severe environmental damage by deepening the riverbed and cutting off wetlands and floodplain forests from the water supply and had the potential to further disrupt the natural habitats in the area (Mohl et al. 2009).

In the early 1990s a major effort began to preserve Europe's last unspoiled riverine landscapes. Initiated and coordinated by EuroNatur in 1993, this effort focused on bringing together stakeholders from Croatia, Austria, Serbia, Slovenia and Hungary, who launched the idea of a transboundary biosphere reserve (BR), as a counter-vision to the plans of building new hydropower dams on the Drava River (Koeck et al. 2022).

By 1997, the idea had developed into a concept for a transboundary Mura-Drava-Danube BR. International efforts to preserve the Mura-Drava-Danube corridor intensified from 2000 under the coordination of WWF. A major step forward came in 2009, when Croatia and Hungary agreed to establish the Mura-Drava-Danube BR to jointly protect their part of the ecosystem, leading to a five-country agreement in 2011. In 2012, UNESCO officially recognised the Croatian-Hungarian section. From there, one success followed another. In June 2017, the Serbian section of the Danube was recognised as a biosphere reserve, followed in the next two years by the Slovenian and Austrian sections of the Mura.

In September 2021, when the TBR MDD was officially recognized by the International Coordinating Council of UNESCO's Man and Biosphere Programme (UNESCO-MAB-ICC) (UNESCO 2021; Zollner & Wolf 2020), an idea born nearly 30 years earlier finally came to fruition.

This designation not only cemented the area's status as Europe's largest protected riverine habitat, but also underlined the critical role of collaborative stewardship in safeguarding the region's biodiversity against the backdrop of climate change and habitat loss.

The UNESCO Five-country Biosphere Reserve Mura-Drava-Danube

Ecosystems often extend beyond national borders and may be subject to differing or conflicting management and land use practices due to political rather than ecological factors. To address this issue, Transboundary Biosphere Reserves (TBRs) offer a collaborative management solution. A TBR is an official recognition at the international level of the political will by an UN institution to cooperate in the conservation and sustainable use of a shared ecosystem through joint management. Currently, there are 738 biosphere reserves in 134 countries that belong to the World Network of Biosphere Reserves, of which only 22 are transboundary, mostly bilateral.

Biosphere reserves serve three functions: conservation of ecosystems, sustainable socio-economic development, and the promotion of education, research, and monitoring.

The management of the region is based on three different zones (see *fig. 1*):

- the core areas, which are very sensitive, strictly protected;
- the buffer zone, where the landscape is protected and managed – together with the core zone of a size of 270,000 ha in the TBR MDD;
- the transition area, open to regional sustainable development – 660,000 ha of the TBR MDD.

The establishment of the TBR MDD is a good demonstration of UNESCO's intention to promote the establishment of TBRs,

namely: the potential to resolve conflicts and strengthen trust between states (Ishwaran 2006; German UNESCO Commission 2007).

In addition to the TBR protection status, the region benefits from various additional levels of protection, such as the Natura 2000 network, which is an EU-wide ecological network of protected areas. There are a total of 17 Natura 2000 sites across all five countries and the Special Nature Reserve 'Gornje Podunavlje' in Serbia highlighting the ecological significance of these river environments. Additional examples of protected areas include the Mura-Drava Regional Park in Hungary, as well as the Kopacki Rit Nature Park and the Drava Mura Regional Park in Croatia.

These conservation efforts are supported by international and EU environmental legislation, including the Ramsar, Bern, and Bonn Conventions, as well as the EU's Habitats and Birds Directives (Schwarz & Mohl 2009).

A haven of biodiversity

The 'Amazon of Europe' is a biodiversity hotspot of global importance. Its vast floodplains and forests are home to more than 5,000 animal species and provide a vital corridor for migratory species. The reserve is home to the Danube Basin's largest coherent floodplain forest system and serves as a breeding ground for the highest density of white-tailed eagles (*Haliaeetus albicilla*) in continental Europe, with over 140 breeding pairs, and is a resting place for over a quarter of a million waterfowl.

5-country Biosphere Reserve Mura-Drava-Danube (TBR MDD)



Figure 1. The TBR MDD and its core, buffer and transition zone. ©WWF

The extensive floodplains also provide the perfect habitat for a variety of a number of other endangered species. For example, in addition to the white-tailed eagle, black storks (*Ciconia nigra*) breed in the floodplain forests. Little ringed plovers (*Charadrius dubius*) nest on the gravel and sand banks of the rivers as well as the common sandpiper (*Actitis hypoleucos*) and the critically endangered little tern (*Sternula albifrons*). Up to 7,000 breeding pairs of sand martins (*Riparia riparia*), European bee-eaters (*Merops apiaster*) and common kingfishers (*Alcedo atthis*) nest in the natural steep river banks. The river system itself is home to rare fish species such as the sterlet (*Acipenser ruthenus*), wild carp (*Cyprinus carpio carpio*) and huchen (*Hucho hucho*) (Schneider-Jacoby 1994; Mohl et al. 2009; WWF/EuroNatur 2009).

This rich tapestry of life is supported by a mosaic of habitats ranging from extensive floodplain forests, wet meadows, natural islands, gravel and sandbanks, steep banks, side channels, and oxbows that have remained relatively untouched by human development. This unspoilt nature owes much to the reserve's complex history as a borderland, which for decades limited human access and intervention, inadvertently fostering a refuge for wildlife.

In addition to their rich biodiversity, the rivers and floodplains play a vital role in the lives of local communities. The

extensive floodplains ensure favourable groundwater conditions and provide self-purification of water, which is essential for the region's drinking water supply. They also offer effective natural flood protection and are of great importance as a recreational area. Moreover, local fishers depend on the fish populations for their livelihoods. The beautiful landscape also has great potential for sustainable tourism, which is further supported by various local projects such as the 'Amazon of Europe Bike Trail' project, described later in this article (Stumberger et al. 2021).

The way forward

The TBR MDD includes a diverse array of ecological conditions and conservation statuses. The condition of the river banks across these rivers varies significantly: about 190 km (9%) remain in a natural state, 765 km (38%) are considered near-natural, and 1,081 km (53%) have been altered or impacted, primarily due to embankment constructions. Notably, the river Mura along the border between Austria and Slovenia sees up to 95% of its banks fixed with embankments, while some sections of the Mura, the Drava in Croatia and Hungary, and the Danube between Croatia and Serbia have less than 40% of their banks altered (WWF 2013).



Figure 2. Implementation of the DRAVA LIFE project in March 2024, showing the opening of a new initial channel at River Drava near the Croatian village of Novačka. ©Goran Šafarek



Figure 3. A section of the Mura River near the village of Petanjci. On the left side, in 2022, the river is very regulated and doesn't have much space. Only one year later, after the implementation of the measures of the Natura MURA project, in this case, the widening of the river bed, the river takes a more natural shape and has more space to form vital habitats such as sandbanks and gravel islands as shown in the photo on the right side. ©VGP, Simon Veberič

The total active floodplain area is reported at 132,341 hectares, accounting for 22% of its historical extent. The majority, or 78%, has been lost to flood protection measures like dikes, with the percentage of active floodplain loss ranging from 66% to 90% in different countries (WWF 2013). Despite these challenges, these floodplains continue to offer crucial ecosystem services, including flood risk mitigation, groundwater regulation, water purification, and supporting recreational and tourism activities.

In the face of ongoing threats such as habitat fragmentation, invasive species and climate change, the establishment of the TBR MDD marks the beginning, not the end, of conservation and restoration efforts. Already during the efforts to establish the TBR MDD, it was shown that repeated plans for new hydropower plants and river regulation 'fuelled' the work and message of national and international NGOs in the area. Another way to fuel and bring forward the message of the TBR was the implementation of cross-border initiatives and cooperation projects, such as those that involved EU funds.

Examples of these projects include the Danube Transnational Programme (DTP) 'coopMDD' project, which aimed to develop common management guidelines for the TBR MDD in cooperation with stakeholders from all five countries (Interreg 2017). This cooperation was continued by the Interreg DTP 'lifeline MDD' project, which aimed to develop a joint five-country restoration strategy and implementing it on a pilot basis (Interreg 2020). Finally, another project that has certainly contributed to establishing sustainable tourism in the TBR MDD is the Interreg project 'Amazon of Europe Bike Trail', a cross-border bike trail along the Mura, Drava and Danube rivers running through all five countries (Interreg 2018).

Other projects focus on the implementation of conservation measures, such as the 'DRAVA LIFE' project, which aims to improve the ecosystem of the Drava River in Croatia through river restoration measures. As part of this project, major restoration works were carried out in the last months, demonstrating the joint restoration efforts of water management, nature conservation and NGOs for the benefit of flood protection

and nature conservation (DRAVA LIFE, 2016).

'WISE DRAVA LIFE' works to improve the conservation and resilience of valuable floodplain forests (WISE DRAVA LIFE 2021; *fig. 2*). Similar projects have also been set up along the Mura River, such as 'Natura MURA', which addresses the key challenges of nature conservation and provision of ecosystem services in the Mura floodplain (Natura MURA 2021; *fig. 3*). This list is not exhaustive, but aims to show the variety of projects and stakeholders involved in supporting the message of the TBR MDD and its conservation.

LIFE RESTORE for MDD

Following its designation in 2021, the TBR MDD Steering Committee (TBR MDD SC) agreed to develop a five-country LIFE restoration project to bring the TBR idea to life (*fig. 4*). The largest restoration project in the TBR MDD to date began in October 2023, involving 17 institutions and organisations in five countries, including public administrations for nature conservation, water, forest and regional management, as well as universities and NGOs, coordinated by WWF-Austria.

With a budget of € 20,024,000 co-funded by the European Union's LIFE programme, and with the involvement of the TBR MDD SC as an advisory body, the project aims to rehabilitate 29 sites along the rivers in the five countries. The aim is to create 2,472 hectares of more robust floodplain forests, reconnect 54,230 metres of river side channels and remobilise 966,000 m³ of sediment to create new gravel and sand banks. This goal will be accomplished by implementing a series of measures, including reconnecting river branches, widening river beds, restoring oxbows and meadows, purchasing valuable land, converting poplar plantations into more natural floodplain forests, and removing alien species in 17 Natura 2000 sites in the TBR MDD (see *fig. 4*). Additionally, large-scale plans for future restoration are being developed. These actions will not only provide valuable habitats for rare fish and bird species, but they will also restore healthier floodplain forests and increase their resilience to drying out.

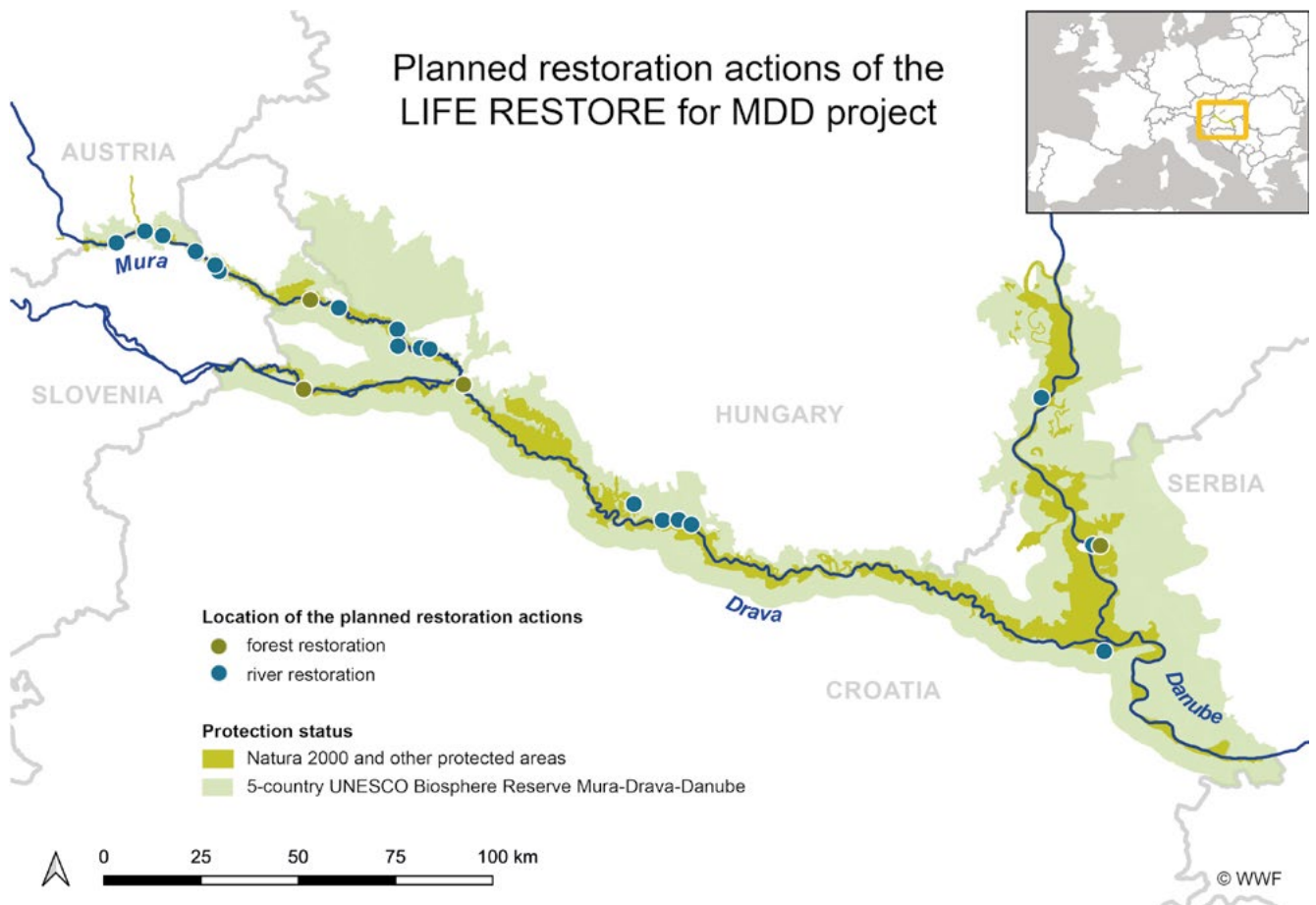


Figure 4. Planned restoration actions of the LIFE RESTORE for MDD project ©WWF

These efforts are complemented by a strong emphasis on environmental education, public awareness and stakeholder engagement, as well as continuous monitoring, ensuring a holistic approach to conservation that involves and benefits local communities (WWF 2023).

Biodiversity extends beyond state borders (Batisse 1997). Therefore, promoting cooperation across political boundaries is crucial for nature conservation and concern for one's own habitat. The TBR MDD serves as an example of successful transboundary cooperation in environmental stewardship and is a significant milestone in global conservation efforts. However, declaring a biosphere reserve is only the initial step towards creating resilient natural areas in the face of mounting environmental pressures.

The effectiveness of transboundary cooperation in tackling global challenges, such as habitat destruction, the climate crisis, and the decline in biodiversity, is exemplified by projects like 'LIFE RESTORE for MDD', a cooperation, which benefits both nature and people in the Five-country Biosphere Reserve Mura-Drava-Danube.

References

- Austria-Forum (2020): AustriaWiki – Donau [online] <https://austria-forum.org/af/AustriaWiki/Donau> (accessed 16 April 2024)
- Batisse M (1997): Biosphere reserves: a challenge for biodiversity, conservation & regional development. Environment: Science and Policy for Sustainable Development 39, 5, 6–33, DOI: <https://doi.org/10.1080/00139159709603644>
- DRAVA LIFE (2016): Integrated River Management for people and nature [online] <https://www.drava-life.hr/en/drava-life-integrated-river-management-for-people-and-nature/> (accessed 28 March 2024).
- German UNESCO Commission (2007): Resolution of the 67th General Assembly of the German Commission for UNESCO, Dessau, 28 June 2007. UNESCO Today – Journal of the German Commission for UNESCO 2, 89. Special Issue UNESCO Biosphere Reserves: Model Regions with a Global Reputation, ed. by L. Möller [online] <https://www.unesco.de/sites/default/files/2018-06/unesco-heute-2-07-engl.pdf> (accessed 28 March 2024).
- Interreg (2017): Coop MDD – Transboundary Management Programme for the Planned 5-Country Biosphere Reserve 'Mura-Drava-Danube' [online] <http://www.interreg-danube.eu/approved-projects/coop-mdd> (accessed 28 March 2024).
- Interreg (2018): Amazon of Europe Bike Trail [online] <http://www.interreg-danube.eu/approved-projects/amazon-of-europe-bike-trail> (accessed 28 March 2024).
- Interreg (2020): LifelineMDD – Protecting and Restoring Ecological Connectivity in the Mura-Drava-Danube River Corridor through Cross-Sectoral Cooperation [online] <http://www.interreg-danube.eu/approved-projects/lifelinemdd> (accessed 15 January 2021).
- Ishwaran N (2006): Introduction. In: Stein R et al. (Eds.): Proceedings of the 2004 International Conference and Expert Workshop of Transboundary Biosphere Reserves: 'Following-up on Seville +5'. Naturpark Pfälzerwald/Parc régional des Vosges du Nord, Lambrecht/La Petite-Pierre. ISBN-3-926775-50-5, p. 9
- Koeck G, Schwach G, Mohl A (2022): Mura-Drava-Danube biosphere reserve: a long way from the original idea to the designation of the world's first 5-country biosphere reserve. Int. J. Environment and Sustainable Development 21, 3, 253–269
- Mohl A, Egger G, Schneider-Jacoby M (2009): Fließende Grenzen – Grenzflüsse im Spannungsfeld zwischen Schutz und Nutzung. Flowing boundaries – tensions between conservation and use of border – rivers. Natur und Landschaft. 84, 9/10, 431–435

Mohl A, Korn-Varga I, Györfi E (2020): The ecological corridor Mura-Drava-Danube and future five-country biosphere reserve. IUCN Guidelines for Conserving Connectivity through Ecological Networks and Corridors 30, 104–106

Natura MURA (2021): Restoration of wetland habitats along the Mura [online] <https://natura-mura.eu/o-projektu/> (accessed 28 March 2024).

Schneider-Jacoby M (1994): Sava and Drava – ecological value and future of the two main rivers in Croatia. *Periodicum Biologorum* 96, 4, 348–356

Schneider-Jacoby M (2012): Overview of the Drava river basin. *Danube News* 14, 25, 2–4. Special Issue Tributaries of the Danube II: Drava/Mura – Protected River Corridor Threatened by Hydropower, ed. by J Bloesch

Schneider-Jacoby M, Mohl A (2012): Mura-Drava-Danube: five countries – three rivers – one biosphere reserve. *Danube News* 14, 25, 5–8. Special Issue Tributaries of the Danube II: Drava/Mura – Protected River Corridor Threatened by Hydropower, ed. by J Bloesch

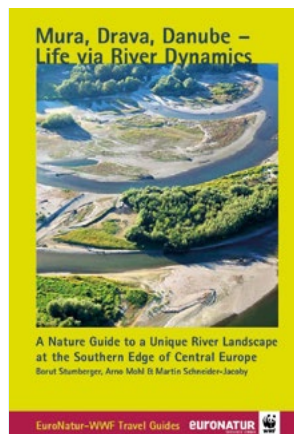
Schwarz U, Mohl A (2009): Lifeline Drava-Mura 2009–2020. A plan for conserving and restoring the Drava and Mura Rivers for nature and People. WWF and Euronatur Foundation, Vienna

Stumberger B, Mohl A, Schneider-Jacoby M (2021): Biosphärenreservat Mur, Drau und Donau – Leben durch Flussdynamik. *Naturreiseführer durch eine einzigartige Flusslandschaft am Südrand Mitteleuropas*. EuroNatur Service GmbH, Radolfzell

UNESCO (2021): Report of the 33rd Session of the MAB-ICC, Abuja, Nigeria [online] <https://unesdoc.unesco.org/ark:/48223/pf0000380848/PDF/380848eng.pdf.multi> (accessed 28 March 2024).

WISE DRAVA LIFE (2021): Wise water management for the conservation of river and flood habitats along the Drava River [online] <https://lifeprogramhrvatska.hr/en/projects/wisedravalife-wise-water-management-for-the-conservation-of-river-and-flood-habitats-along-the-drava-river-life17-nat-hu-000577/> (accessed 28 March 2024).

WWF (2013): Assessment of the River and floodplain restoration potential in the transboundary UNESCO biosphere reserve “Mura-Drava-Danube”. WWF Vienna



Mura, Drava, Danube – Life via River Dynamics

The nature travel guide from EuroNatur and WWF. Experience the unique river landscape on the southern edge of Central Europe.

<https://www.euronatur-shop.com/produkt/mura-drava-danube-life-via-river-dynamics/>

WWF (2023): Mur-Drau-Donau: 20 Millionen Euro zur Renaturierung des „Amazonas Europas“ [online] <https://www.wwf.at/mur-drau-donau-20-millionen-euro-zur-renaturierung-des-amazonas-europas/> (accessed 28 March 2024).

WWF/EuroNatur (2016): “Amazon of Europe” Bike Trail; From the Alps to the Pannonian plain along the largest natural river system in Central Europe. Vienna; Implementation concept [online] <http://www.amazon-of-europe.com/en/bike-trail/> (accessed 28 March 2024).

Zollner D, Wolf L (2020): Transboundary Nomination Form for the ‘5-Country Biosphere Reserve Mura-Drava-Danube’ (TBR MDD). ECO Klagenfurt, Klagenfurt, Austria

Islands as a Web of Life – Humans and Nonhumans in the Middle of the Danube

Stefan Dorondel

*The Institute for Southeast European Studies Bucharest, Romania,
Francisc I. Rainer Institute of Anthropology Bucharest, Romania,
Email: dorondel@yahoo.com*

DOI: 10.5281/zenodo.11108238

When, in May 2020, I submitted an application to the Romanian National Research Agency (UEFISCDI) for a research project on the historical and social life of Lower Danube islands, many of my fellow anthropologists and historians raised an eyebrow. Indeed, islands are vital elements of the river ecosystem as they are playing important hydro-morphological and ecological functions. They contribute to water self-purification and the retention of sediments and nutrients, they provide important habitats for birds, animals, insects and fish reproduction and feeding, and support of a wide variety of vegetation and endemic species (Wyrick 2005; Schneider 2015; Krause 2016). It is hard to deny the river islands importance for the nonhuman life. Islands of the Lower Danube are not inhabited mostly because they are too small for this. For instance, around 1900, the average size of the 122 islands along the Lower Danube was 1.2 km², with a perimeter of 4,6 km. In 2022, the average size of the 81 Lower Danube islands were 1.8 km² with 5,5 km perimeter

(Dorondel et al. 2023). With few exceptions, most of the Lower Danube islands were never inhabited. One important exception is the Ada Kaleh Island inhabited by a handful of people since Medieval times (Dorondel & Ion under review). Few of them were temporarily inhabited or were used as places of refuge in the 19th century (Iancovici 1960). Besides, fluvial islands have a ‘nomadic’ character (Lahiri-Dutt & Samantha 2013): they move along the river, they modify their shape, they merge with one another or separate. They are highly volatile landscapes (Krause & Eriksen 2023). The social vacuity of Lower Danube islands is not an inherent quality of the river islands worldwide. In other parts of the world, for instance in Southeast Asia, the fluvial islands however volatile, are inhabited by people who find an alternative to the mainland (Lahiri-Dutt & Samantha 2013). Yet, to dismiss the social study of Danube islands would be a hasty assessment.

River islands stay in a sheer opposition with their maritime and ocean peers, which are larger, inhabited, more stable and thus more visible for historians and anthropologists (see for instance Patton 1996; Prokić & Šimkova 2024). For historians and anthropologists, European river islands suffer from a social vacuity that made them uninteresting as an object of study and rendered them invisible. So, the question is: Why study



Figure 1. Pigs roaming freely in the ponds in the Danube floodplains. Desa village, Oltenia, June 2016. Photo by S. Dorondel

historically and ethnographically an uninhabited place? In this paper I argue that uninhabited river islands are important landscapes despite their social vacuity. In fact, the point I want to make here is that a space does not have to be inhabited in order to be vital for humans. As Dipesh Chakrabarty (2022, 14) has pointed out many spaces that are not inhabited – such as oceans or the Siberian permafrost – influence the human live, locally and globally. I see Danube islands vital for the riparian population wellbeing and local economy.

Since the 15th century the Ottoman documents attested the wuse of Lower Danube islands by the riparian population on both banks of the river (in what are today Romania and Bulgaria) as wood collection and preferred grazing places for their animals (Kayapinar 2004). Collecting wood from the islands was important for the riparian population. Especially in the

summer, when the water was low and the canal between the islands and the bank was either dry or easily to be crossed by horse carts villagers cut the trees that grew back rapidly on the islands. The yearly floods brought nutrients which made the trees grow faster than on the mainland. Besides, the island forests were protected from the summer draught by the inherent moisture of the island's soil. In a document from June 1888 the forest on some islands is presented as *'being so thick that a lamb cannot go through it'*.¹ Until the emergence of the nation-states of Romania and Bulgaria (1878) the riparian population was free to cut wood on the islands. In 1830, the Russian Empire initiated the first assessment and allocation of the Danube islands based on a newly acquired international law principle: when a river separates two states, the islands on the left side of the thalweg in the direction of the running river belong to the left bank state whereas those on the right side of the thalweg to the right bank state.² Once the Wallachian state acquired the islands, local entrepreneurs entered in a race to lease the forest for exploitation. After 1831, the riparian population was in a permanent state of conflict with local entrepreneurs for access to the rich islands' resources. As a consequence, while before 1831 the exploitation of forests was rather punctual and for the needs of locals, only after this date the entrepreneurs started a thorough exploitation of the forest. It was not just the forest at stake but also the collection of reeds and rushes which were important for the locals but also for the local industry that used these wetland plants. Most islands had water canals and ponds full of fish which remained after the annual Danube floods and were an important part of the entrepreneurs' revenue.³ Even more, some local entrepreneurs suggested the Romanian Ministry of Agricul-



Figure 2. Interspecies relationships. On the Danube banks, Southern Romania, June, 2022. Photo by Adrian Deoancă

ture at the end of the nineteenth century that cultivating the large pastures of the islands (some over 100 hectares) with corn, oat or pepper would maximize the revenue of the state.⁴

For more than six months of the year, the locals sent their animals – pigs, cows, horses – on the nearby islands. From spring to late autumn animals found plenty of food on the lavishly vegetated islands. Pigs scavenged roots and worms and found plenty of snails and molluscs around the ponds scattered around the islands. Horses and cows found plenty of vegetation to graze. Economically speaking, it made a lot of sense. For six months or more, the animal owners had no worries about their animals. They were able to invest the time they would have spent with the animals in some other lucrative jobs. The only thing owners had to do was to go on the island every 5 days and feed their animals with some corn. This was not to supplement the animal's diet but rather to recreate the bond between the owner and their animal, and to keep animals from going completely wild. Equally important was the fact that domestic pigs interbred with the wild boars. If the domestic pig has usually more fat than the wild boar the mixed pigs had less fat and thus more meat.

Animals roaming freely on Danube islands was an ordinary image until the end of the nineteenth century when the nation-states Romania and Bulgaria emerged after 1878. Until then, when the Danube was an 'Ottoman river', the riparian population from both banks were allowed to bring their animals and to collect trees from the islands for a fee paid to the local bay (Kayapinar 2004). Often, both Romanian and Bulgarian shepherds would bring their flocks to spend the winter in places next to the Danube or even on the Danube islands. We collected tens of interviews in villages along the Danube in Bulgaria and Romania, where old people still had

a vivid memory of the time when their fathers and grandfathers brought their animals on the nearby islands.⁵ In fact, this practice totally stopped only after the installation of the socialist regime in both countries Romania and Bulgaria. For the Romanian population, at least, the islands became inaccessible, as the Romanian regime was much stricter than the Bulgarian one in policing the border.

After the 1990s, the riparian population did not retake the habit of bringing their animals to the islands, but kept them mostly in the former floodplains which escaped the socialist land reclamation. Figure 1 and figure 2 show such cases.

The islands became even more important for fishermen, especially after the 1960s. Starting in the 1960s a pharaonic program of agricultural land reclamation started in both Romania and Bulgaria. In Romania, between the 1960s and 1989, around 500,000 ha of land was reclaimed and more than 1,000 km of levees were built along the Danube. Leaving aside many socio-economic consequences, one in particular was damaging for the fish and the fishermen. The former floodplains with their warm, shallow, quiet waters from ponds and lakes from the yearly floods were the preferred spawning grounds for many fish species. The wetland vegetation was the perfect sanctuary for the fry.

Once the floodplain was drained and levees were built the connection with the Danube was lost. The shallow waters protected by the branches of the trees growing on the banks of the islands represent a protection area for the fry. These natural nurseries also attract predatory fish species such as pike or perch. Fishermen are aware of this and they often install fishnets close to the islands' banks (see *fig. 3*). When the waterlevel of the Danube is high, fishermen also set up nets between the trees on the islands.

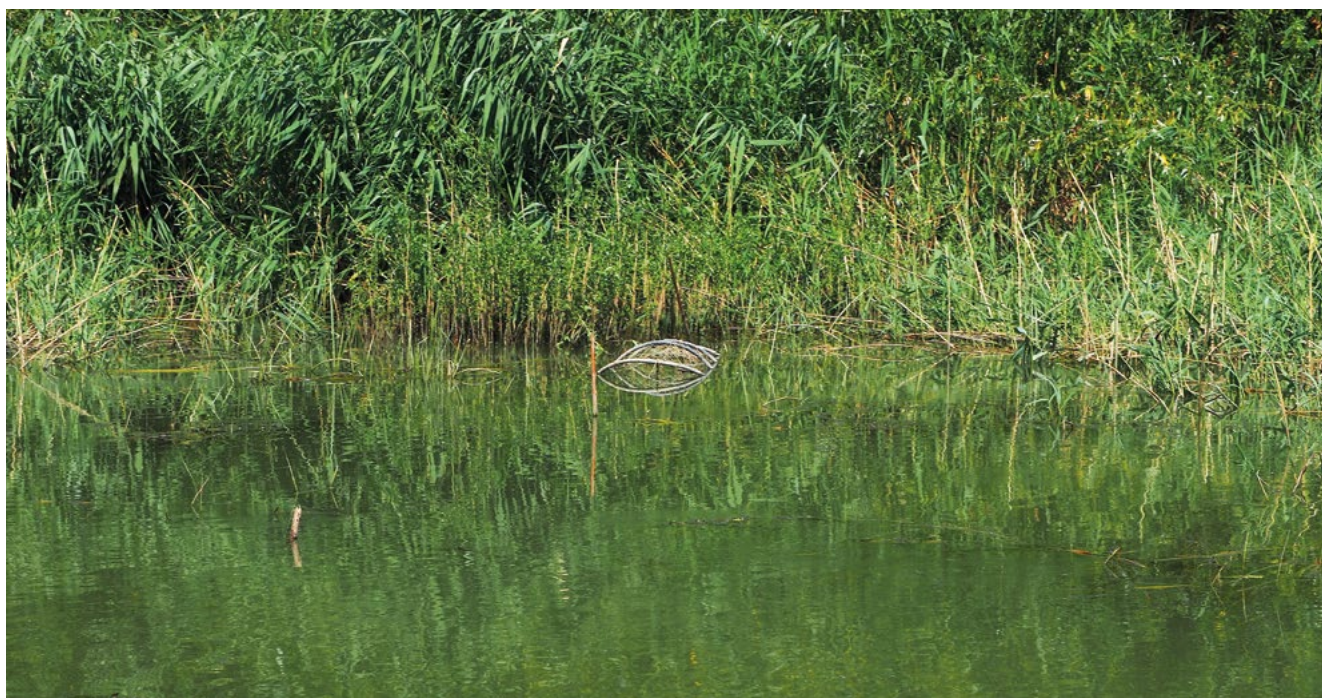


Figure 3. A round fishnet installed on the proximity of a vegetated island's bank. Pardina, Tulcea County, Romania, June 2023. Photo by S. Dorondel

Conclusions

Neglected in the southeast European historiography, fluvial islands were vital for the riparian population and for the riparian states. As sources of revenue for the state, as sources of conflict between an emerging capitalist class of local entrepreneurs supported by the young nation-states and the local people whose livelihood they threatened, fluvial islands were and are disputed and contested, connected to and disconnected from the mainland. They are 'webs of live' in which the human and the non-human are intimately intertwined.

Notes

- ¹ The National Archive of Romania, Fund Ministerul Agriculturii, Regii, File no. 2283/1889, p. 19
- ² See for more details on this process Dorondel, Serban and Cain (2019)
- ³ Monitorul Oficial al Romaniei nr. 6, Marti 10(22) ianuarie 1878, p. 116
- ⁴ The National Archives of Romania, Fund M.A.D. Regii, File 910/1888, p. 15
- ⁵ Fieldwork carried out within the research project State, Communities and the Nature of the Lower Danube islands: an Environmental History (2021-2023) funded by the Romanian National Research Agency (UEFISCDI) (PN-III-P4-ID-PCE-2020-1238)

Bibliography

Chakrabarty D (2022): The Climate of History in a Planetary Age. The University of Chicago Press, Chicago and London

- Dorondel S, Serban IS, Cain D (2019): The Play of Islands: Emerging Borders and Danube Dynamics in Modern Southeast Europe. *Environment and History* 25(4), 521-547
- Dorondel S et al. (2023): Stat, comunități și natură în zona Dunării de Jos: o istorie a insulelor dunărene (1830-2020). Raport științific 2023 [State, Communities and Nature of the Lower Danube Islands: An Environmental history (1830-2020). Scientific Report 2023]. <https://danislandsproject.wordpress.com/publications/>
- Dorondel S, Ion A (under review): The Entangled Life of Islands: Or, Why the Nonhuman Resettlement Project of Ada Kaleh Failed. In: Heidemann F, Schorch Ph (eds.): *Experiencing Islandness: Oceans and Beyond*. University of Hawaii Press, Honolulu
- Iancovici S (1960): Fuga locuitorilor din ostroavele Dunării din cauza exploatării boierești (1833-1834). *Studii Revistă de Istorie* XIII(4), 158-182
- Kayapinar A (2004): Les îles ottomans du Danube au XVI^e siècle. In: Nicolas V, Veinstein G (eds.): *Insularité Ottomane*. Maisonneuve et Larose, Institut français d'études anatoliennes, Istanbul, 177-202.
- Krause F (2016): Rivers, Borders, and the Flows of the Landscape. In: Kannike A, Tasa M (eds.): *The Dynamics of Cultural Borders*. University of Tartu Press, Tartu, 24-45
- Krause F, Eriksen TH (2023): Inhabiting Volatile Worlds. *Social Anthropology* 2023, 1-13. doi:10.3167/saas.2023.04132300
- Lahiri-Dutt K, Samantha G (2013): *Dancing with the River. People and Life on the Chars of South Asia*. Yale University Press, New Haven and London
- Patton M (1996): *Islands in Time. Island Sociography and Mediterranean Prehistory*. Routledge, London and New York
- Prokić M, Šimkova P (2024): *Entire of Itself? Towards an Environmental History of Islands*. The White Horse Press, Cambridge
- Schneider E (2015): The Danube Delta: Lessons Learned from Nature Restoration Projects. In: Iordachi C, Assche K. van (eds.): *The Bio-Politics of the Danube Delta. Nature, History, Policies*. Lexington Books, Lanham, 87-114
- Wyrick JR (2005): *On the Formation of Fluvial Islands*. Ph.D. Dissertation. University of Oregon

The SOS-Water Project

Silvia Artuso, Taher Kahil, Emilio Politti

IIASA (International Institute for Applied Systems Analysis), Laxenburg, Austria, email: silvia.artuso@iiasa.ac.at

Background

Our planet can be seen as a complex system with several critical components that influence its health, such as climate and biodiversity. The Safe Operating Space framework establishes safe thresholds for these components, ensuring that humanity operates within a zone where the Earth System remains within its functional boundaries, while at the same time a just humanity can thrive.

The SOS framework has found its way into the public debate, stimulating the irrevocable discussion on the cooperative coexistence of human society and the Earth system. The framework moves away from the classic opposition between human benefit and nature conservation and sets the stage for a new narrative based on cooperation between nature and society. Yet the inspiring principles of the SOS framework have rarely, if ever, found their way into practical applications.

One of the most important components of the Earth is freshwater use. Scientists estimate that we've exceeded the safe limit, meaning we're using and polluting freshwater faster

than nature can replenish it. This can lead to water scarcity, affecting everything from ecosystems to agriculture and drinking water supplies. In the coming decades, these challenges are likely to be exacerbated by climatic and social changes in many regions of the world. There is therefore an urgent need to define a safe operating space (SOS) for water resources in a changing climate and society, to ensure sufficient and reliable water supplies of a quality acceptable for human activities and natural ecosystems.

Staying within the safe zone for water requires innovative solutions, from water conservation to sustainable agricultural practices, to ensure a healthy future for all.

Project outline

SOS-Water is a project funded by the European Union's Horizon Europe Framework Programme for Research and Innovation. It has a consortium of ten European partners and one additional partner from Vietnam. SOS-Water is coordinated by the Water Security Group of the International Institute for Applied Systems Analysis (IIASA).



SOS-Water aims to create a holistic framework for the assessment of the SOS of water systems. The basis of this framework will be developed in four different case studies in close collaboration with local key stakeholders on the Rhine, the Danube, the Jucar Basin in Spain and the Mekong Delta.

SOS-Water will develop a set of indicators to assess the state of the water system, taking into account not only water values, but also biodiversity and even the interactions of society, policy and economy with water use and the environment. This assessment will be driven by a strong local stakeholder engagement process. At the same time, the project will develop a robust and diverse modelling infrastructure that will allow to examine the current state of the water systems in the case studies and make predictions for the future. Ultimately, this will allow to design a multi-dimensional SOS of policies and water management pathways, that will be evaluated across a wide range of future scenarios. The results of SOS-Water will contribute to a better understanding of water resource availability and facilitate water planning and management from local to regional scales, so that the allocation of water to societies, economies and ecosystems is economically efficient, socially equitable and resilient to socio-economic (e.g., financial crises) and climatic shocks (e.g., droughts and floods).

First stakeholders' workshop for the Danube case study

On November 22, 2022, the first SOS-Water project stakeholder workshop for the Danube basin was held in Vienna, Austria. A total of 29 people from five countries attended the workshop, including stakeholders representing a wide range of freshwater-related institutions in the Danube basin. The International Association for Danube Research (IAD) was

also present. The workshop was organized by researchers from the International Institute for Applied Systems Analysis (IIASA), the Norwegian Institute for Water Research (NIVA), the Romanian National Institute for Research and Development of Marine Geology and Geoecology (GeoEcoMar) and the IGB Leibniz-Institute of Freshwater Ecology and Inland Fisheries.

The aim of this first workshop was to establish an ongoing dialogue involving all significant interest groups related to freshwater in the Danube basin. Through interactive and engaging activities, stakeholders and researchers collectively identified which are the local water challenges in the Danube basin, as well as the needs and preferences of stakeholders. The participation of representatives from three institutions in Romania facilitated collaborative discussions addressing the distinctive issues faced by the Danube Delta in comparison to the rest of the basin.

It was a fruitful day of discussion and exchange, highlighting the importance of collaboration, especially in the framework of a transboundary basin, and emphasizing the need for coordinated efforts to address complex water management challenges.

The insights gained from the workshop will inform the formulation of a Safe Operating Space framework for water resources. Over four years the SOS-Water project will host a total of four workshops for the Danube basin that will culminate in a case-study-specific SOS-Water framework, which aims to illustrate diverse water futures depending on water allocations for human water use and the environment to support healthy ecosystems and ecosystem services.

More information on the project and the Danube case study can be found at www.sos-water.eu.

Link to IIASA pictures: <https://www.flickr.com/photos/iiasa/albums/72157648154449307>

Danube Congress Ingolstadt

Christine Margraf

BUND Naturschutz in Bayern (Friends of the Earth Bavaria), Munich, Germany, e-mail: naturschutz@bund-naturschutz.de

'Securing the Future of the Danube as a Habitat for People and Nature' was the topic of the 32nd International Danube Congress of the BUND Nature Conservation (Friends of the Earth) on December 2, 2023, in Ingolstadt. The central needs of today are: more restoration, more dynamics, more ecological connectivity across the Danube throughout Europe and thus more recreational space for the population.

The conference began with project ideas for the restoration of the Danube in Ingolstadt. Landscape architect Georg Kestel, together with Reglind Seyberth from the local group

BUND Ingolstadt, presented a concept for the development of more dynamics and closeness to nature on the banks of the Danube in the urban area: 'A natural Danube for people and nature'. Not only little ringed plovers and huchen (Danube salmon) should benefit from this, but also people through the increase in attractive and at least partially more accessible riverbanks. The talk was supplemented by the presentation of the development of a Danube city park in Ingolstadt as part of the EU Blue Green City project by Thomas Schneider from the Climate, Biodiversity & Danube Office of Ingolstadt. Elements include a jetty cafe, a Danube stage and riverbank flattening for restoration. The Danube is an indispensable building block for a climate-adapted and livable Ingolstadt. Improving the biotope



*Presentation of the LIFE WILDIsland project by Siegfried Geissler, head of the district's nature conservation authority of Neuburg-Schrobenhausen/Germany.
© Lena-Henrike Maly-Wischhof*

network is a central goal of both the city's and BUND's concept.

The tour then moved from the urban Danube to the neighboring area of the extensive alluvial forests between Neuburg and Ingolstadt on the dammed Danube. Prof. Dr. Bernd Cyffka from the CU Eichstätt-Ingolstadt, Floodplain Institute Neuburg-Ingolstadt, presented the results of the monitoring of the dynamisation implemented here in 2010 by means of a bypass and ecological flooding. The results show that the organisms reacted very differently and at very different speeds to the measures. Water volume, dynamics, fluctuation range and the spatial scope of the measures were not sufficient to have an effect in the Danube floodplain; the effect is limited to the secondary floodplain of the bypass watercourse. Long-term monitoring is particularly important in the floodplain, which is why monitoring was repeated and supplemented in 2022. The explanations were supplemented by examples from the EU project 'DanubeFloodplain' (Reduction of Flood Risk by Restoring Floodplains along the Danube).

Siegfried Geissler from the nature conservation authority of the Neuburg-Schrobenhausen county then showed the potential and already realised measures for 'WILDIslands', also with examples along the entire Danube. The DanubeParks LIFE project 'WildIslands' aims to improve the habitat quality and biotope network of the 912 Danube islands. 34 islands are being revitalised through hydro-morphological or silvicultural measures. In addition, a Danube-wide protection concept has been developed, and a RAMSAR regional initiative has been launched. Examples of measures in the vicinity of Ingolstadt include the removal of stones and the restoration of a side arm on two islands at the Ussel estuary. As one of the measures is also an implementation project

of the Bavarian 'Masterplan for the development and selection of projects to implement the European Danube Region Strategy in Bavaria', Geissler also briefly presented the masterplan.

The presentation by Herman Wanningen from the World Fish Migration Foundation, who presented the 'Dam Removal' initiative as a contribution to achieving the objectives of the EU Biodiversity Strategy, provided a possible glimpse into the future of the Danube. More than 1.2 million dams fragment European rivers, blocking the path of fish and other species as well as the coarse material that is crucial for natural river dynamics and fundamentally changing the river and its floodplain. Impressive examples of dam removals and enthusiastic people from all over Europe showed the path to and the success of dam removals.

In addition to the focus on the Danube, Dr. Thomas Schwaiger from the Management Board of Ingolstadt's Municipal Undertaking focused on the need to pay more attention to urban water. He presented the flash flood risk management of the City of Ingolstadt, which was developed from 2020-2023, 75% of which was funded by the Bavarian Ministry of the Environment through the 'Integral concepts for municipal risk management' funding programme. After analysing the current situation and identifying hazards, measures were developed to provide information, precautionary land use, manage crises and improve monitoring as well as structural protection measures. The hazard map produced is publicly accessible.

All lectures as well as the '10-point Action Plan for Protecting the Danube' created from the conference, can be found in German language at <https://ingolstadt.bund-naturschutz.de/aktuelles/artikel/donaukongress-2923-nachlese>

3rd Austrian National Participation Day of the European Strategy for the Danube Region Waters 2040: Climate Change and Resilient Water Management in the Danube

Gertrud Haidvogl, Thomas Hein

Institute of Hydrobiology and Aquatic Ecosystem Management, University of Natural Resources and Life Sciences Vienna, Austria, email: Gertrud.haidvogl@boku.ac.at; Thomas.hein@boku.ac.at

'On Tuesday, April 9, 2024, the 3rd Austrian National Participation Day was organised at the River Lab, Institute of Hydraulic Engineering and River Research (IWA), BOKU University. It was dedicated to the topic 'Waters 2040: Climate Change and Resilient Water Management in the Danube Catchment'.

The National Participation Day was organised by Foster Europe Foundation for Strong European Regions, in collaboration with the University of Natural Resources and Life Sciences, Vienna, the BOKU Doctoral School HR21, the International Association of Danube Research (IAD), the Danube Civil Society Forum and the EUSDR Priority Area 10 – Institutional Capacity and Cooperation, under the auspices of the Austrian EUSDR Presidency 2024.

The event, which was attended by experts from 21 nations, started with a keynote speech by Leonore Gewessler, the Austrian Minister for Climate Action, Environment, Mobility, Innovation and Technology. Minister Gewessler emphasized the need to tackle water management challenges related to the climate crisis and its effects in the Danube Region.

She highlighted the role of the EU Strategy for the Danube Region (EUSDR) as an important frame for cooperation and cross-sectoral exchange and the need to involve the young generation and the civil society.

National Participation Days in the Danube Region Strategy participating countries are organized regularly. They aim at strengthening trust between public authorities and civil society towards better cooperation for the well-being of people living in the Danube Region. During the Austrian National Participation Day crucial aspects of water management were explored, including cross-priority areas discussions on floods and droughts and their effects on inland water transportation, sustainable energy, water quality, environmental risks, biodiversity, ecosystems, collaboration among relevant institutions, and engagement of citizens. Three key topics relevant to future sustainable water management provided the frame for input presentations and discussions.

- Extreme Hazard and Climate Change
- Biodiversity Crisis & Challenges in Water Quality
- Energy & Transport

PhD students of the BOKU Doctoral School Human Rivers in the 21st Century presented their innovative and highly pertinent research in all three topics and during poster shows during the breaks. Prof. Carmen Postolache, University of



Pressing topics of the Danube's Future were discussed in four world cafes. © Foster Europe

Bucharest and IAD-Expert Group Leader for Water Quality, gave a talk on challenges in Danube Water quality. In the four World Cafes organised in the afternoon 'Co-creation, Co-design and Citizen Science' was another subject of exchange.

As a result of the Participation Day, recommendations on each key area included in the agenda were summarized. This

document will be forwarded to representatives of the EUSDR, e.g., during the Annual Forum in June 2024 and on other occasions. The document and further information can be accessed here:

<https://danubestrategy.eu/events/3rd-npd-austria-waters2040>

International Symposium „Deltas & Wetlands” at DDNI, Tulcea, May 2024

Bernd Cyffka¹, Edward Bratfanof²

¹ Applied Physical Geography, CU Eichstätt-Ingolstadt, Floodplain Institute Neuburg-Ingolstadt, Germany, email: bernd.cyffka@ku.de

² Danube Delta Technological Information Center, Danube Delta National Institute for Research and Development, Tulcea, Romania, email: edward.bratfanof@ddni.ro

The 'Danube Delta National Institute for Research and Development' organized in Tulcea, between May 13 - 17, 2024, the 31st edition of the 'Deltas & Wetlands' International Symposium (<https://ddni.ro/wps/deltaswetlands-31-symposium-2024/>). The event was attended by approx. 200 representatives from 20 countries. It took place under the patronage of IAD (International Association for Danube Research), BENA (Balkan Environment Association), with the support of the Tulcea County Council and the Danube Delta Biosphere Reserve Authority.

The Symposium included four sections, covering several research fields: biodiversity and nature conservation, environmental factors, anthropogenic impact, new research approaches regarding climate change in the European Green Deal Challenges, natural and socio-economic resources, GIS & modelling systems.

Honorary plaques with the title 'Researchers Emeritus' were awarded to Nicolae PANIN and Dan BĂLTEANU. Stoica Preda GODEANU presented the book 'The eight layers of our planet', in the process of release.

The Symposium brought together specialists and researchers, among them Andreea STRACHINESCU, Head of unit - DG MARE, Ming JIANG, Chinese Academy of Sciences, Ulrike LEIS, Deputy Director - Project Finance Program European Climate Initiative (EUKI), Delia DIMITRIU, Climate Impact Director – Smarter Mobility Solutions, Nick NELSON – Inter-Fluve from the United States as well as the IAD members Katrin TEUBNER (General Secretary) and Bernd CYFFKA (President).

Two Living Labs were held within the EcoDaLLi project, the main objective of which was to coagulate the governance structures of the Danube in terms of innovative solutions for the ecological restoration, protection and conservation of the Danube basin and the Danube Delta.

Topics of the presentations addressed the pillars of the Danube Delta Decarbonisation Strategy developed by the 3D Initiative



View of the auditorium. © Edward Bratfanof

(<https://edaphic-bloom.eu/>): Mobility Pillar, Agriculture Pillar, Energy Pillar, Climate Change Mitigation and Adaptation Pillar, Circular Economy Pillar and issues regarding cooperation between the Danube and the Nile deltas.

The round table 'Artificial intelligence for climate change adaptation and mitigation', concluded that an increasing number of researchers are turning to artificial intelligence (AI) to monitor biodiversity and streamline efforts to help species threatened by decline or even extinction. Unlike conventional methods that can disrupt ecosystems or require considerable time, labor and resources, AI has the potential to analyze large amounts of real-world data quickly and efficiently.

Biodiversity loss is one of the most critical issues facing humanity, requiring urgent and coordinated action. Despite continuous conservation efforts, biodiversity has declined dra-

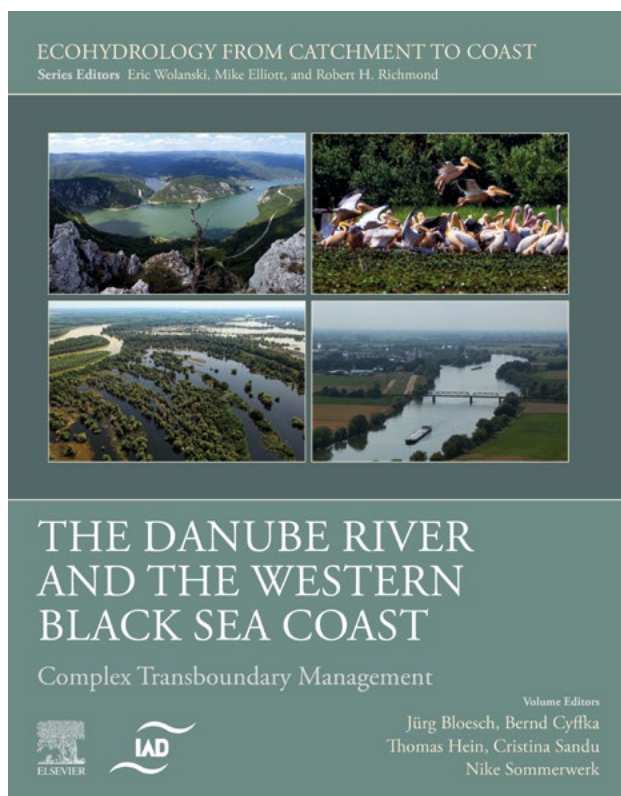
matically in recent decades. Artificial intelligence (AI) is a tool that offers opportunities to accelerate action on biodiversity conservation.

The PICO Business session was an opportunity to explore and discuss issues related to the public CDI partnership with the business environment in an interactive and engaging format. Through the PICO method, participants presented and discussed ideas, innovations and business projects in a concise and structured way.

The symposium provides a valuable platform for the exchange of knowledge, ideas and experiences in wetland ecology and health. The resulting conclusions will serve as a starting point for concrete actions and continued engagement in conserving and protecting wetlands and promoting sustainability in natural resource management.

New book announcement:

The Danube River and The Western Black Sea Coast: Complex Transboundary Management



This book is a new volume in the Elsevier series 'Ecohydrology from Catchment to Coast' treating all large rivers in the world. According to the headline, it focuses on the second largest river in Europe, the Danube River Basin (DRB) and its recipient, the Western Black Sea Coast (WBSC). Sturgeons, as prominent flagship species, that appears in a few chapters, show best the link between the sea and the river. The Editorial

Board and most of the Chapter Authors are IAD members, making this book truly an IAD-publication.

An Introduction (Theory and Practice – Science meets Management) and a summary with outlook (Towards a sustainability approach for the socio-ecological system) encircles three parts: The first part (Chapters 2-7) treats selected scientific aspects such as hydrology and hydromorphology, sediment balance, water quality, aquatic biodiversity, the Danube Delta and the Black Sea Coast. The middle part (Chapters 8-13) covers key pressures and implementation of transboundary water management: hydromorphological alterations and overexploitation of aquatic resources, invasive species, climate change, political key players, the role of protected areas, and stakeholder participation. The third part (Chapters 14-16) assesses visions for a sustainable future in the Danube River Basin, considering sustainable development, ecosystem services, human interaction, and improving biodiversity through floodplain conservation and restoration. Amongst others, the primacy of the economy (business as usual) is questioned with regard to DRB and WBSC development. The greatest political problem is the badly missing implementation of environmental law. A key element for successful projects is the proper application of public participation. A couple of distinct case studies clearly elucidate the existing environmental problems.

The book is addressed to a variety of potential readers, from scientists and students to water managers, economists, nature conservationists and the interested public. Its publication is scheduled for 4th quarter of 2024.

International Association for Danube Research (IAD)

Presidium

President Prof. Dr. Bernd CYFFKA	Vice President Dr. Cristina SANDU	General Secretary PD Dr. Katrin TEUBNER
--	---	---

Member Country Representatives

DE Prof. Dr. Bernd CYFFKA	CH Dr. Edith DURISCH-KAISER	AT Dr. Gertrud HAIDVOGL	CZ Dr. Petr PARIL	SK Prof. Dr. Vladimír KOVÁČ	HU Prof. Dr. Vera ISTVÁNOVICS	HR Prof. Dr. Melita MIHALJEVIĆ
SI Prof. Dr. Mateja GERM	BA N.N.	RS Dr. Snezana RADULOVIC	RO Dr. Albert SCRIECIU	BG Prof. Dr. Teodora TRICHKOVA	MD Prof. Dr. Ion TODERAS	UA Dr. Artem LYASHENKO

Expert Groups

Water Quality Prof. Dr. Carmen POSTOLACHE	Biotic processes Prof. Dr. Thomas HEIN	Microbiology Prof. Dr. Alexander KIRSCHNER	Phytoplankton / Phytoplankton PD Dr. Katrin TEUBNER	Macrophytes Prof. Dr. Georg JANAUER	
LTSE & Environmental History Dr. Gertrud HAIDVOGL Prof. Dr. Martin SCHMID	Fish Biology / Fishery Dr. Mirjana LENHARDT	Invasive Alien Species Prof. Dr. Teodora TRICHKOVA	Ecotoxicology N.N.	Delta / Fore-Delta Dr. Julian NICHESU	Sustainable Development & Public Participation Dr. Harald KUTZENBERGER Prof. Dr. Doru BĂNĂDUC



Catchment of the River Danube

© EuroGeographics for the administrative boundaries, ICPDR for river network, Cartography: C. Pietsch, 2019, 2023

General Secretary:

International Association for Danube Research (IAD)
PD Dr. Katrin Teubner
Dept. Functional & Evolutionary Ecology
Faculty of Life Sciences
University of Vienna
Djerassiplatz 3, 1030 Vienna
katrin.teubner@univie.ac.at

Editors:

Prof. Dr. Bernd Cyffka
CU Eichstätt-Ingolstadt
bernd.cyffka@ku.de
PD Dr. Gertrud Haidvogel
BOKU Vienna
gertrud.haidvogel@boku.ac.at

Layout:

M. Diener, info@diener-grafics.ch

Printing:

Druckwerk24, Wolfgang Rückel
Eisengasse C125,
D-86633 Neuburg a.d. Donau