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Editorial

Last year the European River Symposium was held. The subtitle of the symposium was 'The EU Biodiversity Strategy 2030 and the EU Green Deal shaping Europe's Water management. The intent of the symposium was to help participants get acquainted with the new initiatives to support rivers and wetlands in the EU Biodiversity Strategy and the EU Green Deal and to stimulate the use of these new opportunities in the future.

Reading the articles in this newsletter proves that this can really be the case. They actually teach us that the future started already some years ago. Each of the articles describes a start of a new initiative in the past and showing the results today. It appears that these results match very good with the objectives of the Biodiversity Strategy and the Green Deal policy. This means that implementing these strategy and policy is not starting from scratch, but that is a matter of scaling and speeding up these new types of integrated river basin restoration including funding and financing.

The Norwegian National Restoration Project enables the restoration of North Norway and the 'ecological reopening' of Oslo making Norway's future bright and blue. The Nature Conservancy works on defining prioritised investment plans and attracting more coordinated and targeted funding to deliver those plans for much greater funding and repayable financing which are both needed to deliver on the EU's goals of restoring rivers, free flowing or not!

The Slovenian river restoration practices lead to more biodiversity and multiple ecosystem services, which improve human health and social life, and support economy in various sectors. The MIC's citizen science focuses on selecting short- and long-term impacts that the stakeholders deem to be the high priority for the project and establishing a plan to assess whether these impacts are being achieved or not.

And the last two articles demonstrate an effective Integrated River Basin Management and Planning for fresh water restoration and the reduction of flood risk through floodplain restoration in the Danube basin. The two articles are so much interrelated that reading one, should make you reading the other one as well.

For the event calendar we direct you to the event section of the ECRR website showing enough interesting events you could participate in and challenging you to international travel, what will be hopeful possible again after a while. But first enjoy your time with reading this newsletter!

Bart Fokkens, ECRR and WI. Timur Pavlyuk, RosNIIVH Francisco Martinez Capel, CIREF





Trees on the floodplain in Croatia ©Safarek Goran

Norwegian strategy for river restoration in place

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For more than 10 years, the Norwegian Restoration Project (NRP) at agency level has been organising national seminars on restoration of watercourses and wetlands. The seminars serve as a network arena between authorities, research, consultants, NGOs and the public. The programme includes presentations on recent developments in scientific research & development, as well as best practice examples of restoration projects and inspiring international key-note speakers. The annual seminar has fuelled an increasing interest in watercourse and wetland restoration, as we can tell from the steadily increasing number of relevant projects, published research reports and participants.



Photo 1. Restoration of Northern Norway ©Andreas Lium



Photo 2. Reopening Oslo ©Anders Iversen

Early 2020, the NRP was given the task of developing a proposal for a National River Restoration Strategy towards 2030. Mid-September 2021, our inter-agency proposal was handed over to all the Ministries, as it should be a real national project. The two primary objectives in the proposed strategy are to:

• Restore at least 15 % of degraded watercourses by 2030.

• Reverse the negative trend by 2030, restoring watercourses at a higher rate than they are being degraded.

The objectives are to be accomplished through three primary focus areas:

• Improved cross-sectoral coordination for planning, financing and use of legislation for river restoration.

• Reinforced knowledge, based on existing and new experiences, as well as more systematic pre- and post-evaluations when implementing restoration projects.

• Enhanced dissemination of knowledge, examples, results and experiences.

All three primary focus areas, will together reinforce total restoration capacity. A number of people in key positions has already completed relevant courses implemented by the RRC (UK), and as a result of this we are planning for the development of national courses as well.

Further, our proposal included the strategy to be followed by a dynamic Action Plan. The action plan will include selected watercourses prioritized for coordinated action, as well as specific actions to be made in order to fulfil the strategic focus areas – and thus succeed with our ambitious objectives. Recently, the all ministries reported back with their full support to our proposed strategy and gave their "green light" to continue our work with developing an inter-agency Action Plan.



Photo 3. Atlantic Salmon © Andreas (Lium)



Photo 4. An intact ecosystem! © Andreas (Lium)



European inspiration & tools

While not being an EU member, we're still highly inspired and motivated by the current great international momentum within the field of restoration. Networks such as the European Centre for River Restoration are of great value in this regard. Our restoration strategy is very much in line with ongoing work being done in the EU countries. In addition, several ready-to-use tools are already being used or considered to be used.

At the moment there are total of 1400+ case studies, including 30 registered Norwegian restoration cases, in the web-based River Restoration Centre (UK) database <u>RiverWiki</u>. The Norwegian Water Institute (NIVA) has developed a Norwegian user manual for registering projects in the database, thus making it easier for project owners to do the unaided registrations. By having a user manual in place, the Norwegian Environment Agency can demand registration in the database as a requirement for projects we support financially.

The AMBER project app *Barrier Tracker* has also been translated into Norwegian, and registrations of barriers in Norway are currently being done as part of a citizen science pilot-project. We strongly believe in the importance of local interest and involvement of the general public, in order to achieve our primary goal of healthier and better watercourses functioning in the future.



Photo 5. The Tromsa dam removal © Andreas (Lium)

Going forward, increased connectivity in and along Norwegian watercourses through work on both lateral and longitudinal barriers and riparian zones are of the highest priority, also in line with the EU Biodiversity Strategy goal of restoring 25 000 km free flowing rivers by 2030.

Financing river restoration in Norway

There are mechanisms in place for financing restoration projects in Norway. (see bullet points below). With more knowledge, experience and well documented successful examples of watercourse restoration with benefits to society, we believe that budgets will increase.

• <u>Polluter pays principle</u>: Applies where the entity causing negative impacts can be clearly identified and held accountable (*e.g. Pollution permits for industry, Hydropower licence conditions*).

• <u>Environment Agency</u>: Annual grant scheme for water environment measures, linked to goals stated in the WFD (*e.g. improve habitats/connectivity, reduce run-off/pollution*). In 2021 2.4 mill. Euros in total, to 80 different projects.

• <u>Water resources and Energy Directorate</u>: Grant scheme for flood, landslide and environmental measures (*e.g. pull back or remove old style flood defences*). 2019-2020, average sum to river restoration projects was: 2.0 mill. Euros annually.

• <u>Agriculture Agency</u>: Regional and local grant schemes to reduce agricultural run-off (*e.g. ponds and wetland areas for sedimentation and nutrient retention, improvement of riparian zones*).

• <u>Roads Authority</u>: Measures to mitigate environmental impact or restore negatively affected watercourses. Cost integrated in budgets for construction and maintenance (*e.g. redesigning culverts to improve longitudinal connectivity*).

• <u>Municipalities:</u> Land use planning tools (*e.g. sequence provisions and agreements with developers*), ordinary budgets for water services.

Momentum

Looking ahead, there is good momentum within the field of restoration at the moment, and EU initiatives are influencing the work for protecting and improving aquatic ecosystems in Norway in a very positive way.

Only a few days before writing this this article, a 10m high obsolete hydropower dam in concrete was blown up and removed – reconnecting 10+ kilometres of beautiful tributary habitat for trout to the main river. The project is the first of its kind in Norway (Norway blows up hydro dam to restore river health and fish stocks | Rivers | The Guardian)

The future looks bright and blue!



Photo 6. Removing the seven-metre dam, in Fåvang, Norway, which has not been used in 50 years. © Rob Kleinjans



Funding river restoration in Europe: A call for focus and coordination

TNC Europe submission to ECRR March 2022 Technical Newsletter

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Many of Europe's waterways are highly fragmented and degraded, which is contributing to their collective decline and driving a significant loss of freshwater biodiversity across the continent. Restoring Europe's rivers is critical to reversing these trends.

Restoration measures like removing obsolete barriers allows reconnecting rivers so that fish can move freely to and from their spawning grounds; restoring floodplains can boost resilience to floods and droughts; and re-meandering rivers can provide improved habitats for a diversity of aquatic life. Although river restoration has been recognised as a key objective in the European Union following the adoption of the Water Framework Directive in 2000 and of the Biodiversity Strategy in 2021, questions remain as to how funding for these interventions can be mobilised in a targeted and coordinated way so as to achieve Europe's ambitious targets.



Photo 1. Ennerdale Mill Weir in River Ehen before removal ©West Cumbria River Trust

Across Europe, partners from diverse sectors are working hard to answer these questions and deliver on shared river restoration goals. Over the last 5 years, The Nature Conservancy (TNC) has increased its engagement in Europe on freshwater issues, with a focus on restoring and protecting rivers, as well as avoiding impact from hydropower development. We seek to contribute by bringing innovation and fresh approaches, including by testing investment and governance models that could accelerate and scale ongoing efforts. TNC is a leading global conservation organisation with the mission to conserve the lands and waters on which all life depends. We have accumulated decades of experience with river restoration in the United States and around the world, with more than 300 ongoing freshwater projects across all continents. In Europe, we seek to contribute to mobilising funding for river restoration in three main ways:

• By supporting the development and operationalisation of science-based prioritisation methods and tools, so that interventions can be better directed to the places where they will have the greatest chance of generating positive returns on investment and co-benefits.

• By seeking to address the fragmentation of funding flows, on both the supply and demand sides of the financing equation, so that funding for river restoration can be delivered at a larger scale than ever before.

• And last, but not least, by supporting the preparation of sound investment projects that include river restoration as core objectives, so that demand for funding can adequately be met by supply.

What needs to be done and where?

Two leading causes of river degradation in Europe include hydromorphological change and intensive agricultural practices, which together contribute to many freshwater bodies not meeting 'good ecological status' goals as per the Water Framework Directive and to a <u>staggering 93% decline in migratory</u>

freshwater fish populations in Europe since the 1970s.

The importance of removing obsolete barriers to address particularly high levels of river fragmentation in Europe has become clearer in recent years. River flow, stream bank manipulation, and sediment transport the hydrogeomorphological elements of rivers – are impacted tremendously by barriers. It is estimated that 40 % of all surface water bodies in the European Union are impacted by barriers. The AMBER International project, supported by Horizon 2020 and in which TNC's Joshua Royte served in an advisory capacity, developed and ran a methodology to map river barriers, calculate their density and the length of free-flowing rivers across the continent. The project also developed tools to prioritize restoration and test new technologies for river biodiversity indicators. According to project estimates, there are over 1.2 million barriers in

European rivers. This is equivalent to 0.75 barriers per kilometre on average, making Europe home to the world's most fragmented river systems. <u>Most of these are small barriers</u>, and many are obsolete with no socio-economic benefit.

Removing these structures is supported by EU legislation. The <u>EU 2030 Biodiversity strategy</u> included the target to restore continuity across 25,000 kilometres of river systems; the upcoming EU Nature Restoration Law (expected in March 2022) will play a critical role for implementing this strategy. Prioritising barrier removal could help free up <u>many more</u> <u>rivers</u> according to a recent study commissioned by the World Wildlife Fund (WWF), meaning that the scale of the opportunity is significant.

A second leading cause of river deterioration in Europe is diffuse pollution from agriculture. Intensive agriculture leads



to nutrient leaching and soil run-off into waterways. A <u>Europe-wide analysis published by TNC</u> in 2020 found that surface waters could significantly benefit from at-scale adoption of agricultural best management practices, such as cover crops and riparian buffers. Beyond addressing pollution, greater investment in <u>nature-based solutions (NbS) could contribute</u> to boosting watersheds resilience and mitigate the impacts of floods and droughts, with floods alone causing an estimated € 224 billion in economic losses between 1980 and 2020 according to <u>estimates from the European Environment Agency</u>.



Photo 2. Seeding wild flower meadows in North Norfolk ©The Nature Conservancy

Funding for river restoration is starting to be mobilised at scale

The European Union has agreed to make funding available to restore ecosystems, including rivers specifically. Implementing the EU Biodiversity Strategy will require an increase in spending on biodiversity of €20 billion a year by 2030. Co-legislators have agreed to work towards a goal of dedicating 7.5% of the 2021-2027 Multiannual Financial Framework (the long-term EU budget) to biodiversity objectives by 2024, and 10% by 2026. Cohesion funds have already been used successfully by Member States to those ends, such as in Estonia for the <u>removal of the Sindi Dam</u>.

Private funding is also coming to the fore, although mostly from philanthropic sources to date. One such initiative came from the <u>Arcadia Fund</u>, which, with support from partners of the AMBER project including TNC and Dam Removal Europe, set up the <u>Open Rivers Programme</u>. The Fund will deploy €42.5 million over the next 6 years to support small dam removals and work on strengthening enabling conditions, including fostering the adoption of better rules and providing technical expertise and training to project managers.

While initiatives like these are bringing much needed funding to bear, it is our view that a centralised funding instrument could be even more impactful. Such a mechanism could bring greater clarity and enhance access to funding, compared to current EU funding streams that are scattered across the portfolios of the various Directorates of the European Commission. As a result, we are exploring options for establishing a Nature Restoration Fund and formulated proposals for doing so. Consolidating funding could support coherent and comprehensive ecoregion/ecosystem-scale financial planning across all EU legal instruments.



Photo 3. Wetland waste water treatment ©The Nature Conservancy

Channelling large scale funding calls for setting up investment vehicles that can absorb such funding

To target and coordinate investments, it is often necessary to set up investment vehicles that are able to absorb funding and channel such funding to the most relevant river restoration efforts on the ground. With that in mind, TNC has developed an approach referred to as <u>Water Funds</u>, which are organizations that design and enhance financial and governance mechanisms to unite public, private and civil society stakeholders around a common goal to contribute to water security through nature-based solutions. TNC has contributed to the establishment of more than 40 of these structures, typically to address watershed issues impacting river health but these models could also be set up to tackle other aspects of river health, particularly in circumstances where governance is fragmented.

The roles these platforms can play vary. For example, they may focus on centralising and disseminating information and lessons learned on funding opportunities and eligibility criteria, making it easier for communities to access funding and develop projects. They also can support the development and invest in flagship nature-based solutions projects, by bringing smaller projects under a collective body to increase attractiveness for funding, and even mobilize funding for project areas that traditional funders are not targeting. In <u>Norfolk</u> in Eastern England, TNC is working with local partners including the Norfolk County Council, Anglian Water and Water Resources East (a regional water resource planning platform) on developing such approaches. Our preliminary analysis found that



funding sources and channels are complex and fragmented. We proposed to address this through establishing a collective action platform, which is already working on setting up a visualisation tool to showcase current and future nature-based solutions initiatives in the county. These activities lay the basis for establishing the Norfolk Water Fund, which will focus on increasing resilience of water resource management for all users and in particular address issues related to intra-year water variability.

Providing support to project developers for river restoration projects

Finally, strong project preparation is needed in order to match available funds with investable projects on the ground. TNC has developed a set of guidance documents on removing barriers and others on preparing Watershed investment programmes. We also contributed to the development of an investor guide for NBS for water security in collaboration with the World Water Council and Finance Earth. These documents will be launched at the World Water Forum in Dakar in March 2022. TNC has initiated training programmes for DFI staff and their clients (such as government agencies) to better understand what NBS can offer and how to develop investable NbS projects. On the ground, TNC is working in Greece and Cyprus with the European Investment Bank (EIB) and a consortium of partners (including WWF Greece, GIB Foundation, ICATALIST, Swiss Re and Cyprus Energy Agency) to develop NBS projects to minimise the impact of flooding in the Thessaly plain, and the Pedieos River Basin in Cyprus.

In all of these projects, TNC works on defining prioritised investment plans and attracting more coordinated and targeted funding to deliver those plans. Attracting repayable financing remains somewhat elusive at this stage, but <u>investors have</u> <u>expressed growing interest in investing in natural capital</u>, and water and agriculture in particular. Going forward, it is likely that, with a better track-record and increased visibility, the area of river restoration could start attracting much greater funding and repayable financing which are both needed to deliver on the EU's goals of restoring its rivers.



Photo 4 and 5. Hostovests Ukraine before and after the dam removal ©WWF Ukraine

River restoration practices in Slovenia

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Objectives and challenges

Slovenia is intertwined with watercourses, from small streams to bigger rivers; altogether, there are more than 27.000 km of surface river network in Slovenia. Beside that, due to the karstic nature of significant part of the territory of Slovenia, there is also an important share of the groundwater network. The watercourses provide biodiversity and multiple ecosystem services (ES), which improve human health and social life, and support economy in various sectors. This is also the reason to improve river sections which are under different human pressures and consequently with poor supply of ES and threatened biodiversity. To give the rivers their natural state, some improvements in their corridors must be taken into account. Besides assuring the natural sinuosity of rivers, also adequate space for riparian vegetation and retention space must be preserved. Of course, where other important uses of space, e.g. settlements and infrastructure, are already present some innovative technical solutions must be implemented. Such a river corridor can then provide various ES, not only Cultural, e.g. recreation and tourism, but also Provisional ES, e.g. plant resources, improved water supply or fisheries, and Regulation & Maintenance ES, e.g. retention of nutrients, flood and drought mitigation or soil formation.





Figure 1: Adequate river corridor space for conservation of its main functions (adapted by FOWG, 2001)

To reach these goals next measures are topic in Slovenia: • Decrease in emissions (e.g., eco farming in near distance from river),

• Improving retention capacities (e.g., reactivation of excluded flood areas or old meanders),

• mproving lateral and longitudinal connectivity (fish passes, reopening of the river banks, etc.).

One of the major challenges for effective river restoration implementation is the large number of landowners along and within the river corridors. Therefore, before the restoration works can start, besides providing adequate financial resources the time for communication and negotiation can be largely consumed.

In continuation two river restoration cases in Slovenia are presented, first case deals with river restoration in a settlement area and the second one in an agricultural area.

CASE 1: Restoration of water infrastructure in the Sora River in Medvode town

The Sora River has a confluence with the Sava River in Medvode town. This section of the river is populated on both banks, and has two bridges. To prevent the instability of the downstream bridge, the old one, a small weir was built. In 2014 an extreme flood event eroded the left side of the weir and put in danger some nearby infrastructure. A quick renovation took place, but it was just of emergency type and more detailed planning of more integrative solution has started.



Figure 2: Weir in the Sora River for stabilization of the upstream bridge and the river banks.

The Sora River is also a habitat, especially in spawning season, for Danube Salmon (*Hucho hucho*) which inhabits the Sava River. The Sava River is dammed just 800 m upstream from the confluence with the Sora River, what is another reason why the habitats of the Sora River should improve its connectivity. Since the old weir prevented the efficient migration of Danube Salmon upstream -due to its height-, the planning of reconstruction considered the upstream fish migration. To assure the conveyance of flood discharges and to prevent the banks erosion, the reinforcement of the banks in critical sections was planned. To improve the habitat for fish, the design of groins and placement of big stable rocks were also foreseen.

Figure 3: Aerial view of the Sora River in Medvode town before the confluent with the Sava River, after the reconstruction with description of main activities





The project started in 2017 and was finished in 2018. The cost was around 550.000 EUR, and financial resources were provided by the National Water Fund, with small share from the Local Community Budget. The result was an improved river section for fish habitat, longitudinal connectivity is assured and also flood and erosion risks are mitigated.

Figure 4: Replacement of the old weir with a new two-segment ramp.

Although it is still too early to confirm the positive effects on fish population, the local fishermen already observe the increase in presence of the Danube Salmon.

CASE 2: Restoration of the Stržen stream in the intermittent Cerknica Lake

(KRAS.RE.VITA Project, co-financed by the European Regional Development Fund and the Republic of Slovenia, and Life Stržen Project, co-financed by the LIFE Programme)

The main activity of these two projects is the restoration of two parts of the old riverbed of the Stržen Stream in a losing segment on the Cerknica polje, which was regulated in the past. The aim of the restoration is to improve the living conditions of the Natura 2000 species dependent on the most important watercourse in the Cerknica polje. In the Cerknica polje, which lies in the karst area, an intermittent lake was formed, where water persists for nine months a year, approximately. When full, the Cerknica Lake is the largest lake in Slovenia and one of the largest intermittent lakes in Europe. This area of exceptional biodiversity is part of the protected area of the Notranjska Regional Park and a Natura 2000 site.



Figure 5: Map of three karst poljes of the Ljubljanica River catchment, with designation of the restoration area in the intermittent Cerknica Lake.



In the past (between 1844 and 1958), all 10 watercourses in this area were regulated. Prior to the interventions, the total length of the riverbeds was 45 km, after their regulation it was shortened to about 33 km.

After successful restoration of the upper parts of two watercourses, in 2018 the Institute of Notranjska Regional Park undertook also the restoration of the Stržen losing stream.

The aim of the project is to increase the water body and the water retention period: in the dry season, the water in the wider and longer riverbed could stay from 20 to 25 days longer, thus improving the living conditions for many endangered species. This will contribute to the return of the Eurasian bittern (*Botaurus stellaris*), a rare bird, which is nesting nowa-days only in the area of the Cerknica Lake. In addition, the self-purification ability of the running water will improve.

Four meanders in two parts of the riverbed (2,600 m and 2,100 m) will be restored to their natural state, and two regulation channels (700 m and 600 m) will be backfilled. The excavation plan follows the dimensions of the natural riverbed, between 10 and 20 m wide and between 1.5 and 2.5 m deep. Prior to backfilling, all fish and crustaceans will be fished out of the channels and moved to safe areas.



Figure 6: Aerial view of the restoration of two meanders of the Stržen Stream in the areas Beli breg (in the front) and Ključi (in the rear). Photo: Hidrotehnik d.o.o.



The operational work is adapted to the very sensitive area of the Cerknica Lake and limited to a period of a little more than a month in an individual season, when the conditions are suitable for work. The first restriction is the prohibition of any encroachment on the lake during the nesting season of birds (April to July). The work is also suspended during periods of high water levels. Indeed, the Cerknica Lake fills up already during the first heavy autumn rains, and the water usually persists until the drier summer months. The third restriction is related to weak bearing soils, especially during unstable meteorological and hydrological conditions, which could not be expected during the dry period. The new situation made it necessary to adapt the transports of the excavated earth, so that instead of the planned dump tracks on wheels, lighter rubber track carriers were used.

The restoration of the Stržen watercourse, which is expected to be completed in 2021, is one of the major projects for improving the water status in Slovenia. Nature is likely to heal "scars" in the wider area in as little as two years. With the transfer of plants from parts of the channel into the new riverbed, the natural balance in the watercourse will be quickly established. For some years after the intervention, the monitoring to assess the establishment of a naturally meandering watercourse will be continuously carried out by the Notranjski Park.

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Transports were possible only by rubber track carriers with load capacity of 5 m³, photo: Jože Papež.



Preparation for the construction of a crossing barrier between the newly excavated Stržen riverbed and the channel for diverting water flow into the new riverbed, in the Ključi area, photo: Hidrotehnik d.o.o.

Figure 7: Physical works for renaturalisation in the Stržen Stream.

Measuring the Impact of Citizen Science (MICS)

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A Recap of the MICS Project

In a previous ECRR Technical Newsletter (January and November 2020) we introduced the Measuring the Impact of Citizen Science (MICS) project (www. mics.tools), a European Union Horizon 2020 funded project that aims to develop approaches and tools to assess citizen science impacts. Understanding

the impact of citizen science activities can help to:

- provide evidence to evaluate projects;
- secure funding;
- design more effective and impactful citizen science initiatives.



Photo 1. MICS Case Studies ©The RRC

Now in its final year, this update reflects on the approaches that MICS has developed to investigate impact and the outcomes of this work.



The focus and scope of river restoration and citizen science projects varies across Europe, with regional differences being driven by the differing needs, context, and approaches to environmental management. In Western Europe, river restoration is increasingly carried out within an ecosystem-based management framework at river or catchment scale; in Southern Europe, river restoration tends to be issue-specific with some ecosystem relevance; while in Central and Eastern Europe, river restoration is about ecosystem protection and related to existing infrastructure.

The MICS impact assessment tools are being tested in five case studies across Europe: in the UK, Romania, Italy, and Hungary (Fig. 1). Two of these projects are pre-existing *contributory* citizen science initiatives (Outfall Safari and Riverfly, UK), and three are new projects (Italy, Hungary and Romania) developed using a *co-design* methodology. In the January 2021 Technical Newsletter, we explored the process of co-design within the MICS case studies and how it was being used to develop hands-on citizen science.

Activities in 2021 focused on working with the stakeholders involved in the case study projects, to explore the avenues through which their projects could generate impact.

The MICS Impact Assessment Framework

To allow us to assess the impact of citizen science projects, the MICS team utilises a conceptual construct known as the MICS Impact Assessment framework. The application of this framework involves three main steps:

1) Context Analysis

2) Design and Validation of Theory of Change (the 'Impact Journey Map')

3) Planning, Monitoring, Evaluation and Learning

Outfall Safari Impact Journey



Fig 1. The locations of the MICS case study sites across Europe.

The *context analysis* ensures that the case study is well understood. Project coordinators are asked to reflect on the context in which a citizen science project was established, confirming the desired areas where the project seeks to engender change and the pathways by which this is being, or will be, achieved. Coordinators should also identify the various stakeholder groups involved in a project and their motivations and influence.

The design and validation of the Theory of Change involves identifying the expected impacts and outcomes of the project and how these are achieved through the project's activities. This is best achieved by engaging with all stakeholders involved in a project, who will all bring differing perspectives regarding the impacts of the activities they are involved in. Stakeholders engage in several exercises that focus on creating a visual representation of the Theory of Change known as an Impact Journey Map for their project (example shown in Fig. 2). Stakeholders effectively work backwards in time, first consid-



ering the long-term impacts (>3 years) of a project, before thinking about the more immediate short-term impacts (<3 years) that may occur. Lastly, they are asked to identify what activities are needed to achieve

Fig. 2. Impact Journey Map for the citizen science project Outfall Safari. The lines connecting items have been coloured by the MICS team to indicate different types of causal relationships: solid purple lines indicate observed causal relationships, while dashed green lines represent expected causal relationships.



the short-term and long-term impacts they identified and the outputs of these activities, e.g., monitoring, engage with stakeholders, establish communication links with stakeholders. The long-term impacts are considered first, as these are often the easiest to identify, often including the primary goals of the project. By working through the Theory of Change with stakeholders in this way a visual representation in the form of an 'Impact Journey Map' displaying the cause-and-effect relationship for the project is created.

The last step in the Impact Assessment framework is *planning*, *monitoring*, *evaluation and learning*. This focuses on selecting short- and long-term impacts that the stakeholders deem to be high priority for the project and establishing a plan to assess whether these impacts are being achieved through the project activities.

coordinator/representatives of associated organisations), to capture both viewpoints regarding the impacts of the project. During the workshops, attendees were engaged in several interactive activities to create an Impact Journey Map for Outfall Safari.

Following the workshop the MICS team distilled the two separate Impact Journey Maps (IJM) created during the workshops to create a single synthesised version (Fig. 2).

Visual inspection of the IJM shows that the impacts within the IJM can be grouped into three strategies, relating to the activities and outputs needed to achieve them:

Separating the IJM into individual strategy maps helps organ-

ise and communicate the project scope and impacts.

- Fostering Stakeholder Engagement (Fig. 3)
- From Data to Action (Fig. 4)
- Driving Future Project Development (Fig. 5)

Outfall Safari, UK

An example of the impact assessment process is described here for the UK case study, Outfall Safari. Outfall Safari is an established citizen science methodology that employs citizens to locate and assess urban outfalls and identify pollution. A major threat to water quality in urban rivers is misconnected domestic appliances and the inappropriate disposal of waste. When misconnected pipes are incorrectly plumbed into surface water drains, they send wastewater directly to rivers where they impact biodiversity and the amenity value of waterways. Detecting misconnections is problematic, and sewage pollution often remains a hidden problem. The Outfall Safari method involves citizens mapping the location and condition of outfalls and reporting those that are polluting to the regulator and water company.

To develop a robust impact assessment for Outfall Safari a series of workshops were organised in 2021 with the project stakeholders, including citizen scientists, project coordinators and representatives from associated organisations.

Separate workshops were held with the two stakeholder groups (citizen scientist and the project

Fig. 4. Impact pathways feeding into the 'From Data to Action' strategy for Outfall Safari.



Fig 3. Impact pathways feeding into the 'Fostering Stakeholder Engagement' strategy for Outfall Safari.





Fig. 5. Impact pathways feeding into the 'Driving Future Project Development' strategy.

MICS Impact Assessment Platform

In addition to the Impact Assessment Framework, MICS is developing an online platform that practitioners and managers of citizen science projects can use to measure the impact of their activities. This platform is nearing completion and we will soon be pilot testing it with the results from our case-study sites. We have all this to look forward to, and we hope we can bring you more news soon!





Photo 2. Examples of PSWO and volunteers conducting assessing outfalls during an Outfall Safari survey. ©From ZSL (2019)

You can keep up to date regarding the latest outputs of the MICS project by following us on Twitter @MICSproject. Alternatively, if you would like to find out more or get involved with

the MICS project and platform testing contact John or Hannah at the River Restoration Centre (<u>rrc@therrc.co.uk</u>) or visit <u>www.mics.tools</u>

Integrated River Basin Management and Planning for Freshwater Restoration in the Danube River Basin

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The Danube River Basin (DRB) covers more than 800,000 square kilometres – 10% of continental Europe – and extends into the territories of 19 countries. This makes it the most international river basin in the world. About 79 million people live in this basin. They depend on its surface and groundwaters for drinking water consumption, energy production, agriculture, and transport. Its ecological diversity, from plant and animal species to critical habitats, is also highly valued.

To mark their commitment to transboundary cooperation for the protection and sustainable use of the Danube River, the main Danube countries signed

the Danube River Protection Convention (DRPC)¹ in 1994. Today, 14 Danube Basin countries and the European Union are "contracting parties" of the International Commission for the

¹ https://www.icpdr.org/main/icpdr/danube-river-protection-convention.



Photo 1. Vienna, Austria

Danube River (ICPDR). They work jointly towards the sustainable management of the Danube Basin's waters. The ICPDR has a global reputation as a pioneer of successful transnational water management.



In 2000, the EU Water Framework Directive (WFD) came into force, establishing a legal framework to protect and enhance the status of aquatic ecosystems, prevent their deterioration, and ensure the long-term, sustainable use of water resources throughout the EU. In response, the ICPDR countries, including non-EU Member States (MS), agreed to implement the WFD throughout the entire basin. The contracting parties made the ICPDR the facilitating platform to coordinate WFDrelated work.

Three key elements provide the three pillars of action that are needed for the Danube to achieve:

• a Cleaner Danube – this means reducing pollution from settlements, industry and agriculture;

• a Healthier Danube – this means protecting rivers as ecosystems that provide a living environment for aquatic animals and plants, as well as services for people such as drinking water and recreation;

• a Safer Danube – this means a safer environment for people to live without the fear of major flood damage, accidental pollution and water free from harmful substances.

In December 2021 the updated Danube River Basin Management Plan (DRBMP) and Danube Flood Risk Management Plan (DFRMP) have been adopted by ICPDR countries guiding water management in the Danube River Basin until 2027.²



Fig. 1.: Screenshots of cover page of layouted DRBMP and DFRMP Update 2021

The DRBMP Update 2021 includes updated assessments of the main pressures impacting the Danube basin's waters, updated information on water status and progress achieved, as well as the joint further actions agreed by the Danube countries to be undertaken until 2027. The key issues requiring joint actions on the basin-wide level (Level A) are addressed, underpinned by more detailed River Basin Management Plans at the national level (Level B).

The DRBMP Update 2021 focuses on five Significant Water Management Issues (SWMI), which are the main pressures and effects that affect water status in the Danube River Basin. These are:



Photo 2. Near Kloster Weltenburg, Germany ©Pascal Rösler

- Pollution by organic substances
- Pollution by nutrients
- Pollution by hazardous substances
- Hydromorphological alterations, including alterations of the sediment balance

• Effects of climate change (drought, water scarcity, extreme hydrological phenomena and other impacts)

All these issues relate to the impacts on the ecological and chemical status of surface waters. For transboundary groundwater bodies, both, qualitative and quantitative issues are addressed.

The Joint Programme of Measures to achieve the objectives according to the WFD is an integral part of the DRBMP Update 2021 and builds upon the results of the pressure analysis, the water status assessment and includes, as a consequence, measures of basin-wide importance oriented towards the agreed visions and management objectives for 2027. It is structured according to the SWMIs and follows the basin-wide management objectives for each SWMI and groundwater in order to achieve the WFD environmental objectives by 2027. The basis for the measures are the national programmes of measures of Danube countries. Priorities for the effective implementation of national measures on the basin-wide scale are highlighted and are the basis of further international coordination.

As for the effects of climate change, important climate change impacts related to the Danube River Basin are shifts in precipitation patterns and snow cover and an increase in the frequency



Figure 3.: Levels of management for WFD implementation in the Danube River Basin District showing the increasing level of detail from A to B.



² <u>https://www.icpdr.org/main/2021-updates-danube-river-basin-flood-risk-management-plans-published.</u>



Photo 3. Pelicans in Bulgaria ©Reni Petrova

of flooding/flash flooding and droughts. Simulations show both a future increase in the intensity and frequency of dry periods, hot days and heat waves and local and regional increases in heavy rainfall. To reduce and manage the risks posed by climate change, both adaptation and mitigation measures are urgently needed. The main aim is therefore to ensure that measures taken in the context of other, pressure specific SWMIs (e.g. focussed on particular issues relating to pollution or hydromorphology) are "climate proof". This means that the respective measures must achieve the desired results without negative and unintentional side effects even under changed climate conditions. This will be ensured by integrating climate change into the approaches adopted within the recognized SWMIs as well as via coordinated implementation of the WFD and FD and other environmental Directives in the Danube River Basin. As a frontrunner and pioneer among transboundary river basin commissions, the ICPDR adopted the first ICPDR Strategy on Adaptation to Climate Change in 2012 and prepared an update of it in 2018. The 2018 Update of the ICPDR Strategy on Adaptation to Climate Change takes further steps to promote action in

a multilateral and transboundary context. The strategy serves as a reference document for national strategies and activities in general and, more specifically, gives guiding principles and outlines suitable adaptation measures for the national and international RBMPs and FRMPs and provides an overview of relevant background and framework conditions.

As water is a cross-cutting issue and relevant for different sectors and industries, the integration with other sector policies is an important issue in the Danube River Basin in order to create synergies and avoid potential conflicts. Activities are ongoing to continuously implement and further intensify the exchange with different sectors such as nature protection including sturgeon conservation activities, inland navigation, sustainable hydropower and agriculture. Considerable efforts are also being made towards the coordination of water management with the sustainable management of floods according to the Floods Directive.

Fig. 3.: Screenshot of 2018 Update of the ICPDR Strategy on Adaptation to Climate Change

Throughout 2021, the DRBMP and DFRMP Updates 2021 have been elaborated and reviewed with the involvement of stakeholders and the public alike, throughout the Danube River Basin during the ICPDR's Public Consultation Process. For the next six years, the work of the ICPDR will be streamlined with the



implementation of the two management plans and the measures contained therein.

Photo 4. Picturesque floodplain in Croatia ©Safarek Goran





Reducing the flood risk through floodplain restoration in the Danube Basin

Results and lessons learned from the recently completed Danube Floodplain project

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More frequent occurence of catastrophic floods and severe droughts urge an action plan on Danube and tributaries. Since compared with 19th century, less than 19% of the former floodplain areas remain untouched (sound) on the entire Danube River Basin, pressure is getting higher to restore floodplains along a coherent management plan.

The recently completed Danube Floodplain project aimed to develop an action plan for the restoration of the floodplains of the Danube and five selected tributaries. This project was implemented in international cooperation, with the participation of 18 partners and 4 associated strategic partners across ten countries sharing the Danube River Basin.

The project aimed to improve knowledge transfer among Danube countries on integrative water management through restoration of the floodplains, combination of grey and green infrastructures, natural retention measures, involving all related stakeholders, whose cooperation is very important in the planning and realization of such projects and in successful implementation of the results.

The conceptual approach developed within the project has as starting point the identification and evaluation of nowadays active and potentially restorable floodplains along the Danube River and main tributaries. A holistic method for evaluation of

Fig. 1. Designated potential floodplains for restoration in the Hungarian part of the Danube River (intense blue) and extent of former floodplains on the Danube (pale blue) source: http://www.geo.u-szeged.hu/dfgis/



Photo 1. Danube floodplain landscape ©Andrea Samu

floodplains was further developed, serving as decision support for the relevant stakeholders and indicating where efforts of floodplain preservation or restoration should be applyed first within an integrated flood risk management approach.

Nowadays not only small room for rivers and floods is available but the ecological status of the remaining areas is also deteriorated due to residential or infrastructural "developments", regulation structures for navigation, altered sediment transport and riverbed incision because of dams, inappropprite land use, spreading of invasive species, garbage, etc.

With the floodplain Evaluation Matrix (FEM) developed by the Institute of Hydraulic Engineering and River Research at the Uni-







Fig 2. Evaluated and ranked active and potential floodplains in Hungary (Source: Danube Floodplain Manual)

versity of Natural Resources and Life Sciences (BOKU) in Vienna (BOKU), a valuable decision support tool has been available for relevant stakeholders to assess the multiple benefits that floodplain restoration and preservation as a sustainable nontechnical measure can offer in accordance with demands of

the EU Floods Directive (2007/60/EC). In general, it allows the evaluation of various river reaches by setting up a priority ranking, which indicates where efforts of floodplain preservation and, or restoration should be spent first to obtain maximum benefits.

On the whole Danube stretch in Hungary 2394,5 km² potential floodplains were designated which could be reconnected to the river and should be managed according to landscape features. In addition most of the active floodplains require more or less restoration measures – these good practices were also collected.

It is very important to keep in mind that rivers and floodplains provide a lot of ecosystem services and should be handled as a whole ecological system from source to the estuary and it is of exceptional public inter-

est as regards their features on national and international level as well. Therefore it is extremely harmful to modify this complex system alongside claims of one or two sectors or interests.

Because of the mishandling of floodplains in last decades, restoration requires more foresight and planning. To support this process was an other aim of the project, preparation of restoration of floodplains were therefor investigated and com-



Fig. 3. Workflow of the extended cost-benefit analysis (CBA) for floodplain restoration measures in the Danube Floodplain project



plex methodologies for realization were developed, in orderto help in implementation of such attempts from regulation aspects until planning and realization with local people

Therefore one main output of the project was a feasibility study of five pre-selected pilot areas. Feasibility studies summmarised all evaluations used in project to choose the restoration scenario which integrates the most benefits. These evaluations included assessment of changes in ecosystem services, habitats, potential vegetation, flood control and economic values after restoration.

Heavily altered rivers can provide much less ecosystem services and in lower quality. However nowadays economically tangible and more expensive for the society is the lack of flood control and severe droughts derived fromfloodplain loss and inappropriate land use. Under the umbrella of these valuable ecosystem services, floodplains can be preserved or restored.

However, partial reconnection of former floodplains to the rivers is not enough. Many landowners live mainly from agriculture and from area-based payments that the Common Agricultural Policy provides for each EU country. Ideally a land use adapted to the presence of water should be supported. Better and more sustainable results are achievable if stakeholders are involved in the process of land use change, because in some cases a permanent management of the area is indispensable.

Partial reactivation of the floodplain by regulated inundation necessitates alteration of the current cultivation structure. Improvements in the water balance bring long term benefits, but

alteration of the system is only reasonable when the sustainability of the altered farming and land usage structure can be garanted.

Such farming and management methods should be able to handle problems related to sudden floods and along them appearing invasive plants. To achieve the defined objectives, operation of drainage and water retention systems could be effective tools for handling these problems.

In the past pasturing livestock farming was a prevalent farming method on the floodplain. Short floods fertilized forests, orchards, fields, grazing lands and grasslands. Periodically flooded grasslands and meadows with higher grass yields were ideal for livestock farming. The most effective method of repressing invasive bush and tree species – that are unfavourable from flood protection perspectives and

are causing huge problems – is pasturing or regular mowing in areas that are not used as forests or croplands. On active floodplains exposed to more floods or their parts deemed appropriate, extensive, organic or bio-farming could also mean a sustainable solution.

Danube Floodplain - Reducing the flood risk through floodplain restoration along the Danube River and tributaries is co-funded by the European Union funds ERDF and IPA in the frame of the Danube Transnational Programme (Interreg Project reference number: DTP-003-2.1).

Website: <u>http://www.interreg-danube.eu/approved-projects/</u> <u>danube-floodplain</u>



Photo 2. Danube floodplain riverscape ©Andrea Samu





Join the 5th World Fish Migration Day (WFMD)

Organizations from around the world organize their own event in order to create awareness about the **importance of migratory fish and free-flowing rivers**. At the same time, through this global celebration, we highlight the efforts of each organization that somehow works on river, wetlands, lakes restoration and/or migratory fish population recovery.

This next May 21st we will celebrate a truly special <u>World Fish Migration Day 2022</u>, with our new **BREAK FREE** campaign!

You can already see new <u>events registered</u> on our website. Few examples are a documentary screening in Venezuela and a school coastal clean-up in Turkey. There are so many events, small and large, that can be organized on May 21st (or another day if it suits you best). You are welcome to <u>REGISTER YOUR EVENT</u>!

Euro-INBO 2021 DECLARATION OF MALTA

The members of the Euro INBO network met from 8 to 10 December 2021 in Malta for their 19th international conference on the implementation of the European water directives. The experience acquired in the face of the challenges of demographic growth, economic development, worsening of pollution, climate change, the fall of biodiversity, shows that basin management is a tool which has proved its effectiveness.

The WFD and the directives related to water (flood directive, marine environment directive, etc.) have shown over the last 20 years a recognised effectiveness, especially in terms of methodology, identification of water bodies, planning and reporting.

The participants wish to reaffirm the solidity of the experience acquired over more than 20 years, in the face of the challenges of demographic growth, economic development, worsening pollution, climate change and the decline in biodiversity.

The complete declaration can be downloaded here:

https://www.inbo-news.org/sites/default/files/Malta%20Declaration%20-%20EUROPE-INBO%202021_V%20 ENG_16.12.2021.pdf





The events calendar

The events calendar is regularly updated and allocated on ECRR website www.ecrr.org/News-Events/Events.





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If you want to share your river restoration project, event, or publication with others, please write an article about it.

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