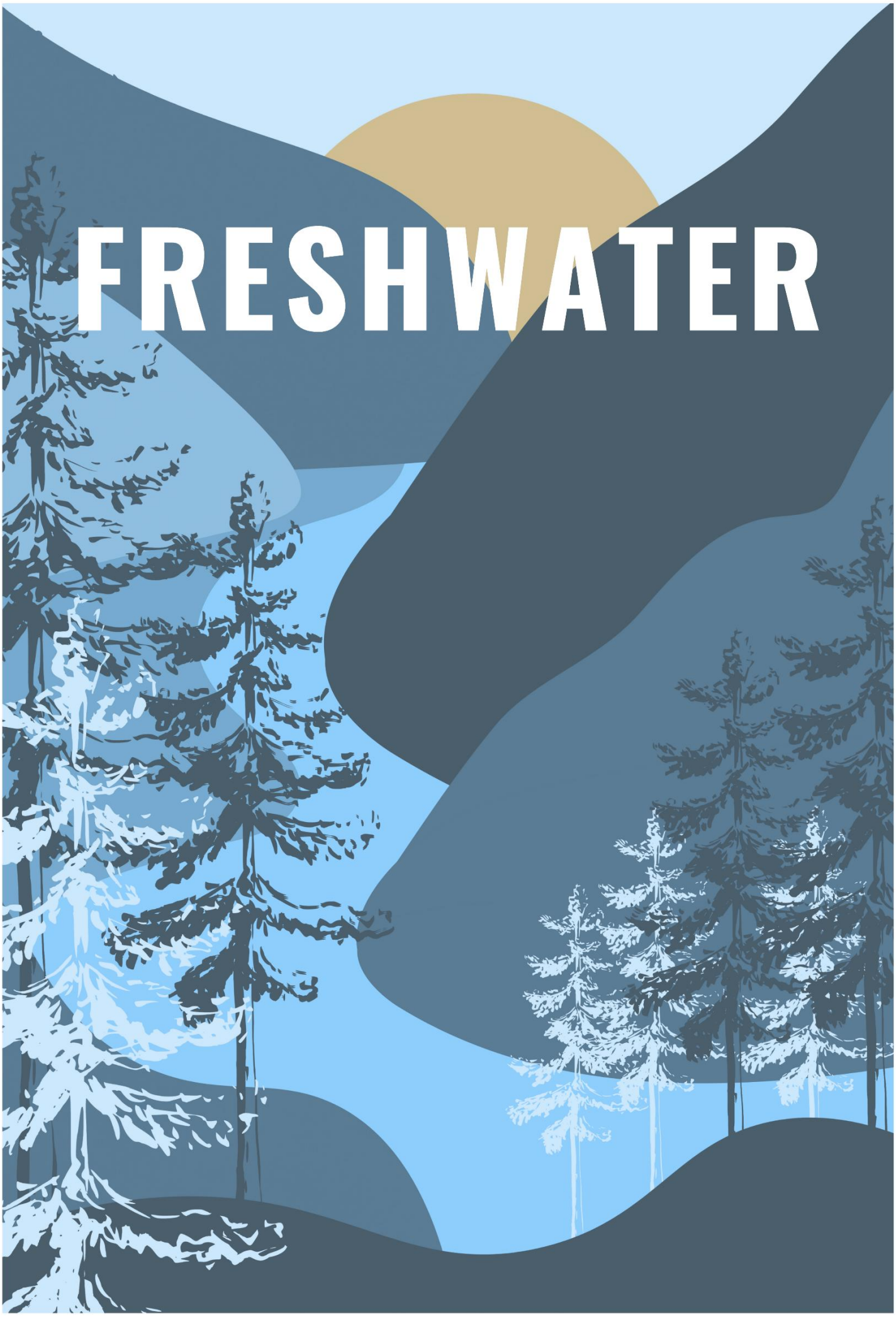
FRESHWATER

Freshwater ecosystems are some of the most diverse on our planet and are critical in sustaining our lives, for example contributing to food security and human health[1,2,3]. However, freshwater ecosystems are also amongst the most vulnerable, with their biodiversity declining faster than in oceans or forests[4]. In Europe, less than 40% of lakes, rivers, estuaries and coastal waters meet ecological and chemical pollution standards[5], and only 32% of EU rivers are in good ecological status[6]. This not only has impacts on the majority of freshwater species in Europe, but has been most pronounced in freshwater migratory fauna, which have suffered a decline of 93%[7]. The urgency to protect, preserve and restore healthy freshwater ecosystems is further testified by a series of international commitments, including the potential targets of the Post-2020 Global Biodiversity Framework[8].

This policy brief aims at highlighting the importance and the necessity of tackling each environmental problem holistically by using the Danube River as a case study. Safeguarding our rivers is crucial for freshwater ecosystems, oceans, and communities dependent on them, which is why this document will focus on the interlinkages between the Danube and the Black Sea. The Danube is one of the greatest waterways of the world and it has been the centre of many of the most memorable historic events in East Central Europe. Its waters, once reflecting a myriad of shades, changing from the crystal-white, youthful springs of the Black Forest into the bright "blue" Danube of the Vienna Woods, are now grey. We chose the Danube River as a case study for two reasons, namely (a) as the 2nd longest river in Europe it encompasses many bioregions and experiences many of the same ecological challenges as other European rivers and (b) it is important to both Eastern and Western Europe as the Rhine-Main-Danube (RMD) Canal connects the North Sea to the Black Sea and runs through 10 European Countries transporting freight and passengers. The river is also the home of six species of Sturgeons, migratory flagship species threatened throughout their lifespans[9].

While the legal framework of the Danube River Basins dates back to 1856, the single most important piece of legislation currently governing the Basin is the Convention on Cooperation for the Protection and Sustainable Use of the Danube (DRPC), signed in 1994. To achieve the objective of the Convention, the International Commission for the Protection of the Danube River (ICPDR) was established with goals for the preservation of the natural balance of those freshwater ecosystems, to address the risk related to pollution and to reduce the risk and damages caused by floods. This multilateral agreement is however only one piece of the complex mosaic that governs the river basin. Riverine States complemented the treaty with several legal instruments such as the Ramsar Convention on Wetlands, the UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes, and the EU Water Framework Directive (WFD)[10].

As this brief also focuses on the marine environment, it is important to mention the Bucharest Convention, an agreement between the coastal Black Sea states on the protection of its marine environment. The prevention of pollution and sustainable management of marine living resources are the main objectives, that are operationalised through three protocols, which provide for measures relating to pollution from land-based sources, dumping, oil and other harmful substances. The main relevant policy provisions applied include pollution reduction from rivers, conservation of biological diversity and expansion of protected territories[11].

From the source to the sea

To better highlight the different pressures that negatively affect the Danube ecosystems, this policy brief will focus on the five key drivers of biodiversity loss, as identified by IPBES, that affect the river in all its parts. To begin with, invasive alien species (IAS) negatively affect socio-economic situations (e.g., health risks, biofouling etc.), ecosystem services, native species, and biodiversity in general[12]. Due to the RMD Canal, the Danube is a recipient and donor for invasions as it lies in the Southern Invasion Corridor[13]. It is therefore no surprise that IAS are a major threat to native biodiversity in the Danube River Basin and its tributaries[14] and it is likely to increase as the climate crisis alters environments, making them more conducive to invasion[15,16]. In order to combat this threat, IAS are given a high priority within the

Danube River Basin District Management Plan, that of its tributaries[17,18,19], and the Action Plan for the European Union Strategy for the Danube Region[20].

Hydrological engineering is changing the shape and the flow rate of the river, and hydropower installations alone have the single most significant impact on fish[21]. Navigation and irrigation systems, dykes, reservoirs and, above all, dams (namely, the Iron Gate I and II, and Gabcìkovo) are responsible for lack of ecosystem connectivity and loss of ecological diversity[22]. The resulting modifications of the water regime apply the heaviest pressure on freshwater ecosystems[23]. Physical barriers interrupt the migration of sturgeons and other species, and damage the health of fish populations by making spawning and feeding sites inappropriate[24]. As a consequence, many species that were commonly found in the river are now declining and becoming threatened, and this negative trend is likely to be exacerbated by concurrent factors like pollution and overfishing[25].

The degradation of the Danuban ecosystem is further aggravated by pollution and waste. Agriculture is one of the main sectors contributing to water pollution in the EU, having significant impacts on standing waters, rivers, ponds and marine habitats as well as on their species[26]. The Danube River Basin is highly polluted by inappropriate agricultural practices, such as the heavy use of fertilisers and pesticides, manure disposal and effluents from agro-industrial units[27]. Estimates from the ICDPR show that nutrient and organic pollution are responsible for 40% of the risk of failing good status for the Danube's surface water by 2021[28]. The Common Agricultural Policy (CAP) has failed its biodiversity conservation objectives[29] and in 2020 key amendments aimed at ensuring a more sustainable farming sector have been rejected by the European Parliament in the new CAP (2023 - 2027) discussions. Furthermore, the Council of the EU agreed that CAP investments in irrigation need not be compliant with the Water Framework Directive. GYBN Europe thus urges the EU Member States to align their CAP National Strategic Plans to the EU Green Deal and the European Commission to continue supporting the greening of agricultural policies in Europe.

Like many other rivers, the Danube is also polluted with large amounts of plastic. In Europe, plastic waste is mostly sent to landfills, but still, one way or another, enters first our rivers and then our seas. This phenomenon is influenced by many factors, including population density, levels of urbanization and industrialization within catchment areas, rainfall rates, and the presence of artificial barriers such as weirs and dams. In Europe, the Danube River releases 530–1,500 tonnes of plastic into the Black Sea annually[30]. Ecosystems are increasingly damaged when plastic litter mounds up waterways. With plastic litter now outnumbering fish larvae in the Danube, the food chain is likely to be disrupted from its very base[31]. Although threats to wildlife have been largely underestimated in freshwater ecosystems[32], they include entanglements and ingestion[33], with direct effects on survival[34]. This has spill-over impacts on other animals along the food chain, such as insects and other small animals, which are a primary source of food for higher carnivores and reptiles occupying wetlands.

The food web is also affected by direct exploitation of the fish stocks in the Danube River basin and the Black Sea. Fisheries are currently managed unsustainably, with dramatic declines in fish species such as sturgeons[35,36,37]. Fish stocks are overexploited as a result of illegal and unreported fishing, as well as poor regulations and management, including inappropriate quotas not based on long-term sustainability[38,39]. When talking about sturgeons in the Danube region it is also worth mentioning how this endangered species is also greatly threatened by poaching and illegal trade[40]. Additionally, other species like marine mammals and sharks are affected by the decline in fish species, as well as through bycatch from fishing gear[41,42]. As for all drivers of biodiversity loss above mentioned, climate change is also expected to exacerbate the negative impacts of overfishing[43].

Given the transboundary character of the river's ecosystems and of the environmental problems that are degrading it, it follows that not only transnational efforts are needed, but also an encompassing approach to tackle all the issues considered.

Implementing the EU Green Deal

The European Union, with its legislation and policies, has the potential to protect, preserve and restore the Danube ecosystems. The EU Biodiversity Strategy for 2030 highlights how EU environmental legislation is fit-for-purpose and ambitious, but previous efforts have lacked proper implementation. Through the EU Restoration Plan, the EU plans to restore at least 25 000 km of free flowing rivers by 2030[44], by removing obsolete barriers and restoring wetlands and floodplains. This should be done through boosting transnational cooperation and management of the Interreg project MEASURES that consists of identifying and mapping key areas for fish, identifying obsolete barriers and dams, creating green corridors, managing fish populations (which might include re-introduction or relocation) and carry out monitoring activities and tracking[45]. Furthermore, dam removal should be added as a key river restoration measure in the next cycle of River Basin Management Plans (period 2022-2027), as recommended in the Dam Removal Europe's COVID-19 Recovery Agenda[46].

The European Green Deal also includes two other strategies that are relevant for freshwater ecosystems: the Zero Pollution Action Plan for Air, Water and Soil and the Farm to Fork Strategy. The Zero Pollution Action Plan (to be adopted in 2021) aims at restoring ground and surface waters, and preserving biodiversity in lakes, rivers, wetlands and estuaries[47]. The Commission has committed to create measures to address pollution from urban and industrial wastewater, microplastics, chemical pesticides, pharmaceuticals, hazardous chemicals, while guaranteeing the involvement of industries, simplifying and strengthening the legal framework, and using better the EU agencies and scientific bodies[48]. To be effective, this zero-pollution ambition must apply the principle of "control at source"[49], possibly integrated with the principles of polluter pays and corporate responsibility. Standards for urban water cycle must be raised to prevent the circulation of hazardous substances, and collaboration between the scientific-technological and the water sectors must be enhanced[50].

The Farm to Fork Strategy specifically addresses the excess of nutrients in the environment, as it is one of the sources of pollution that has drastically contributed to the reduction of biodiversity in European waters. A reduction of nutrient losses by 50% and pesticides by at least 50% can be achieved only with an ambitious and enforceable integrated nutrient action plan, supported by the Member States. Ambitious and decisive measures must also be taken in regard to the CAP and the CAP strategic plans. Environmental safeguards, especially in the EU countries in the Danube Basin, should be put in place to ensure a more sustainable water management and a reduction in excess nutrients.

In line with the Youth Manifesto for Wild Rivers, we believe that young people should be taught about the value of rivers and catchments through schooling and have the opportunity to explore rivers and get practically engaged. Open and accessible information must be presented to everyone, and opportunities should be provided for youth to play a role in decisions around rivers and the development, monitoring and revision of water management plans. The EU offers several opportunities for young people to contribute to the development and improvement of the state of European river systems; in 2012, the "Youth for Rivers" YiA project brought 22 young Europeans from over 9 countries together for one week to learn about river ecosystem restoration and to create a youth networking space. The River CleanUp movement set up the goal of cleaning 1000 rivers and raising awareness by showing them that trash can be found, in and around the river where they grew up, live or work.

As GYBN Europe, recognizing that there is not a one-size fits all solution to the complex issues affecting the Danube River Basin, we want to highlight an issue of common concern and to propose a set of recommendations that encompass the youth as a key part of the way forward. Younger generations all over the continent are demanding a safer and more sustainable future, while at the same time joining the frontlines of environmental action and advocacy. The recommendation within this policy brief should, where applicable, be applied to all European rivers. While this brief

focused on the Danube, GYBN Europe will relentlessly work to improve the ecological status of freshwater ecosystems all over the continent. We want to contribute to the world of tomorrow, and since we do not yet have positions of power and decision-making, what we can do is to offer our time, skills and passion.

GYBN Europe Priorities

The recent evaluation of the EU WFD as "fit-for-purpose" and the declaration by EU Commissioner Virginijus Sinkevičius to focus on its implementation, without changing the Directive, confirmed once again the importance of effective environmental legislation[51]. The goal of having 100% of the EU's freshwater ecosystems in good health by 2027 at the very latest must be applied to the Danube Basin and must be considered a priority. This would also contribute to achieving the targets of the Post-2020 Global Biodiversity Framework, as they are currently suggested.

Therefore, GYBN Europe calls for an ever-stronger, inclusive and enforceable monitoring and governance framework at EU and CBD levels. The Youth are ready to work for a better, greener, and fairer tomorrow.

Utilizing ecosystem-based management

The Danube River basin and the Black Sea are affected by multiple stressors, each contributing towards reducing the resilience of the systems. To resolve these issues, we cannot look at these stressors in isolation and must take a holistic approach instead[52]. GYBN Europe therefore advocates for a comprehensive ecosystem-based management approach that integrates all stressors in all River Basin Management Plans to achieve the WFD's objectives during the 2022-2027 cycle.

Implementing robust financial means, including "polluter pays"

Currently the EU LIFE+ Programme funds multiple projects along the Danube River including the LIFE FOR DANUBE STURGEONS project which is managed by organisations from 5 different countries[53]. However, we should not only be looking at the EU to fund the € 1 billion euros per year for river protection, restoration, conservation and management that the European Rivers Programme 2027 Declaration calls for[54]. GYBN Europe recommends using a mosaic funding model that includes private sector funding through the polluter pays principle. By 2025, all management plans for the Danube River Basin should have a cost-recovery plan and by 2030 should use the tools to implement it, efficiently and justifiably[55].

Promoting a free-flowing Danube

The EU Green Deal and its components must be the guiding strategy to achieve a successful green transition and improve the state of nature in the EU. Following the Biodiversity Strategy to 2030, the Farm to Fork Strategy, and the latest draft of the Post-2020 GBF, GYBN Europe calls for the restoration of at least 800 km of free-flowing Danube and for the integration of concrete measures at all levels to adopt dam and levees removal in the upcoming fourth River Basins Management Plans. In line with this, GYBN Europe stresses the need to promote multilateral partnerships such as Dam Removal Europe, which aim at removing obsolete barriers and restoring our European rivers. This project, developed by Wetlands International, Rewilding Europe, WWF and other organizations has been successful also within the Danube Biosphere Reserve, in particular in Ukraine by removing 10 dams thus improving the ecological status of the delta[56,57]. Furthermore, increasing pressure will be placed on our European rivers due to the transition to greener forms of energy, such as hydropower. It is fundamental that a thorough Environmental Impact Assessment prior to their construction is carried out, while ensuring at the same time full compliance with the relevant EU environmental acquis.

Restoring ecosystem services

Rewilding Europe is currently involved in the rewilding of the Danube Delta, a unique ecosystem with abundant biodiversity that has previously benefited from restoration efforts enacted by Ukraine, Moldova and Romania. The goal is to re-establish and support ecosystem functions, including the reintroduction of the auroch as grazing species[58]. This programme should act as a best practice example for recognizing the importance of ecological restoration, and, in this context

GYBN Europe calls for the initiation of at least two other projects aimed at restoring ecosystem services in the Danube basin by 2025.

Nurturing collaborative governance

Stakeholder collaboration and participation in environmental governance can improve environmental outcomes, including in relation to river management[59,60,61]. However, this participation must be meaningful, as its positive effect on environmental outcomes is stronger when participants are given decision-making power and communication is high[62]. GYBN Europe therefore urges for a collaborative governance approach to river management, in which all stakeholders, including youth, are guaranteed a position in the decision-making process.

Breaking free from plastic

Plastic designed only for a linear life cycle is problematic. Several countries have already adopted the Break Free From Plastic Act, which tackles the most common forms of plastic pollution, saves taxpayers billions and holds large corporations accountable for waste: GYBN Europe demands to intensify the measures put into action by the Plastic Ban and extend it to all the plastics packaging placed on the EU market by 2025.

Exploring nature rights for rivers

Interest in giving rivers legal authority has increased in recent years[63]. As with everything else, its success lies in its implementation, but it does bring a sense of urgency, a new tool for enforcing the polluter pays principle which can reduce ongoing damage, and a more eco-centric perspective which can facilitate progressive and inclusive conservation measures. GYBN Europe recommends that the Danube River and its tributaries be granted legal status as per the Earth Law Centre's Universal Declaration of River Rights by 2030[63].