



# Dam Removal: a growing trend to fix Europe's rivers

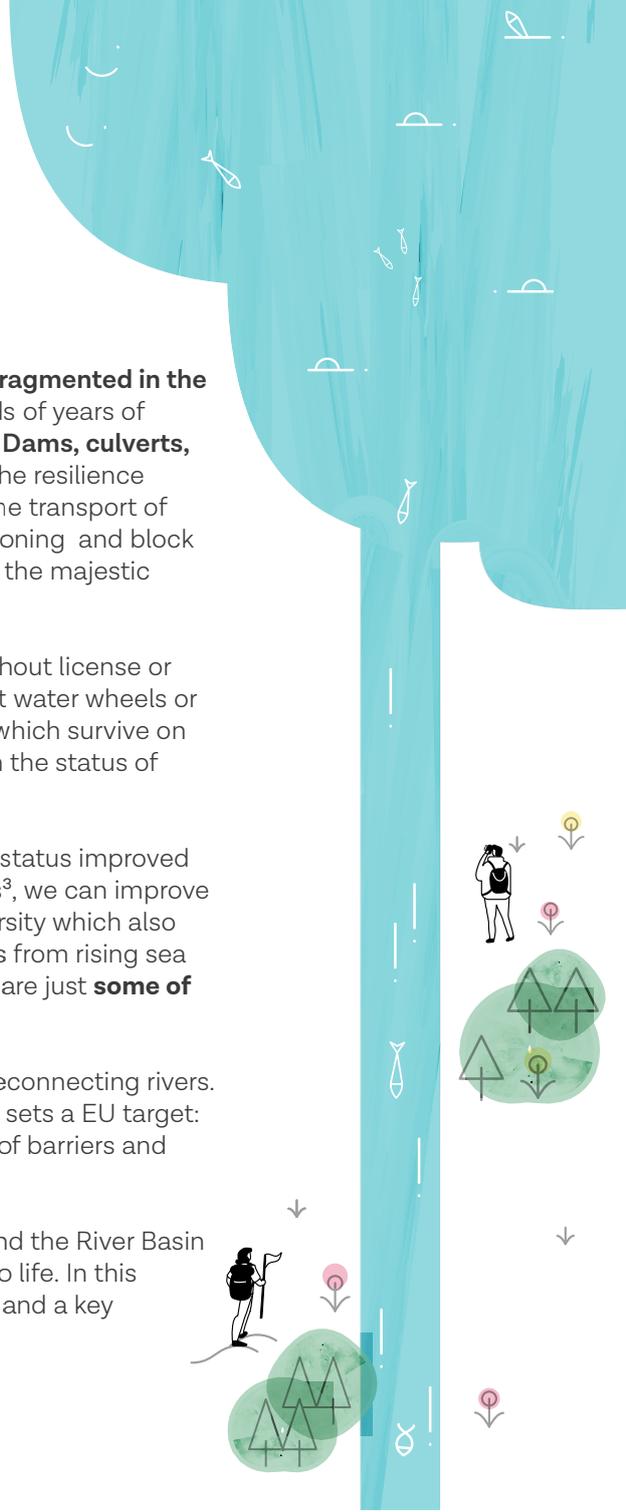
According to the latest AMBER study, **Europe's rivers are the most fragmented in the world** with more than 1 million barriers slicing up our rivers<sup>1</sup>. Hundreds of years of human activity have brought free flowing rivers nearly to extinction. **Dams, culverts, weirs and other barriers** disturb the water quality and flows, affect the resilience against the effects of climate change and natural disasters, affect the transport of sediments and nutrients, dry up the forests, affect ecosystem functioning and block the migration of many declining freshwater fish populations such as the majestic sturgeon.

**Many of these obstacles are past their expiration date**, unused, without license or simply not necessary anymore. From old hydropower plants, ancient water wheels or abandoned industrial factories to inefficient hydroelectricity plants which survive on subsidies. Such obstacles are contributing to the largest decrease in the status of **surface water bodies** in Europe<sup>2</sup>.

Making sure Europe's river barriers are removed and their ecological status improved means that we can prevent the devastating consequences of floods<sup>3</sup>, we can improve the fish populations in our waters contributing to freshwater biodiversity which also helps a flourishing fishing business, we can protect our coastal areas from rising sea levels and storms, we can stimulate the local economy... and those are just **some of the benefits**.

The EU recognizes the importance of addressing these issues and reconnecting rivers. The Green Deal<sup>4</sup> and in particular the EU Biodiversity Strategy 2030, sets a EU target: to restore at least 25,000 km of free-flowing rivers through removal of barriers and restoration of floodplains by 2030.

To integrate this target with the Water Framework Directive (WFD) and the River Basin Management Plans is a unique opportunity to bring our rivers back to life. In this document we show you why barrier removal should be a top priority and a key component of your country's River Basin Management Plans<sup>5</sup>.



# How removing dams contributes to comply with some of the existing global and EU legislation?\*



## Enabling passage for migratory fish and other organisms.

(Habitats Directive, Global Convention of Biodiversity and Convention on Migratory Species (CMS), Ramsar Convention on Wetlands).



## Achieving good ecological status of the EU water bodies

by 2027 (Water Framework Directive (WFD)).



## Establishing favorable conservation status for specific habitat types and species of interest.

(Bird & Habitats Directive, Bern convention, Convention of Biodiversity (CBD), Ramsar Convention on Wetlands, Sustainable Development Goals (SDG 15), Water Framework Directive (WFD)).



## Allowing flow of water and sediments

(Water Framework Directive (WFD), Bird & Habitats Directive, Sustainable Development Goals (SDG 6), Ramsar Convention on Wetlands).



## Protecting and restoring World Heritage sites

(World Heritage Convention).

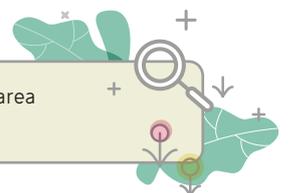


## Restoring biodiversity

(CBD, Ramsar Convention on Wetlands, SDG 15).



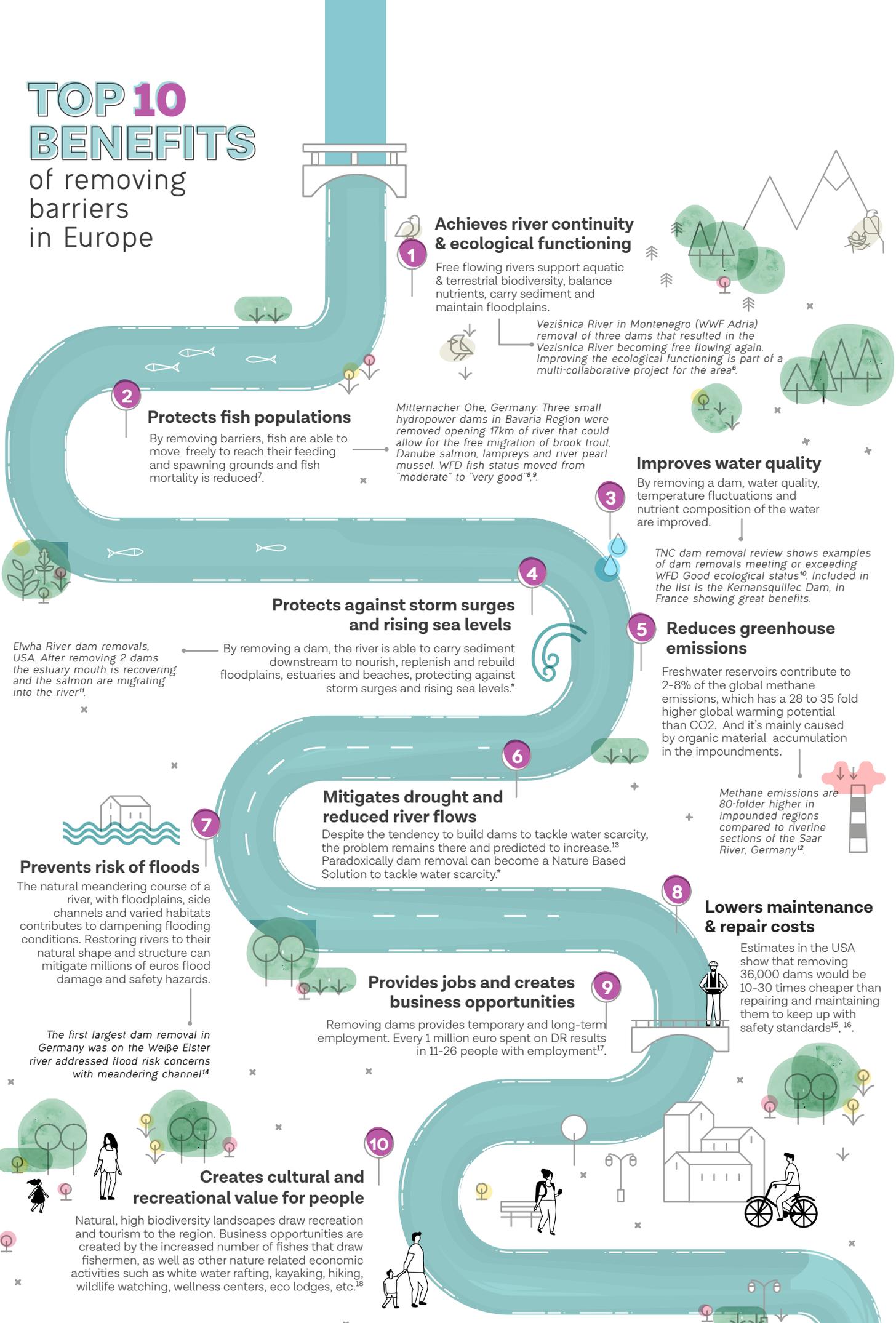
Reach biodiversity and conservation targets quicker by removing barriers in a protected area or in an area that serves as an important habitat for target species.



\* This is a brief impression of global and EU legislation and is not a comprehensive overview.

# TOP 10 BENEFITS

## of removing barriers in Europe



### 1 Achieves river continuity & ecological functioning

Free flowing rivers support aquatic & terrestrial biodiversity, balance nutrients, carry sediment and maintain floodplains.

*Vezišnica River in Montenegro (WWF Adria) removal of three dams that resulted in the Vezišnica River becoming free flowing again. Improving the ecological functioning is part of a multi-collaborative project for the area<sup>8</sup>.*

### 2 Protects fish populations

By removing barriers, fish are able to move freely to reach their feeding and spawning grounds and fish mortality is reduced<sup>7</sup>.

*Mitternacher Ohe, Germany: Three small hydropower dams in Bavaria Region were removed opening 17km of river that could allow for the free migration of brook trout, Danube salmon, lampreys and river pearl mussel. WFD fish status moved from "moderate" to "very good"<sup>8,9</sup>.*

### 3 Improves water quality

By removing a dam, water quality, temperature fluctuations and nutrient composition of the water are improved.

*TNC dam removal review shows examples of dam removals meeting or exceeding WFD Good ecological status<sup>10</sup>. Included in the list is the Kernansquillec Dam, in France showing great benefits.*

### 4 Protects against storm surges and rising sea levels

By removing a dam, the river is able to carry sediment downstream to nourish, replenish and rebuild floodplains, estuaries and beaches, protecting against storm surges and rising sea levels.\*

*Elwha River dam removals, USA. After removing 2 dams the estuary mouth is recovering and the salmon are migrating into the river<sup>11</sup>.*

### 5 Reduces greenhouse emissions

Freshwater reservoirs contribute to 2-8% of the global methane emissions, which has a 28 to 35 fold higher global warming potential than CO<sub>2</sub>. And it's mainly caused by organic material accumulation in the impoundments.

*Methane emissions are 80-fold higher in impounded regions compared to riverine sections of the Saar River, Germany<sup>12</sup>.*



### 7 Prevents risk of floods

The natural meandering course of a river, with floodplains, side channels and varied habitats contributes to dampening flooding conditions. Restoring rivers to their natural shape and structure can mitigate millions of euros flood damage and safety hazards.

*The first largest dam removal in Germany was on the Weiße Elster river addressed flood risk concerns with meandering channel<sup>14</sup>.*

### 6 Mitigates drought and reduced river flows

Despite the tendency to build dams to tackle water scarcity, the problem remains there and predicted to increase.<sup>13</sup> Paradoxically dam removal can become a Nature Based Solution to tackle water scarcity.\*

### 9 Provides jobs and creates business opportunities

Removing dams provides temporary and long-term employment. Every 1 million euro spent on DR results in 11-26 people with employment<sup>17</sup>.

### 8 Lowers maintenance & repair costs

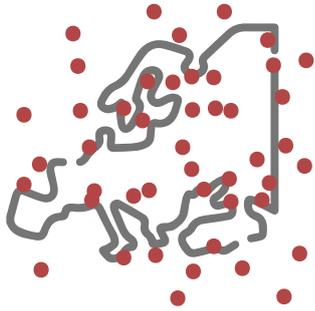
Estimates in the USA show that removing 36,000 dams would be 10-30 times cheaper than repairing and maintaining them to keep up with safety standards<sup>15, 16</sup>.

### 10 Creates cultural and recreational value for people

Natural, high biodiversity landscapes draw recreation and tourism to the region. Business opportunities are created by the increased number of fishes that draw fishermen, as well as other nature related economic activities such as white water rafting, kayaking, hiking, wildlife watching, wellness centers, eco lodges, etc.<sup>18</sup>

\* If removing barriers is an action to solve such societal challenges, barrier removals can be classified as Nature Based Solutions (NBS)<sup>29</sup>.

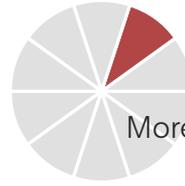
# The current EUROPEAN SCENARIO



Europe has at least

**1.2 million barriers**

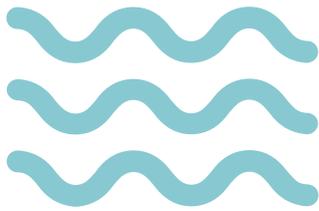
across **36 European countries**<sup>1</sup>.



More than **10%** of these barriers **are either abandoned or obsolete**<sup>20</sup>

Currently there are

**only 3 rivers free flowing**

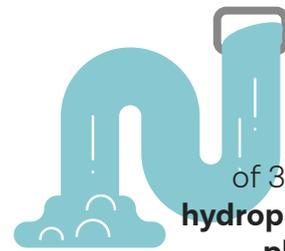


**longer than 1000km** in Europe<sup>19</sup>

**60%** of surface waters



**don't meet the Water Framework requirement** for a Good Ecological Status<sup>5</sup>



**91%** of 30,172 **hydropower plants**

in Europe produce **negligible amounts of energy**<sup>21</sup>

**<10MW**

There are over

**600,000 small barriers**<sup>1</sup>

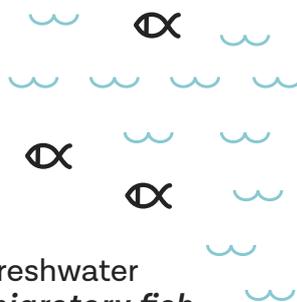
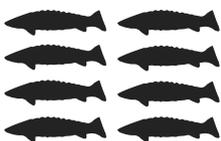
that are **overlooked and unmapped** despite their enormous negative impact



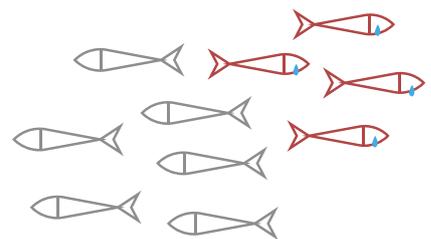
**8 European sturgeon species**

**are critically endangered**

on the IUCN Red List of Threatened species<sup>24</sup>



Freshwater **migratory fish** populations in Europe **have declined by 93%** since 1970's<sup>23</sup>



**42%**

**Freshwater fish species in Europe are threatened**

**77 out of 202** are listed in Annexes II, IV and V of the Habitats Directive<sup>22</sup>

# Amber Atlas Barrier Map

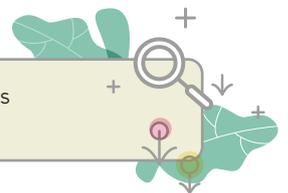
Central Europe has the highest abundance and density of barriers, whereas rivers in the Balkans in southeastern Europe, in parts of northern Scandinavia and in some remote areas in southern Europe remain relatively free-flowing.<sup>20</sup>

Check this **interactive citizen science barrier tracker** from Amber: [amber.international/european-barrier-atlas/](https://amber.international/european-barrier-atlas/)

The **Amber Barrier tracker** is a citizen science tool used by thousands across Europe to map unknown and obsolete barriers<sup>25</sup>.

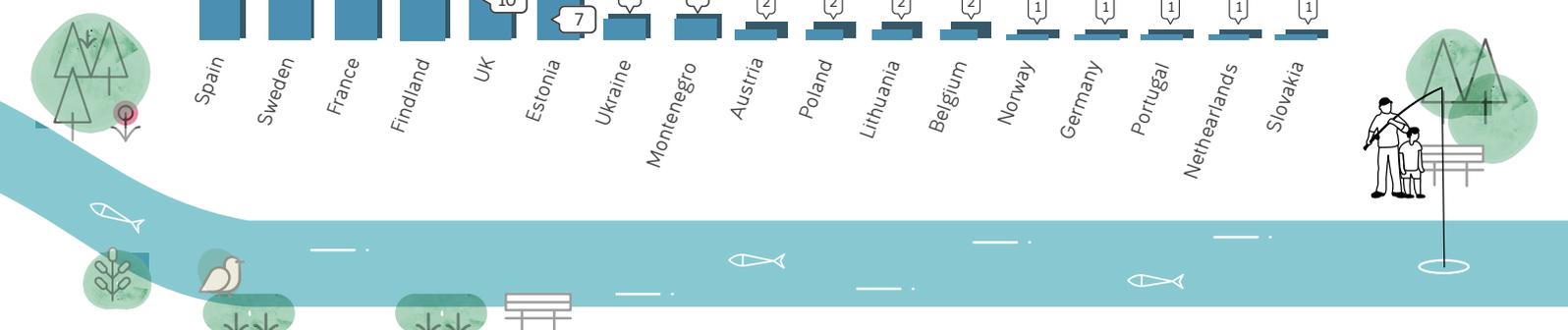
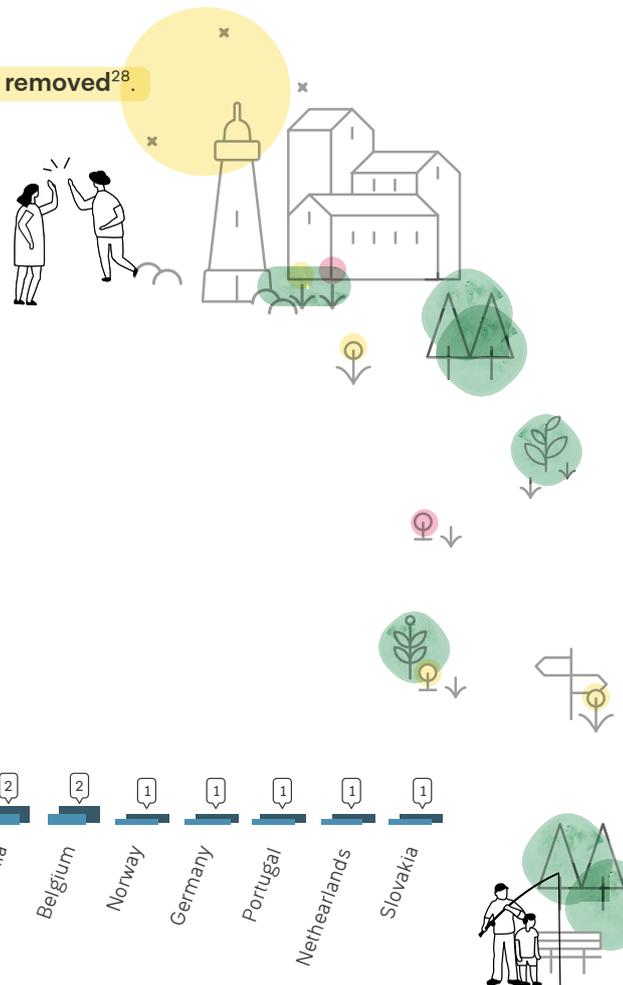
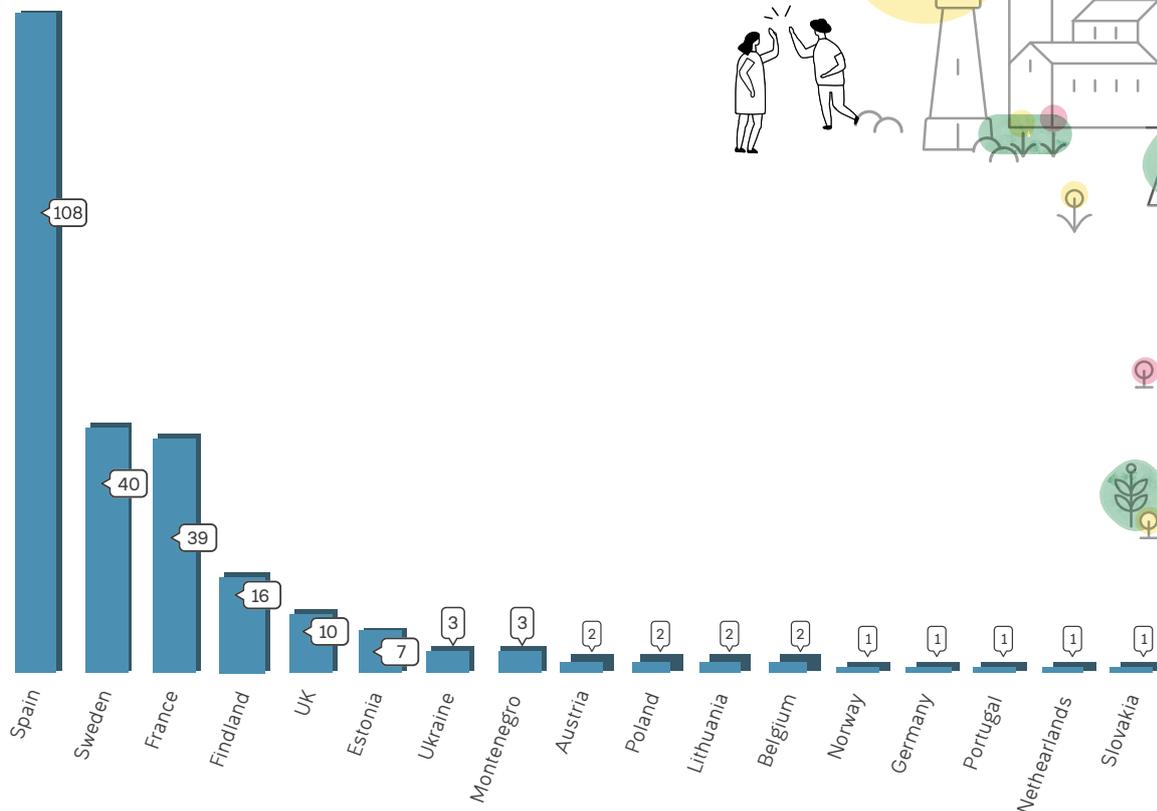


The best way to start restoring rivers to fully integrated ecosystems is by removing old and obsolete barriers.



# The bright side

In 2021 Dam Removal Europe reported **at least 239 barriers were removed**<sup>28</sup>.



# How are the countries River Basin Management Plans doing?

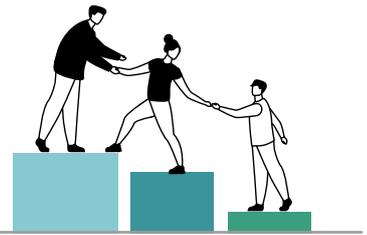
Review of barrier removal in 21 draft River Basin Management Plans (RBMP)<sup>5</sup> shows that:

- **Removal and adaptation of barriers is very relevant for 71% of the assessed RBMPs** (where barriers are the main problem or a significant water management issue).
- Despite this importance, commitment to action is low. Only **28% of draft RBMPs plan to remove 2.5% or more obsolete barriers**.
- 8 out of 21 RBMPs make reference to or states vaguely the cost analysis and monitoring planning of the removal measures.
- Only 8 out of 21 RBMP include prioritization criteria that **properly identifies barriers that can be removed as a priority**.
- **Some plans have clear objectives for obstacle removal:** for instance, the Spanish Duero draft RBMP dedicates a large budget (€194 million) for up to 767 hydromorphological measures.
- **Other plans don't have clear objectives:** such as the draft RBMP for the Romanian Danube region. Despite the presence of 307 potentially significant hydromorphological pressures (like dams & weirs for flood risk mitigation) were identified, no clear indication was provided on whether any such measures will be implemented.



# How barrier removal can be addressed

Barrier removal is one of the key measures to bend the curve of this freshwater biodiversity loss <sup>26</sup>.



1.



## Integrate barrier removal into the EU Nature Restoration Law:

The European Commission announced in the biodiversity strategy for 2030 will propose legally binding EU nature restoration targets to restore biodiversity and degraded ecosystems. An ambitious specific target to restore free-flowing rivers should be included in the upcoming Nature Restoration Law, which is expected to be presented in 2022, after some delays. Member States will then be obliged to identify and remove barriers to reach the set restoration target.

2.



## Integrate barrier removal into the RBMPs:

**Identify the problem:** Take stock of all the barriers on the surface water bodies and describe their negative impacts. The draft RBMP should include a list of barriers for which the usage permits expire and will be revised during the 2021-2027 period.

**Identify list of priority barriers that can be removed:** Identify barriers that are a priority for removal, such as obsolete or decommissioned barriers, barriers in protected areas, barriers that do not serve a significant purpose, barriers whose removal can free the longest portion of river, or barriers especially affecting endangered species.

**Include cost benefit analysis and monitoring plans:** Assess the economic effects of dam removal related to water status, biodiversity, and communities. We can see some examples of this in the guidance of barrier removals<sup>27</sup>.

**Specify which dams will be removed in the RBMP:** include the removal of at least 20% of the obsolete or decommissioned barriers in the RBMP.

3.



## Exchange knowledge :

Communicating results and exchanging knowledge is an essential, but often overlooked component in opening up rivers. By sharing knowledge, we can learn from past experiences and show the benefits of such measures. **Dam Removal Europe** provides a platform to share knowledge and inspire each other to build a movement of people working together to remove barriers. <sup>28</sup>

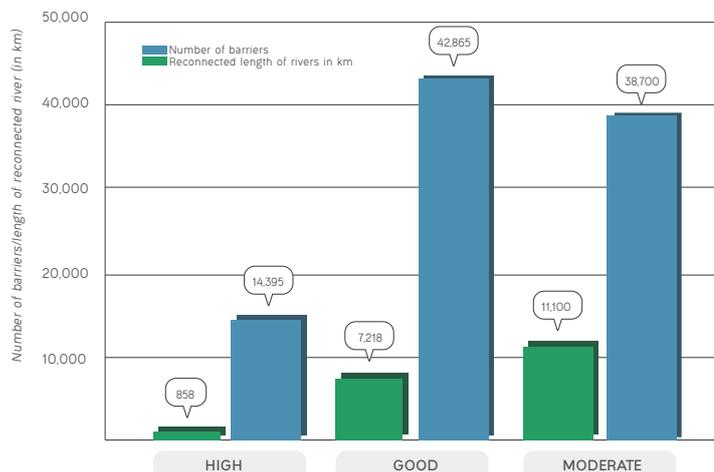
### Going beyond the 25000km target is possible!

Out of a sample of 30,000 river barriers across 40 countries, a recent WWF report<sup>29</sup> identifies 858 barriers across larger European rivers. This includes **732 barriers with a "high" reconnection potential, whose complete removal can offer the greatest benefits in terms of reconnection of ecosystems.** Removing those barriers would allow to achieve nearly half of the target set by the EU Biodiversity Strategy (25,000 km) by reconnecting 11,500 km. If we'd remove barriers

with both "high" and "good" reconnection potential, we'd double the EU target by reconnecting 57,000 km of rivers.

The results of this study, based on a sample of 3% of existing barriers in Europe, show that the 25,000 km target set by the EU Biodiversity Strategy is a good start but there is potential, and need, to go much further by looking at smaller rivers (excluded from the current study) and at a broader range of barriers. It would bring substantial benefits in terms of restoring freshwater and riparian habitats.

### Distribution of barriers with reconnection potential in Europe:



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**Living European Rivers** is a WWF-led initiative to bring life back to Europe's waters for the benefit of people and nature. Involving other civil society organizations, governments, investors, businesses and communities, the initiative aims to protect rivers, lakes and wetlands that are still in good health and restore the ones that have been degraded. To achieve this ambitious goal by 2030, the initiative works to improve water governance, redirect financial flows towards nature-based solutions, remove dams, fight unsustainable hydropower, and raise awareness about the values of freshwater ecosystems. **WWF** is part of the Dam Removal Europe coalition, working together with partner organizations across the continent to free our rivers from unnecessary obstacles.