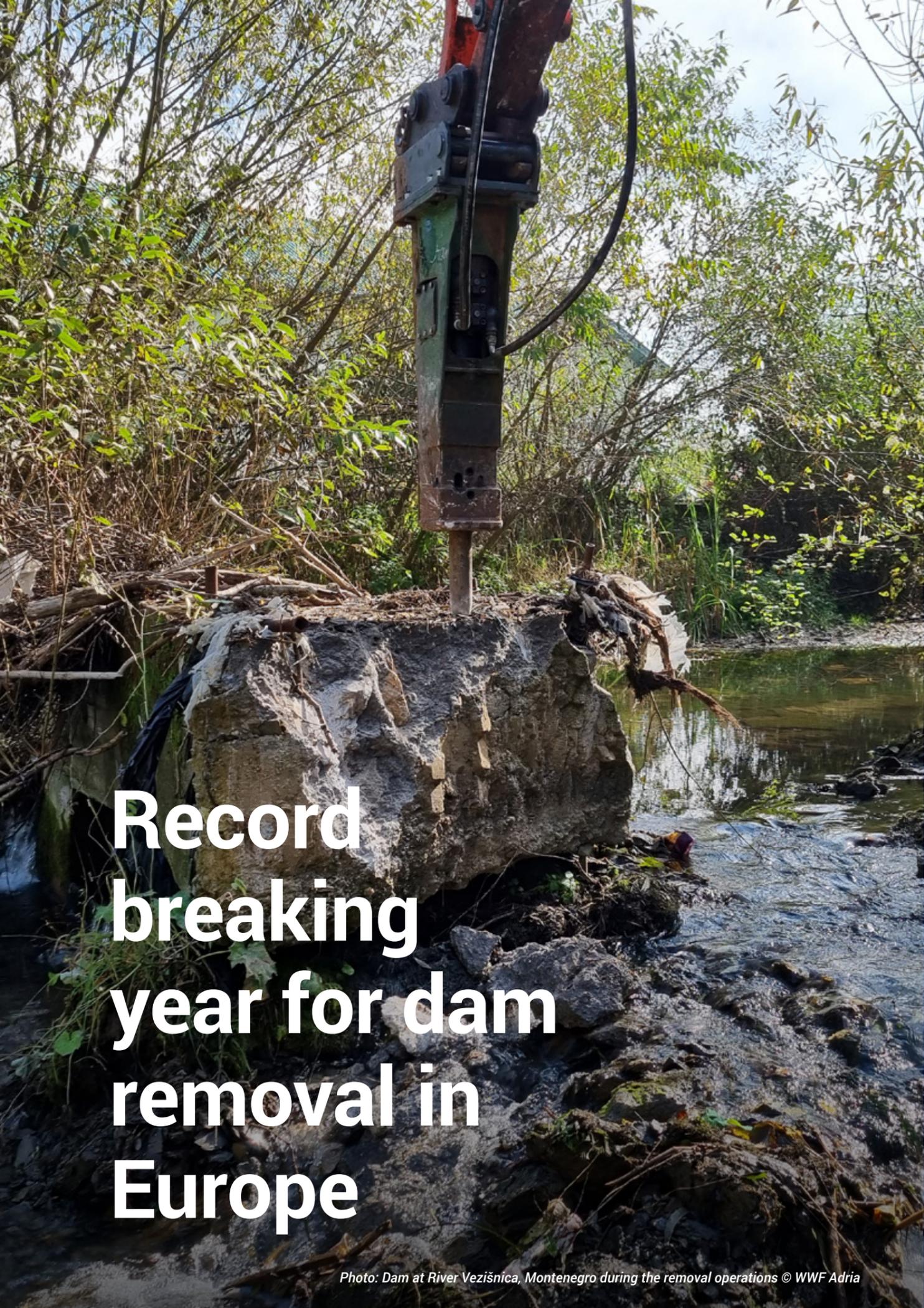


# DAM REMOVAL PROGRESS 2021

 : DAM  
REMOVAL  
EUROPE



# Record breaking year for dam removal in Europe

Photo: Dam at River Vežišnica, Montenegro during the removal operations © WWF Adria

In the words of Ursula von der Leyen, President of the European Commission: “Making nature healthy again is key to our physical and mental wellbeing”. Restoring at least 25000 km of rivers to a free-flowing state is flagged as one of the key elements of the European Union Biodiversity Strategy for 2030<sup>1</sup>, which in turn is one of the actions included in the European Green Deal<sup>2</sup>. Barrier removals aiming to restore river longitudinal connectivity are currently trending in Europe (Schiermeier 2018; Sala & van Treeck 2021). The continuously accelerating pace of riverine barrier removals is justified by the multifaceted impact of such barriers on natural wetland ecosystems, including altered sediment loadings and flow and temperature regimes, modified nutrient and biologically-mediated energy flow, degraded habitats, transformed aquatic communities’ composition, fragmented gene flow, and reduced species abundance and distribution ranges (Van Looy et al. 2014). In 2020, a study reported the existence of at least 1.2 million barriers fragmenting rivers and streams in 36 European countries (with a mean density of 0.74 barriers per kilometer), 15% of which (~200000) are considered obsolete (Belletti et al. 2020). The latter study is the first comprehensive estimation of river fragmentation in Europe and was conducted as part of the EC-funded Horizon 2000 “Adaptive Management of Barriers in European Rivers” (AMBER) project ([www.amber.international](http://www.amber.international)).

All artificial riverine barriers, at some point, will outlive their useful lives, will no longer serve their economic functions, and may even become safety concerns. In such cases, a decision should be made to either repair or demolish the construction. Generally, the costs of repair are considerably higher than the costs of demolition (Habel et al. 2020). In parallel, barrier removals benefit recreational activities and aesthetics and have significant positive

effects on fisheries and on local property values (Lewis et al. 2008). Additionally, in respect with restoration of fish passage – one of the primary goals of barrier removal projects worldwide – recolonization by migratory fish is observed swiftly after dismantling the riverine barriers (Duda et al. 2021).

To evaluate the advancement in the implementation of European Union policies and to analyze the progress and impact of dam removal utilization as a river restoration measure in each European country, Dam Removal Europe (DRE) publishes – since 2021 – an annual progress report. This year’s report shows an increasing trend in both the total number of removals and in the number of European countries that reported barrier removals.

<sup>1</sup> European Commission, Biodiversity strategy 2030 ([https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030\\_en](https://ec.europa.eu/environment/strategy/biodiversity-strategy-2030_en))

<sup>2</sup> European Commission, European Green Deal (A European Green Deal | European Commission ([europa.eu](http://europa.eu)))

## DAM REMOVAL EUROPE

Dam Removal Europe (DRE) is a coalition of seven organizations: the World Wildlife Fund, The Rivers Trust, The Nature Conservancy, the European Rivers Network, Rewilding Europe, Wetlands International, and the World Fish Migration Foundation. The overall ambition of DRE is to restore the free-flowing state of rivers and streams in Europe. In that respect, DRE aims to establish barrier removal as a restoration tool and to mainstream this practice. Through a bottom-up process DRE has created a continuously growing European network and it is working towards a holistic approach to remove barriers.

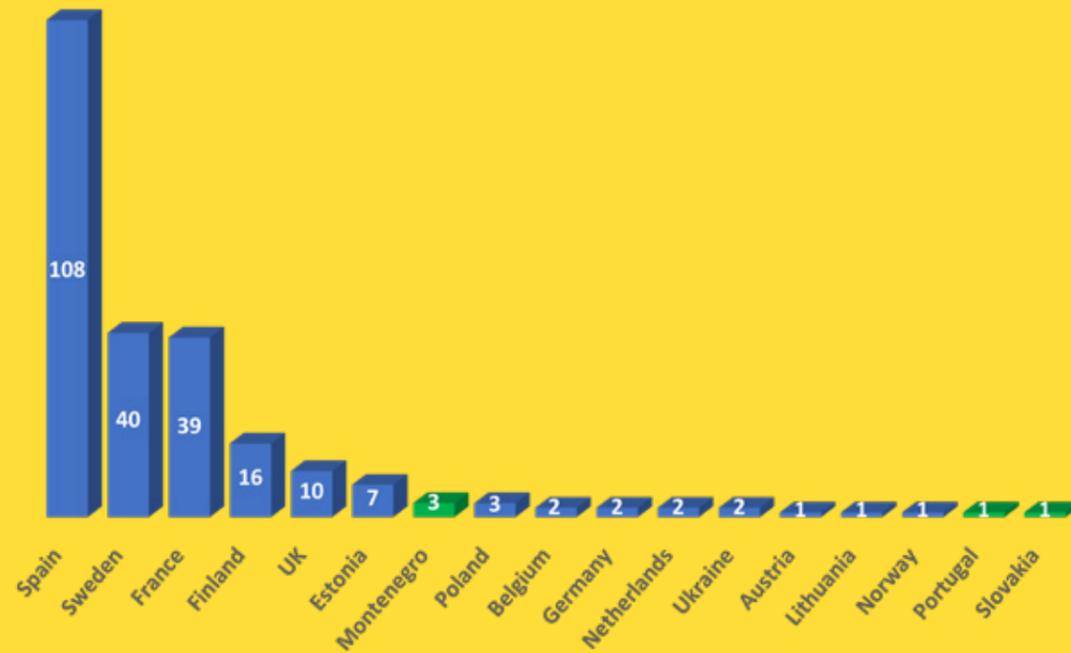


Figure 1. Number of removed barriers per country in 2021.  
In green, the countries that reported their first barrier removal in 2021.

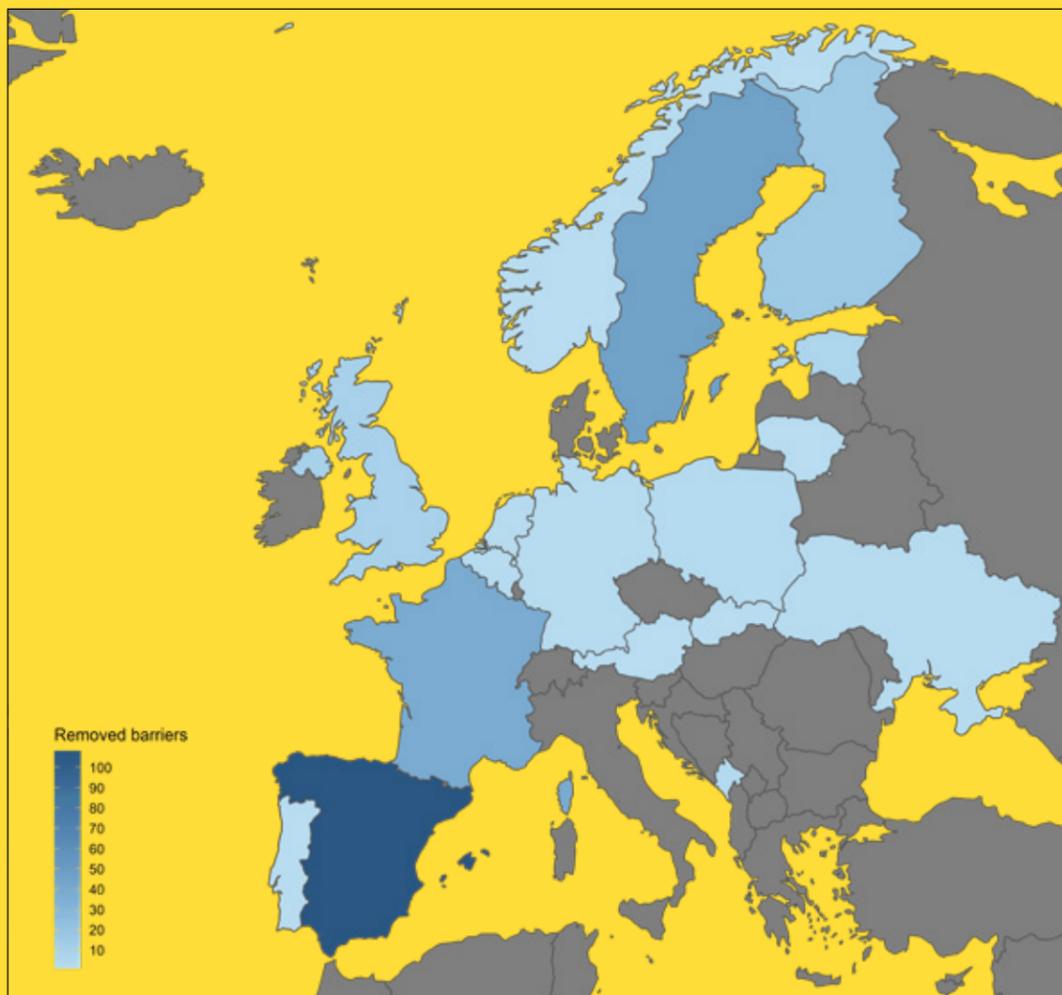


Figure 2. Map of European countries that removed barriers in 2021.  
Color gradient refers to the number of removal cases.

## DATA COLLECTION & RESULTS

The data reported herein were collected through: (1) direct written requests to public authorities of European countries dealing with barrier removals, (2) relative requests to the European DRE network (more than 3200 people from 41 countries), and (3) an online survey posted to the DRE website that remained active from April 2021 till the end of the year. A clear definition of what DRE considers as barrier removal<sup>3</sup> was included in all requests. Data were provided by NGOs, municipalities, water agencies, ministries of environment, river trusts, scientists, researchers, and river restoration practitioners. All data received from sources other than public authorities were verified for their accuracy and their relevancy to the goal of the present report.

Based on this information DRE reports that in 2021:

- ✂ At least 239 barriers were removed in 17 European countries (Figure 1)
- ✂ Spain spearheaded barrier removal in Europe (Figure 2), taking the lead from Sweden which was last year's trailblazer (Sala & van Treeck 2021)
- ✂ 3 countries (Portugal, Montenegro, and Slovakia) executed their first barrier removals
- ✂ 87% of the removed barriers were weirs<sup>4</sup>
- ✂ 76% of the removed barriers<sup>5</sup> were lower than 2 m, validating previous estimations of high occurrence of low-head structures fragmenting European rivers and streams (Belletti et al. 2020)

The total number of removals in 2021 represents a 137% increase from the previous year (101 barrier removals in 2020; Sala & van Treeck 2021). Additionally, since last year, the number of European countries that reported barrier removals was increased by 6 (55% increase). These results can be attributed to the modifications made to our data collection scheme, as well as the recently published (in May 2020) European Union Biodiversity Strategy for 2030. However, our final count of removed barriers is certainly an underestimation. We haven't included data from at least a few organizations/countries<sup>6-7</sup>, due to several reasons, including the complexities in tracing barrier removals (e.g., France and Finland; see relevant text-box), lack of relative inventories, unsuccessful attempts to contact the appropriate people in public authorities, and limited data collection timeframe.

<sup>3</sup> A barrier must have been removed through the full vertical extent of the structure for a significant portion of the stream width permitting fish passage and ecological flow. Technical fishways and bypasses were not considered as barrier removals and thus were not included in this report

<sup>4</sup> Type was available for 71 out of the 239 barriers that were included in this report

<sup>5</sup> Height was available for 155 out of the 239 barriers that were included in this report

<sup>6</sup> French Water Agency Agence de l'eau Rhône-Méditerranée-Corse reported 33 barrier removals in 2021. These cases were not included in this report since specific details were not available at the time

<sup>7</sup> Finland reported 110 barrier removals in 2021. Due to the high number of removals in the country last year, and the fact that multiple organizations were involved in these projects, there were no resources to provide specific details and location of each barrier. Thus, these cases were not included in this report



Photos: (Upper panel) Unnamed weir Oria River, Spain, before and after the removal operations  
© Gipuzkoa Provincial Council - Department of the Environment and Hydraulic Works



## COMPLEXITIES IN TRACING BARRIER REMOVALS IN FRANCE AND FINLAND

Tracing barrier removals in France is a hard task. Annually, the six French Water Agencies grant funds addressed to river restoration projects, including barrier removals. However, given that each project can be completed up to three years after funding, the estimation of the total number of barrier removals executed per year is a highly complex endeavor. For instance, in 2021, Agence de l'eau Adour-Garonne and Agence de l'eau Loire-Bretagne granted funds for 57 and 60 barrier removals, respectively, but whether these projects were carried out within 2021 or not remained uncertain by the time this report was published. In that respect, the total

number of barrier removals executed in 2021 in France reported herein (39) should be considered an underestimation.

Finland is probably one of the most efficient European countries when it comes to removing riverine barriers. In addition, Finland is among the very few European countries that remove active hydropower dams. However, due to the high number of removals in the country last year, and due to multiple organizations involved in such projects, there are no resources to provide specific details and location of each barrier. Thus, the total number of barrier removals executed in 2021 in Finland reported herein (16) should be considered an underestimation.

## HYDROPOWER PLANTS ARE DEMOLISHED TO FREE RIVER HIITOLANJOKI

The Hiitolanjoki project is the largest river restoration project in Finland. Authorities, foundations, associations, companies, and private individuals worked for decades, while extensive cooperation and funding were needed to actualize this project. Its main goal is to remove riverine obstacles to enable upstream migration of the landlocked salmon population at Lake Ladoga. By doing so, River Hiitolanjoki will become Finland's most important habitat for landlocked salmon, enabling the development of fishing tourism and of other recreational activities in the area. River Hiitolanjoki runs from Finland to Russian Lake Ladoga, and it has been fragmented by three hydropower dams for over a century. Kangaskoski, the first of the

three dams, was demolished in autumn 2021, while the next two dams are planned to be removed within the next couple of years. The project was carried out by the South Karelia Foundation for Recreation Areas, and the results of the dam removal are already visible since fish spawning nests were observed in the autumn of 2021. This project has already attracted many visitors during the two events organized on the removal site last year. Special guests attended the first event, in September 2021, including the Minister of Agriculture and Forestry, Members of Parliament, mayors, and partners involved in the various phases of the project. At the second event, in November, more than 300 visitors celebrated the demolition of the Kangaskoski Dam.

See project website: [www.hiitolanjoki.fi/en/](http://www.hiitolanjoki.fi/en/)

**BEFORE AND AFTER REMOVAL**



**UNNAMED WEIR – HATCHFORD BROOK – ENGLAND**  
© Alan Graham - Trent Rivers Trust



**UNNAMED BARRIER – RIVER PÁMANES SPAIN**  
© Cantabrian River Basin Authority



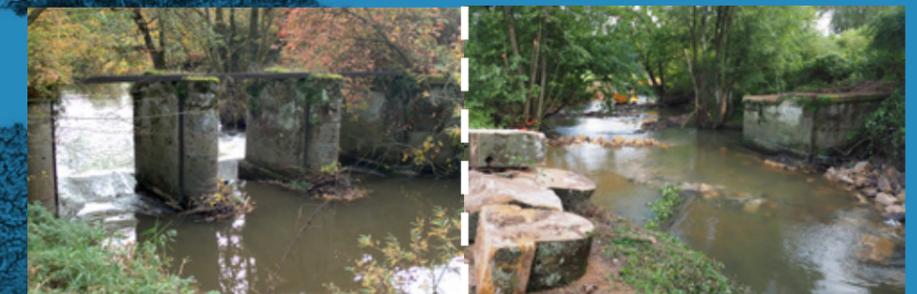
**PESSEGUEIRO MULTI-CULVERT ROAD CROSSING – RIVER VASCÃO – PORTUGAL**  
**THIS WAS THE 1ST BARRIER REMOVAL IN THE COUNTRY**  
© (left) Jorge Bochechas, (right) Ana Cristina Cardoso



**KANGASKOSKI DAM – RIVER HIITOLANJOKI – FINLAND**  
© (left) Mikko Nikkinen / WWF Finland, (right) Jenny Jyrkänkallio-Mikkola / WWF Finland



**UNNAMED WEIR – RIVER SOPOT – POLAND**  
© Dzika Rzeka



**LEUCHERHOF WEIR – RIVER BAUNACH – GERMANY**  
© (left) Raphaela Titus - WWA Kronach, (right) Sigrun Lange - WWF Germany



**UNNAMED WEIR - RIVER HUCAVA - SLOVAKIA**  
© Rob Kleinjans



## COUNTRIES THAT JOINED THE DAM REMOVAL MOVEMENT IN 2021

### PORTUGAL

Portugal joined the dam removal movement in 2021 by executing its 1st barrier removal. The barrier was located along River Vascão in the Southeastern part of the country, which is part of the Natura 2000 Network (site PTCO0036), and it is also included in the RAMSAR Convention (Convention on Wetlands; site number 2090). Despite its great ecological importance, River Vascão is highly fragmented by smaller structures, like road crossings and weirs. The first of the 18 barriers that are considered as having a substantial negative impact on fish migration was removed in October 2021. Specifically, the middle section of a multi-culvert road crossing was removed, and a bridge was constructed in its place. The project was co-financed by the EU Cohesion Fund (85%) and the National Fund-Fundo Ambiental (15%). The newly constructed road crossing permits unhindered passage to all fishes, regardless of the species, the fish size, or hydrological conditions.

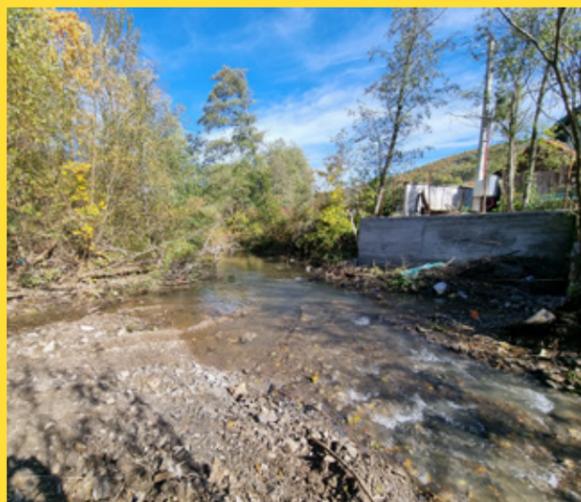


Photo: River Vezišnica, Montenegro after the removal operations © WWF Adria

### MONTENEGRO

Dam removal history was made in the Western Balkans in 2021, since the 1st barrier removals took place in Montenegro to improve the ecological status of River Vezišnica. Three illegal, non-functional weirs were removed from River Vezišnica which, for years, had suffered the detrimental effects of industrial pollution, untreated wastewater, and fragmentation of its corridor. The project was executed by WWF Adria, the Municipality of Pljevlja, and the Ministry of Environment, with the support of the Sports and Fishing Club “Lipljen-Pljevlja”. Thanks to these removals, the free-flowing state of River Vezišnica has been fully restored. This was a particularly interesting case, where the involved parties removed the dams in just 9 months.

### SLOVAKIA

In 2021 Slovakia removed its 1st barrier through a WWF/DRE crowdfunding campaign. It was an abandoned weir at River Hučava in Central Slovakia within the Poľana Protected Landscape Area (designated in 1981), which is also a Site of Community Interest and Special Protected Area under the NATURA 2000 Network, and it is also included in the UNESCO list of Biosphere Reserves since 1990. The removal was executed to restore river connectivity, enhance fish populations, and improve water quality, since this weir was an unsurpassable obstacle to migratory fish and a blockage to the natural transportation and deposition of sediment. The project was executed by WWF Slovakia in cooperation with the Slovak Water Management Enterprise and the State Nature Conservancy of the Slovak Republic. This case was part of a bigger plan to make a paradigm shift and show to stakeholders that dam removal is the best measure to restore rivers.

## Acknowledgements

Dam Removal Europe coalition and World Fish Migration Foundation wish to express their gratitude to all the public authorities and everyone who provided valuable information/data/photos on barrier removals.

## References

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## NEXT STEPS

DRE's goal is to optimize the data collection process and create the most accurate database in Europe to evaluate the advancement in the implementation of European Union policies and to analyze the progress of this river restoration measure in each country. In that respect, a new, simplified, modified online survey will be launched via the DRE website in May 2022, and will remain active till the end of the year. The survey will enable the fast registration of barrier removals executed in 2022 and will ensure the accuracy of the submitted data.

Even though the data collection period for the purposes of this report ended in early March 2022, reports on barrier removals executed during the first quarter of the

current year are already accumulating from the United Kingdom, Norway, Portugal, Sweden and The Netherlands. Barrier removal is a cost-efficient and highly effective river restoration tool and DRE's goal is to establish it as a common practice throughout Europe in the next few years. DRE will continue monitoring and reporting the trends in barrier removal and will keep providing guidance and assistance to river restoration practitioners, with the ultimate goal to mainstream barrier removal in all European countries. Additional information on unique barrier removal cases, upcoming projects, seminars, webinars, and relative news is provided on the DRE website (<https://damremoval.eu/>) and by the DRE Newsletters (subscription available through the DRE website).



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#### **Resources and tools**

For more information about dam removal showcases, events, tools and resources, visit: [www.damremoval.eu](http://www.damremoval.eu)

#### **World Fish Migration Foundation**

World Fish Migration Foundation is the coordinator of the Dam Removal Europe coalition, working together with other international NGOs to restore rivers in Europe that have high natural or cultural importance by removing obsolete barriers and ensure healthy free-flowing rivers.

#### **Dutch Postcode Lottery & ForestPeace Foundation**

World Fish Migration Foundation is proudly supported by the Dutch Postcode Lottery and ForestPeace Foundation to enable and scale up dam removal as a viable tool for river managers in Europe. Interested in becoming a donor too and help to restore free-flowing rivers in Europe? Send an email to: [info@damremoval.eu](mailto:info@damremoval.eu)

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