


# **A JOINT VISION FOR SUSTAINABLE FLOOD RISK MANAGEMENT IN OUR SHARED BASIN**

**DANUBE FLOOD RISK MANAGEMENT PLAN UPDATE 2021**

A wide river flows across the frame, its surface reflecting the warm, golden light of a low sun. The sky is filled with soft, white and grey clouds, creating a dramatic and serene atmosphere. The water in the foreground shows gentle ripples and small waves, with some white foam visible near the bottom left corner.

# THE DANUBE RIVER BASIN

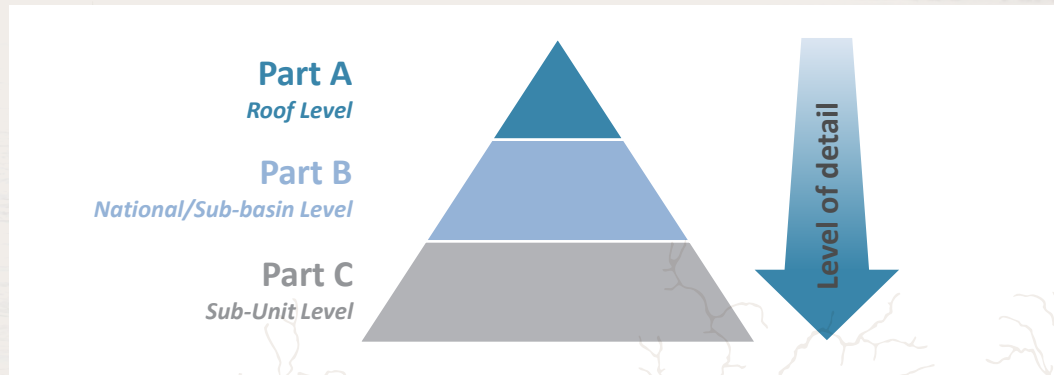
Welcome to the  
Danube River Basin!

The most  
international river basin  
in the world.

# WHAT IS A RIVER BASIN?

A river basin is the area of land from which all the water flows into a particular river, and in the case of the Danube River into the Black Sea. Within a river basin various and partly contradicting uses, rights and claims emerge. These have to be coordinated and negotiated.

The International Commission for the Protection of the Danube River (ICPDR) serves as the coordinating platform to address multilateral issues at roof level (international and basin-wide level) in the Danube River Basin District (DRBD).



Three levels of management for Floods Directive (FD) implementation in the DRBD showing the increase of the level of detail from Part A to Part B and C



*Let us explain!*

## The Danube River Basin

The Danube River Basin covers over 800,000 km<sup>2</sup> and 10% of continental Europe. It extends into the territories of 19 countries, making it the most international river basin in the world.

About 79 million people reside in the basin, with many depending on its diverse uses, such as drinking water, energy production, agriculture, and transport. Its ecological diversity, from plant and animals species to habitats, is also highly valued.

*Let us explain!*

## The International Commission for the Protection of the Danube River (ICPDR)

The basis for the ICPDR was formed with the signing of the Danube River Protection Convention (DRPC) on 29<sup>th</sup> June 1994. Today, the ICPDR comprises 15 members – 14 countries plus the European Union. The signing of the DRPC is celebrated every 29<sup>th</sup> June throughout the Danube River Basin on Danube Day.

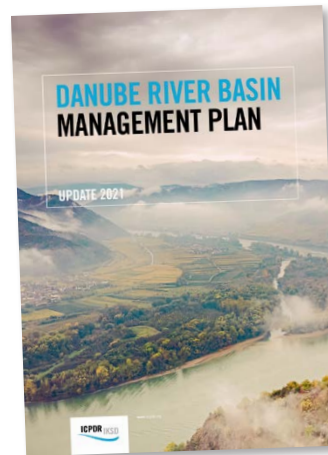
Rivers are natural systems without borders, and the ICPDR is in a unique position, comprising as it does, EU and non-EU members alike. Thus, by facilitating the implementation of measures effectively across borders, the ICPDR has already helped **better prepare the Danube aquatic ecosystem for the challenges of the future.** The ICPDR's management plans are the result of working together with national governments and a broad range of stakeholders for the benefit of our shared river basin.

# THE GOALS OF THE ICPDR

The work of the ICPDR is guided towards achieving three pillars of action:

- **“CLEANER”** waters for everyone to enjoy – which means reducing pollution from settlements, industry, and agriculture.
- a **“HEALTHIER”** home for aquatic animals and plants – which means protecting habitats for aquatic animals and plants, drinking water, and river recreation.
- a **“SAFER”** environment for people to live without the fear of floods – which means living without the fear of major flood damage and accident risks.

These three pillars support our objectives to make the water environment of the Danube **cleaner, healthier, and safer** – not only for us, but for future generations too.



To achieve these pillars, the ICPDR coordinates the establishment of the Danube River Basin Management Plan (DRBMP) and thereby supports the implementation of the EU Water Framework Directive (WFD) in ICPDR member countries.

# THE DANUBE FLOOD RISK MANAGEMENT PLAN UPDATE 2021: WHY & WHAT?

## Why update this plan?

Floods are natural phenomena. They have shaped natural landscapes, created habitats, and supported ecosystems in floodplains, wetlands, and other lowlands since time immemorial. Floods are impossible to prevent entirely, although measures may be taken to reduce their frequency and the damage they cause.

## What is the Danube Flood Risk Management Plan (DFRMP)?

Every six years, the ICPDR updates its Danube Flood Risk Management Plan (DFRMP), focusing on the assessment and management of flood risks in the Danube River Basin. 2021 marks the first update to the DFRMP, the first version of which was published in 2015. The second update is due for 2027.

This management plan offers rich and comprehensive information about flood risk management measures to be taken in the Danube River Basin. Flood Risk means the combination of the probability of a flood event and of the potential adverse consequences for human health, the environment, cultural heritage and economic activity associated with a flood event. ▼



*Let us explain!*

## The Danube Management Plans

The DFRMP Update 2021 was created at the same time as the DRBMP Update 2021. The latter is a document focusing on assessment and measures towards the achievement of “good status” in waters of the Danube River Basin. The two plans are coordinated and synergised in keeping with the environmental objectives as stipulated by the WFD.

*Let us explain!*

## Floods Directive

The EU Floods Directive (FD) is legislation on the assessment and management of flood risks. Its full name is Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks. The FD is connected to the Water Framework Directive (Directive 2000/60/EC), stating that measures shall take into account the relevant environmental objectives in the WFD.



Flood risk management plans have to define appropriate objectives and include measures to achieve these objectives.

The following objectives of the DFRMP were agreed upon by the ICPDR in 2015, and continue to form the backbone of the updated plan as of 2021:

- Avoidance of new risks
- Reduction of existing risks
- Strengthening resilience
- Raising awareness
- Promoting the solidarity principle

These objectives focus on the reduction of potential adverse consequences of flooding for human health, the environment, cultural heritage and economic activity. They address all aspects of flood risk management focusing on prevention, protection and preparedness, including flood forecasts and early warning systems and taking into account the characteristics of the Danube River Basin.

We, the ICPDR, act as a joint platform for the implementation of the Danube River Protection Convention, our founding legal document, along with the European Union's Water Framework Directive (WFD) and Floods Directive (FD). The benefits of these important pieces of legislation are for the entire basin and its people.



# OUR FOCUS IN 2021

The measures described in the DFRMP focus particularly on:

## **Prevention**

For example, this could mean preventing damage caused by floods by avoiding construction of houses and industries in flood-prone areas, or by adapting future developments to the risk of flooding.

## **Protection**

For example, this could mean taking measures to reduce the impact of floods in a specific location, including the restoration of floodplains and wetlands.

## **Preparedness**

This could include awareness-raising activities and the provision of practical information to the public on what to do in the event of flooding, for example, by making flood risk maps available.

*Let us explain!*

## Self-Protection Measures

There are a variety of ways in which we encourage individuals and property owners to take their own precautionary measures against floods:

### Keep water away from the building

(choice of location of the building, water sensitive shaping of the terrain, walls and swells, ramps, little banks, mobile elements, demountable barriers)

**Sealing and protecting** (sealing of doors and windows, mobile closures, waterproof walls)

**Wet precaution** (controlled flooding, stilted buildings)

To stimulate self-protection measures and responsible behaviour in case of flooding, relevant information about everyone's exposure to floods needs to be communicated. The key service that can be offered in this respect is the preparation of flood hazard and risk maps.

# FLOODING AND THE DANUBE: A GROWING RISK

- Flood events in recent decades have proven that, despite all protection efforts, some level of residual risk will always remain. Even during 2021 itself, the year this plan was under consultation by the public, various extreme flooding events occurred across Europe, including some parts of the Danube River Basin.

In accordance with standards, flood protection measures are designed, when possible, to withstand a so-called '100-years flood event' (a flood only likely to occur once per century). Even so, it is possible for these measures to become overloaded by even larger floods, or to fail, thus they do not guarantee a 'total' safety – although certainly a greatly reduced probability of damage and casualties. Such flood protection measures should always be built in coordination with all relevant stakeholders including the participation of potentially affected people.





# CLIMATE CHANGE ADAPTATION

Several key factors are important to be assessed and considered when formulating flood risk management plans. Socio-economic development in flood prone areas and the associated increase in flood risk is one such factor. The likely impact of climate change on the flood processes and flood events are also of utmost importance.

With regard to the latter, the ICPDR Climate Change Adaptation Strategy contains an overview of guiding principles which provide support for the integration of adaptation to climate change into flood and drought risk management. Adaptation is being carried out with a priority given to win-win, no-regret and low-regret measures that are flexible enough for various conditions.

Within these guiding principles, included under “Awareness raising, early warning and preparedness measures”, is a recommendation to perform a **climate check of flood risk measures**. The report prioritizes those DFRMP measures which are sufficiently robust to the uncertainty in forecasting of climate change impacts. This robustness has been achieved through focusing on the risk of pollution in various flood-prone zones, and on implementable non-structural measures when possible.





This ICPDR product is based on national information provided by the Contracting Parties to the ICPDR (AT, BA, BG, CZ, DE, HR, HU, ME, MD, RO, RS, SI, SK, UA) and CH. EuroGlobalMap data from EuroGeographics was used for all national borders except for AL, BA, ME where the data from the ESRI World Countries was used; Shuttle Radar Topography Mission (SRTM) from USGS Seamless Data Distribution System was used as elevation data layer; data from the European Commission (Joint Research Center) was used for the outer border of the DRBD of AL, IT, ME and PL.

# MAPPING AND IDENTIFYING FLOOD HAZARDS

To ensure a coherent approach with river basin management planning, the flood hazard and flood risk maps were prepared for the catchments with an area larger than 4,000 km<sup>2</sup>. These maps show the potential adverse consequences associated with different flood scenarios and serve as an effective tool for information, as well as a valuable basis for priority setting and further technical, financial and political decisions regarding flood risk management.

## Flood Hazard Maps

The ICPDR agreed that two scenarios for flood hazard areas – with medium and low probabilities – are relevant for the level of the Danube River Basin. Almost all of the medium probability floods are based on a 100-year recurrence period. Overall, the medium probability hazard area covers 55,629 km<sup>2</sup> in the basin.

The recurrence period of floods with low probability (or ‘extreme events’) varies mostly from 300 to 1,000 years. Overall, the low probability hazard area covers 84,305 km<sup>2</sup> in the basin.

The flood hazard map was prepared at the scale of 1:4,500,000 with the goal of providing a general overview for the entire basin. For more detailed information, such as flow velocity and depth, please view the national maps here: [www.icpdr.org/main/national-frm](http://www.icpdr.org/main/national-frm)



**300-1,000**

years flood information  
available in the whole  
catchment

**84,305**

km<sup>2</sup> low probability  
hazard area

Discover our up-to-date flood risk maps of the Danube River Basin at [icpdr.org/main/activities-projects/flood-risk-management](https://icpdr.org/main/activities-projects/flood-risk-management)



**5,543,229**

people are potentially affected by floods in the Danube River Basin

## Flood Risk Maps

### Risk and Population Map

This map shows the population affected by floods with low, medium, and high probabilities in the territory of countries within the basin.

#### Affected Population:

- Floods with high probability potentially affect 1,044,862 people;
- Floods with medium probability potentially affect 2,987,964 people;
- and floods with low probability potentially affect 5,543,229 people.

### Risk and Economic Activity Maps

These maps display the share of inundated area by class of economic activity for low, medium, and high probability floods. Agricultural areas have the major share with approximately 33,225 km<sup>2</sup> of agricultural areas potentially affected by low probability floods in the basin. Significant proportions of urban areas are potentially affected by low probability floods in Austria, Bosnia and Herzegovina, Slovakia, and the Czech Republic. The largest urban area potentially affected by low probability floods is in Hungary (905 km<sup>2</sup>).

### Risk and Installations Map

This map shows the potential that Integrated Pollution Prevention and Control (IPPC) and Seveso installations (sites containing large quantities of dangerous substances, as defined by the EU's Seveso II Directive) will be affected by floods with low, medium, and high probability in the territory of countries within the basin.

#### **Installations with the Potential to Cause Pollution:**

- Floods with high probability potentially affect 91 installations;
- Floods with medium probability potentially affect 216 installations;
- and floods with low probability potentially affect 517 installations.

#### **Risk and WFD-Protected Areas Maps**

Map a) shows low probability flood hazard areas that overlap Natura 2000 protected areas (nature protection areas in the territory of the European Union, which are made up of Special Areas of Conservation and Special Protection Areas designated respectively under the Habitats Directive and Birds Directive).

Map b) displays the total numbers of areas designated for the abstraction of water intended for human consumption under WFD Article 7, and of the water bodies designated as recreational waters (e.g. bathing waters), that are potentially affected by floods with low, medium and high probability in the territory of countries within the basin.

#### **Drinking Water and Recreational Water Areas:**

- Floods with high probability potentially affect 927 protected areas;
- Floods with medium probability potentially affect 1,114 protected areas;
- and floods with low probability potentially affect 1,389 protected areas.



**517**

Installations with the  
Potential to Cause Pollution



# OBJECTIVES

As stipulated in the EU Floods Directive (FD), appropriate objectives for the management of flood risks should be established focusing on the reduction of potential adverse consequences of flooding for human health, the environment, cultural heritage and economic activity, as well as other initiatives reducing the likelihood of flooding.

The following objectives of the DFRMP for the Danube River Basin District were agreed upon by the ICPDR in 2015 – and continue to form the backbone of the plan's 2021 update.

## Avoid New Risks

New buildings in areas of potential flood risks present an easily avoidable risk. Inappropriate spatial planning as well as urban, rural and industrial development and construction in the areas of potential significant flood risk will lead to future increases in damages, losses and casualties. All such activities shall be planned and carried out without having any impacts on increasing the risk of flooding.



## Implementation Examples: Avoiding New Risks

Status: Ongoing

Target area: Austria (country-wide)

Project: Hazard Zone Planning in Austria

In Austria flood hazard zone plans have to be elaborated, delineating inundated areas and flood intensities (a product of flow velocities and water depths). This is done on a high resolution scale (1:2,000). The plans are then communicated to the public and discussed with potentially affected people, leading to implications or recommendations in spatial planning. The flood hazard zone plans are based on Austrian federal legislation (Water Act, Forest Act). Spatial planning is regulated at the provincial level, therefore, the results of the flood hazard zone plans are incorporated into these nine province-level legislations differently.



## Reduction of Existing Risks

The purpose of the FD is to establish a framework for the assessment and management of flood risks, aiming at the reduction of the adverse consequences associated with floods. All FD implementation steps in the Danube River Basin have been accomplished following this principle, including Preliminary Flood Risk Assessment (PFRA), along with the development of both flood maps and of the Danube Flood Risk Management Plan (DFRMP).

### Implementation Examples: Reducing existing risks

Status: *Implemented*

Target area: *Kolubara River Basin, Serbia*

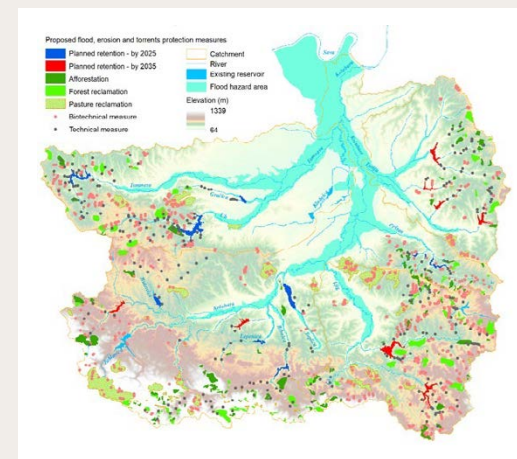
Project: *Study on Flood Risk Management in the Kolubara River Basin*

Following disastrous floods in May 2014, affecting the entire Kolubara River basin (estimated damage of €900 million – €1 billion) a study was prepared with the main objective to define a concept for integrated flood protection in the basin.

Hydrological and hydraulic models were used for the reconstruction of the May 2014 floods and for simulation of 100- and 1,000-year flows. About 410 km of rivers were modelled and flood hazard maps prepared. The results revealed that the statistical ranks of peak flows in May 2014 in the middle and lower parts of the basin were between 300 and 500 years. Potential flood damage was assessed by using the extent of the 2014 flood and risk data at present (2015) and in the future (2035), revealing that a new catastrophic flood would cause 50% greater damage than the 2014 flood. Therefore, a set of structural and non-structural flood protection measures was proposed. The proposal included new structures for attenuating flood waves (20 flood retention reservoirs), erosion control measures and measures for natural retention of water in the basin (technical, biotechnical, biological, agrotechnical and other measures) and, reconstruction or construction of levees to increase flood protection level of the most important areas.

Total cost of the proposed structural measures was estimated at EUR 200 million.

A variety of non-structural measures were proposed as well, which should be implemented by the water sector, safety and rescue services, hydro-meteorological services, health services, spatial planners, nature conservation, municipalities, reservoir users, as well as citizens, non-governmental organizations, companies and entrepreneurs in flood hazard areas.





## Strengthening Resilience

To improve its resilience against flooding, society must have an adequate emergency response both during and immediately following flooding events. This helps to limit adverse effects and assists in recovery to regain a standard of living comparable to – or perhaps even better than – how it was prior to the flooding event.

### Implementation Examples: Strengthening Resilience



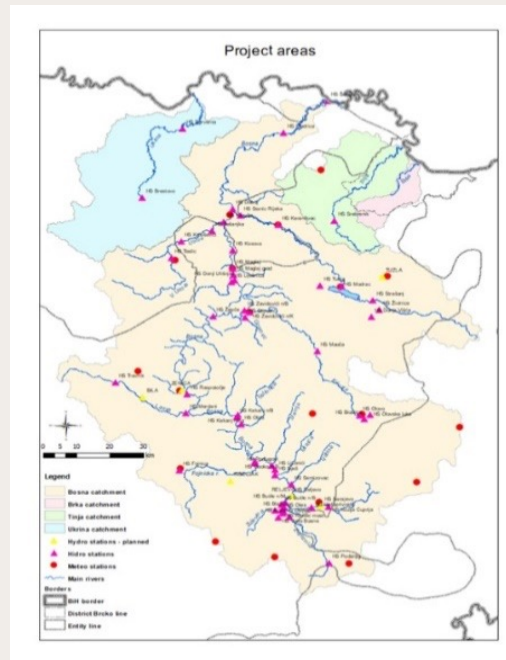
Status: Implemented

Target area: Bosna River, Bosnia-Herzegovina

Project: Development of Hydrological Flood Forecasting System for Sava River Basin (Bosna River)

Implemented in 2021, the overall objective of this project was to support the development of integrated flood risk management in Bosnia-Herzegovina in line with the WFD.

It supported the development and implementation of several cutting-edge tools and technology for flood forecasting, and the integration of a consistent hydrological flood forecasting system (HFFS) to increase social, economic and environmental safety.



*Let us explain!*

## What is the solidarity principle?

The ICPDR is fully aware of the importance of applying the **solidarity principle**; one should not pass-on water management problems from one region to another. That is why the ICPDR agreed that measures with downstream effects shall have key priority at the basin-wide level. According to the DFRMP: "Countries shall not apply measures which, by their extent and impact, significantly increase flood risks in the countries neighbouring upstream or downstream. Countries should take all possible steps not to export the flood problems to their neighbours."

## Raising Awareness

Preparedness is a result of awareness and is based on the necessary information to make the individual recognise what possible courses of action they could take. It is the personal responsibility of anyone who lives and works by or on rivers or floodplains, to consider adapting to help minimise flood risks. Thus, it is vital for all Danubians to know the risks and act appropriately. It is therefore important for authorities to share relevant information transparently. All measures linked to public information and awareness raising are most effective when they involve participation at all levels. It is also important for the public to have easy access to risk maps and information on how to be prepared in case of flood events.

Public participation in decision-making is a cornerstone of successful implementation of integrated and comprehensive management plans, both to improve the quality and the implementation of the decisions, and to give the public the opportunity to express its concerns and to enable authorities to take due account of such concerns.

## Promoting the solidarity principle



The solidarity principle is very important in the context of flood risk management. In the light of it, countries should be encouraged to seek a fair sharing of responsibilities, when measures are jointly decided for common benefit. The FD explicitly stipulates this principle with regard to EU members, and the DFRMP extends it to all Danubian countries.

# RECONNECTING FLOODPLAINS

The wetlands and floodplains of the Danube River Basin play an important role in the functioning of aquatic ecosystems and have a positive effect on water status. The water retention attributes of well-connected wetlands and floodplains also play a significant role during flood events and may also have positive effects on the reduction of nutrients and improvement of habitats. As an integral part of the river system, they are hotspots for biodiversity, also providing habitats for e.g. fish and waterfowls that use such areas as spawning, nursery and feeding grounds.

The ICPDR's basin-wide vision is that floodplains and wetlands throughout the Danube River Basin should be reconnected and restored. The integrated function of these riverine systems will contribute to the development of self-sustaining aquatic populations, flood protection, climate change adaptation and reduction of pollution.

The DFRMP includes measures aimed at encouraging stakeholder dialogue and balancing interests around floodplain reconnection.

Over the last 200 years, nearly 80% of the basin's natural wetlands and floodplains were disconnected from rivers to support activities such as flood protection, navigation, and hydropower generation. Not only did this cause many negative ecological impacts; it also worsened flooding in many cases. More recently, our awareness of the multiple benefits of floodplains – for example, naturally retaining flood waters, moderating extreme events, and reducing water pollution – has increased.

Through the DFRMP, the Danube countries now maximise win-win synergies further and work towards truly integrated water management.

*Let us explain!4*

## Why Public Consultation?

The DFRMP lies at the core of the ICPDR's central work programs – so it should be developed with strong involvement of civil society and stakeholders at all possible levels from the beginning and throughout the entire cycle of all activities.

The public is therefore invited to get involved in a variety of activities, ranging from developing policies, to implementing measures and evaluating impacts.

Additionally, public consultation is a legal requirement of the FD.

The ICPDR aspires to work ever closely with the public to reach our goals together. Only with adequate public participation, will we be able to make the Danube **CLEANER, HEALTHIER and SAFER**.

# #HAVEYOURSAY: PUBLIC CONSULTATION ON THE DFRMP UPDATE 2021

Doing the work is only the first part of the job. We, the ICPDR also care about public participation, and especially during the drafting of these plans we make sure that the voice of the public gets heard. Involving the public in conferences and workshops – as well as providing regular information through magazines and websites – is an essential part of flood risk management. The ICPDR supports the active involvement of stakeholders and civil society on all levels of its work. During the process of updating the DFRMP in 2021, the ICPDR included a range of public consultation measures along the way.

As a result of our work, public participation in water management matters is in fact increasing throughout the Danube River Basin, and those living in the region are signing up more and more to be a part of the solution.

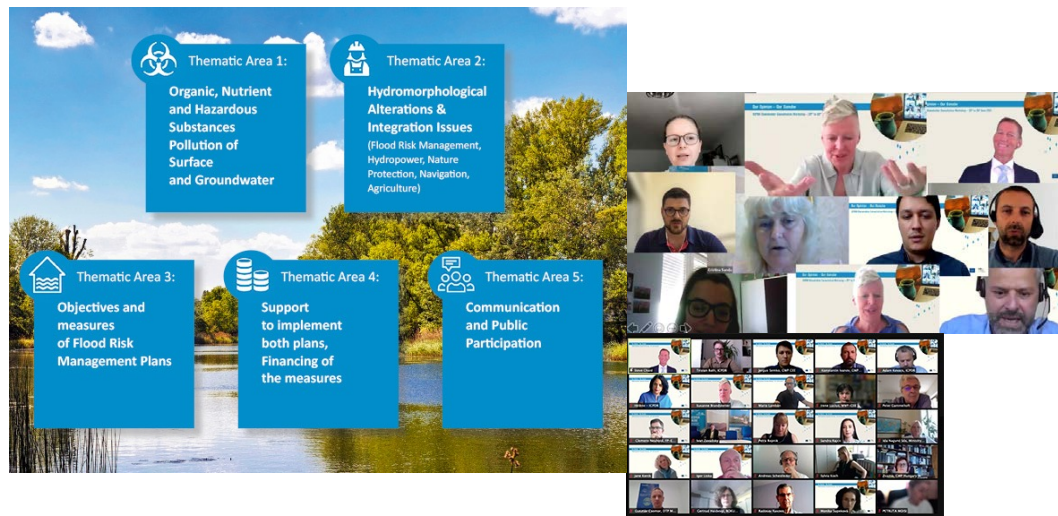
Throughout 2021, the ICPDR engaged in the following public consultation activities as part of the process of drafting the DFRMP Update 2021:

- On 30<sup>th</sup> March 2021, the draft text of the DFRMP Update 2021 was published on ICPDR.org for the public to access. The public was invited to comment or mail in their comments over a six-month period, ending on 30<sup>th</sup> September 2021.
- An Online Questionnaire was published and made available to the public on the same date as the draft plans. Available in 10 Danubian languages (plus English), the questionnaire aimed to engage with and receive input from a broader public on the issues of the DFRMP.

And even for members of the public without any prior knowledge of the plan, it was possible to fill in the questionnaire.

- An Online Stakeholder Workshop, *Our Opinion – Our Danube*, open to the public along with various ICPDR stakeholders and observers, was held on 29<sup>th</sup> & 30<sup>th</sup> June 2021. The workshop was the biggest single event of the consultation process and provided a forum for direct contact between the public, ICPDR, and several key stakeholders.
- A dedicated social media campaign also took place throughout the process to promote and encourage public consultation on the plan.
- The ICPDR’s regular in-house magazine, *Danube Watch*, also featured several articles on the topic of the Public Consultation Process.

*The 5 key Thematic Areas under discussion during Our Opinion – Our Danube; various workshop participants and Danube experts throughout the two-day online event.*



### Information

## Consultation Outcomes and Public Reach

One written statement was sent from one institution on the subject of the DFRMP Update 2021, containing **24 comments** on the plan.

The social media campaign for the public consultation process involved over **13,000** online interactions and made over **300,000** impressions!

The entire Public Consultation Process, including a record of all the comments received throughout from a wide variety of stakeholders, can be found on the ICPDR home page.





These  
events can happen



in many years but also  
tomorrow.

## IMPRINT

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Danube River Basin Management Plan Update 2021

Read now via: <https://www.icpdr.org/main/activities-projects/river-basin-management>

