

# INCREASING THE PREPAREDNESS OF THE DANUBE REGION AGAINST ENVIRONMENTAL RISKS



**Károly Gombás**  
Budapest, 11/09/2018

**Priority Area Coordinator,**  
*EU Strategy for the Danube  
Region Priority Area 5 –  
Environmental risks;*

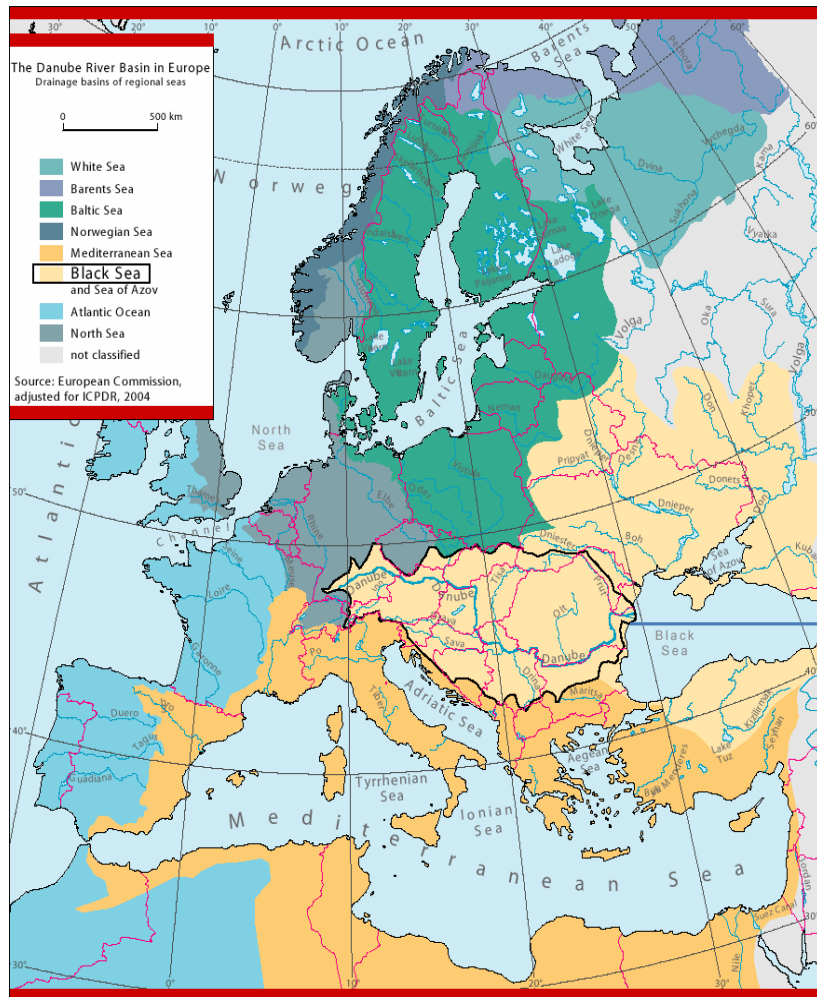
**Chairman,**  
*International Commission  
for the Protection of the  
Danube River, Flood  
Protection Expert Group*



# The Danube Basin characteristics

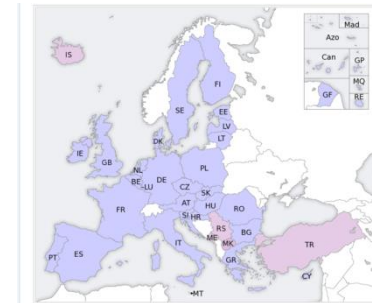


# The Danube River Basin District within the European Union



## Characteristic numbers:

- 10% of Europe
- 801,463 km<sup>2</sup>
- 83 mil inhabitants
- 19 countries



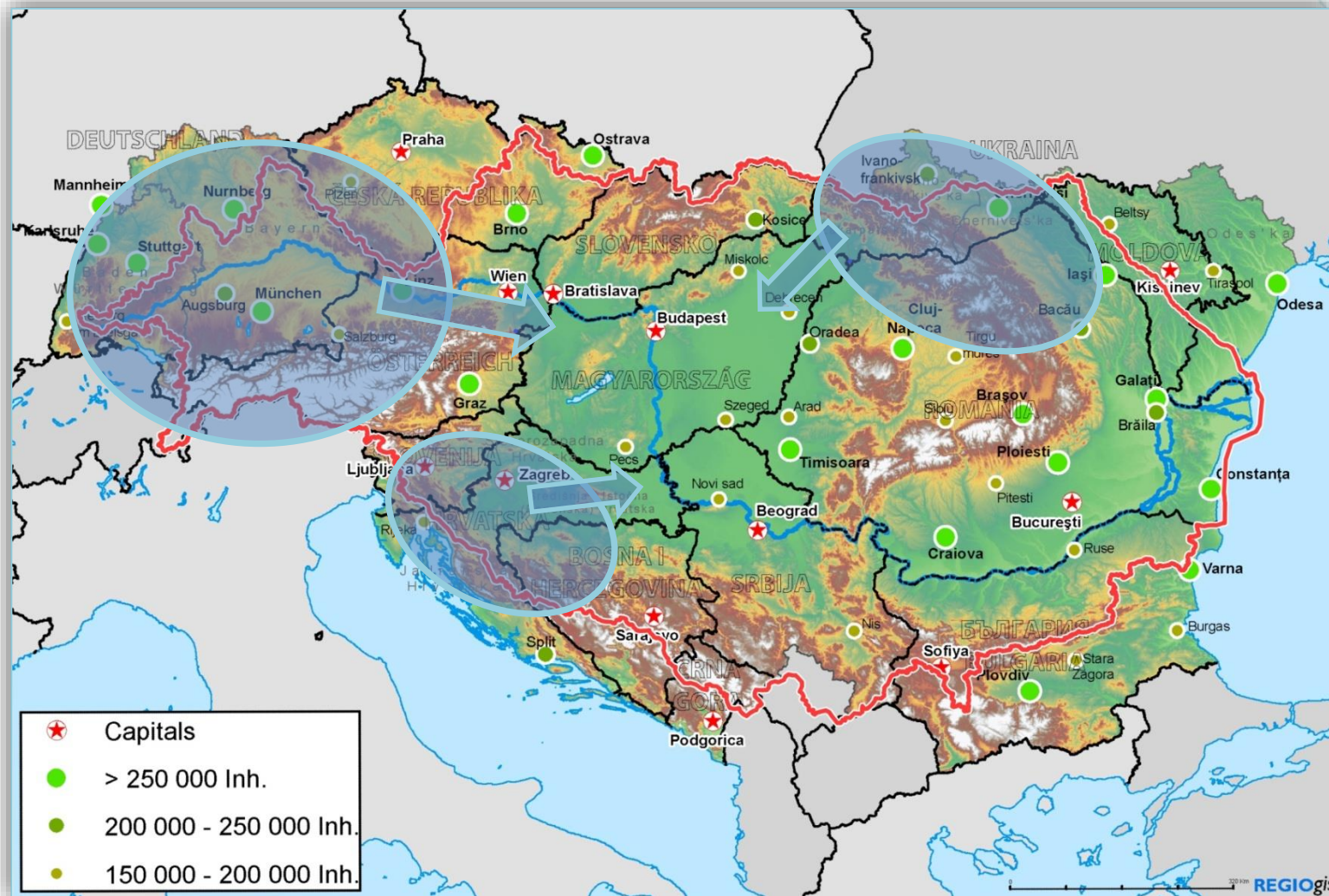
## Most international river basin in the world.



The Danube River stretches over 2.800 km (1.170 miles) across Europe and flows into the Black Sea. The drainage area is influenced by two major mountain chains: the Alps and the Carpathians.

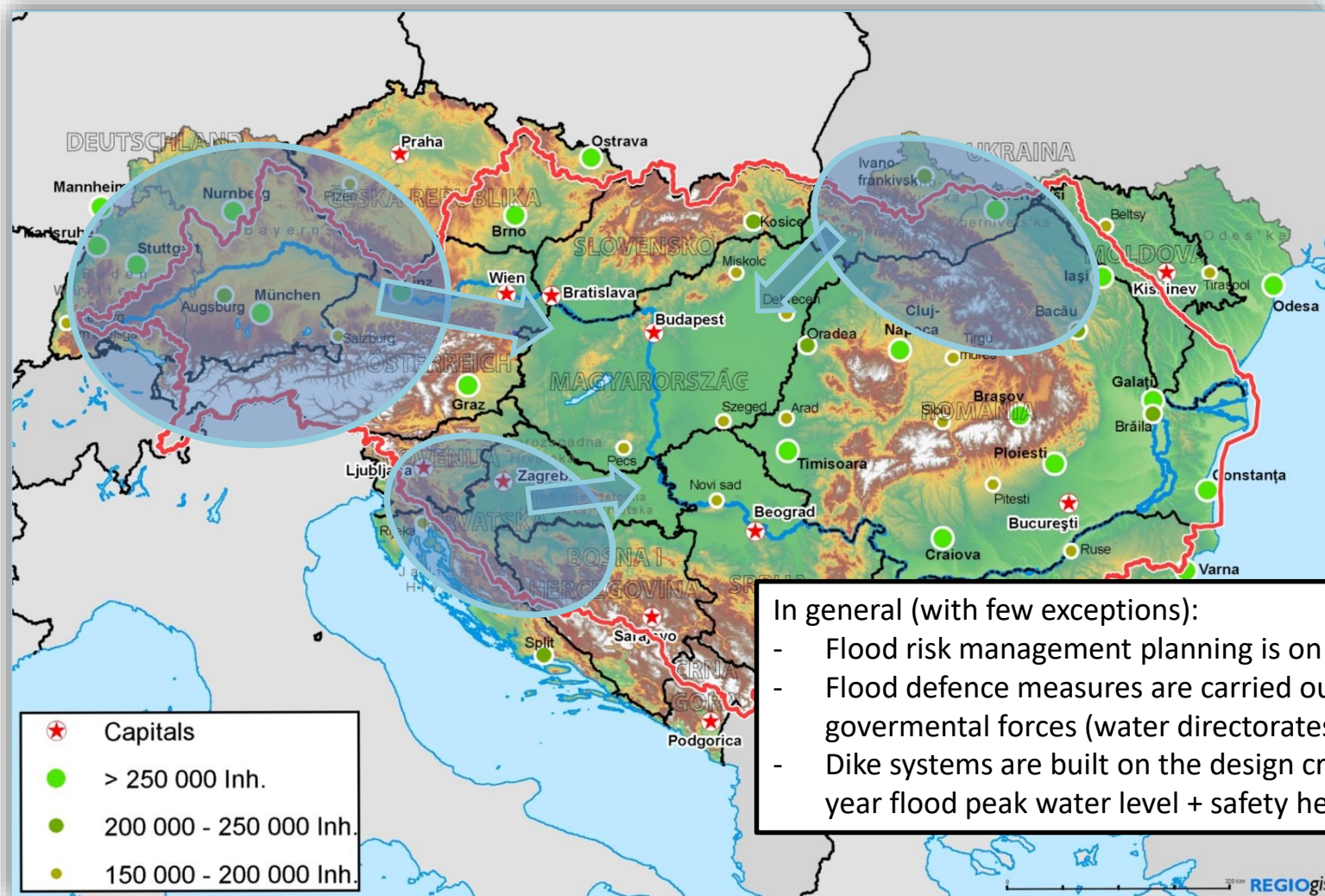


# Basin wide issues in flood management | DRB



Root cause of characteristic flood events in Danube River Basin: heavy precipitation in the mountainous areas.  $Q_{max}$  (2013) in lower Danube = 11.000 m<sup>3</sup>/s (388.000 cfs, ft<sup>3</sup>/s)

# Basin wide issues in flood management | DRB



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# EU funds and programmes with basin wide relevance in the field of hazard and risk mitigation

*They all need international cooperation!*





# Institutions for cooperation



# Implementation of Flood Directive in the Danube Basin



European Union level: Working Group on Floods (WG-F)



Danube basin, „level A”



Flood Protection  
Expert Group (FP-EG)

Environmental Risks  
Priority Area (PA5)



HU presidency: 2019

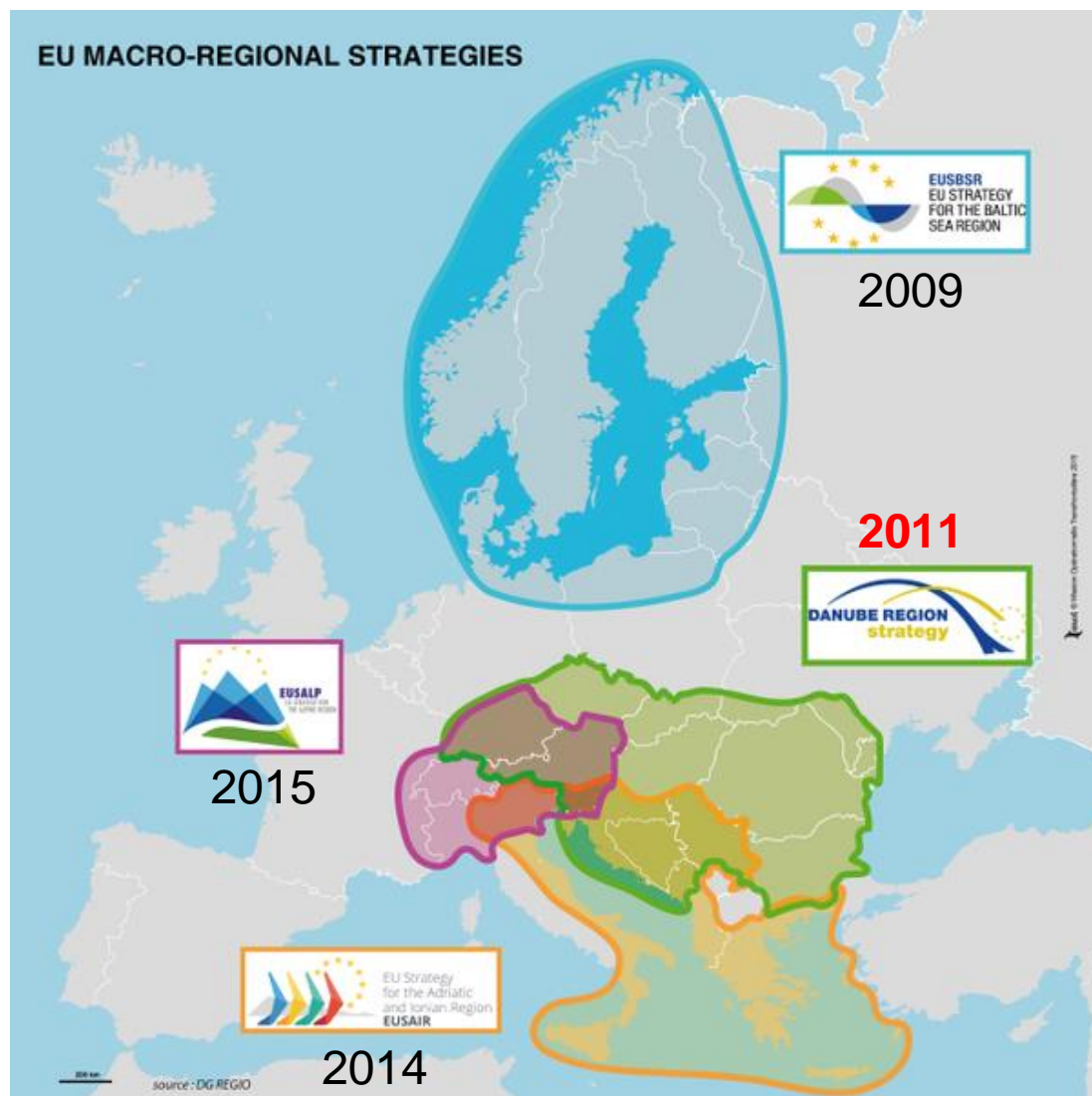


HU presidency: 2017



# Macro-regional strategies of the EU

- 3 NOs of EU communication in relation of macro strategies
  - NO new institutes,
  - NO new acts
  - NO new funding sources
- Objectives should be embedded into existing legal frameworks, programmes and financing tools (EU level, regional, national, pre-accessing)
- Multi level governance should foster the cooperation between stakeholders from different levels without the creation of new decision making bodies.



# EUSDR priority areas

## Pillar-1 Connecting the region



**PA 1A**

Waterways Mobility



**PA 1B**

Rail-Road-Air Mobility



**PA 2**

Sustainable Energy



**PA 3**

Culture & Tourism

## Pillar-2 Protecting the environment



**PA 4**

Water Quality



**PA 5**

Environmental Risks



**PA 6**

Biodiversity & Landscapes

## Pillar-3 Building Prosperity



**PA 7**

Knowledge Society



**PA 8**

Competitiveness of Enterprises



**PA 9**

People & Skills

## Pillar-1 Strengthening the Danube Region



**PA 10**

Institutional Capacity & Cooperation



**PA 11**

Security

# EUSDR priority areas and SDG goals

## Pillar-1 Connecting the region



**PA 1A**

Waterways Mobility



**PA 1B**

Rail-Road-Air Mobility



**PA 2**

Sustainable Energy



**PA 3**

Culture & Tourism

## Pillar-2 Protecting the environment



**PA 4**

Water Quality



**PA 5**



**PA 6**

## Pillar-3 Building Prosperity



**PA 7**

Knowledge Society



**PA 10**

Institutional Capacity

## Pillar-1 Strengthening the Danube Region

### Sustainable Development Goals







# Danube Region Strategy and PA5 - Environmental Risks

(*[Danube.envirisks@mfa.gov.hu](mailto:Danube.envirisks@mfa.gov.hu)*)

# Actions of PA5

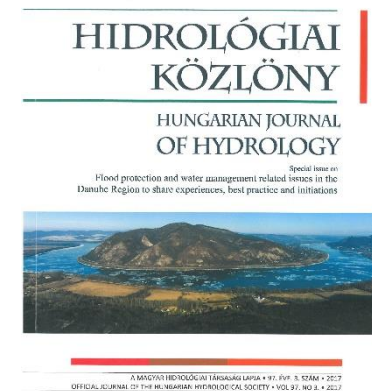
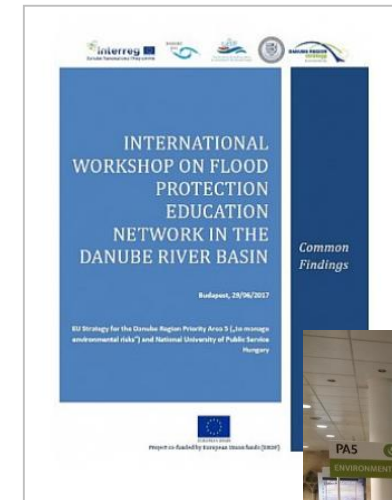


- To develop and adopt one **single overarching floods management plan at basin level** or a set of flood risk management plans coordinated at the level of the international river basin
- To support **wetland and floodplain restoration as an effective mean of enhancing flood protection**, and more generally to analyse and identify the best response to flood risk (including “green infrastructure”)
- To extend the coverage of the European Floods Alert System (EFAS) system to the whole Danube river basin, to step up preparedness efforts at regional level (including better knowledge of each other's national systems) and to further promote **joint responses to natural disasters and to flood events in particular, including early warning systems**
- To continuously update the existing database of **accident risk spots (ARS Inventory)**, contaminated sites and sites used for the storage of dangerous substances
- To strengthen **operational cooperation among the emergency response authorities** in the Danube countries and to improve the interoperability of the available assets
- To develop **rapid response procedures and plans in case of industrial accidental river pollution**
- Anticipate regional and local **impacts of climate change** through research
- To develop **spatial planning and construction activities** in the context of climate change and increased threats of floods

# Period 2017-2019

## Executed PA5 project elements so far

- Cooperation with other EUSDR PAs and with other international organizations and EU institutes (ICPDR, JRC, CC, GWP, ISRBC, EC DGs, 3 macro-regional strategies)
- International conference session on flood protection experiences, techniques and technologies 05/07/2017
- Special issue on flood protection experiences of a scientific journal 18/10/2017
- Workshop for higher education institutes for networking, curricula development, identifying funds/scholars 29/06/2017
- E-learning material development in 2018 related to flood protection (+ project support)
- Letter of recommendations to new project ideas (23 international projects) – tool to support macro-regional importance and alignment of actions





# EUSDR PA5 cooperation with other macro-regional strategies of EU

- ❑ INTERACT **Joint meeting of macro-regional coordinators on climate and disaster risk reduction** (Budapest, 16-17/11/2017)
- ❑ As a follow-up the coordinators **jointly** organized a **conference session on the EU Civil Protection Forum 2018** in Brussels “SCALING UP PREVENTION: Cross-border cooperation for effective disaster risk management” highlighting their achievements for the whole European civil protection community.



# PA5 - Call for Papers 2018

- **Journal of Environmental Geography (JoEG)** is a peer-reviewed open access online journal published by the University of Szeged
- **Thematic issue on „Climate Change Adaptation in the Danube Region”** financed by EUSDR PA5
- The issue will facilitate to **raise awareness** and gather stakeholders to **share knowledge** and focus on the better preparedness and resilience of the Danube countries against the adverse effects of climate change.
- Gives a great opportunity to **trace the Danube basin research progress** in order to stimulate further investigation topics.
- **Manuscript submission until 15<sup>th</sup> of September 2018**

## THEMATIC ISSUE ON “CLIMATE CHANGE ADAPTATION IN THE DANUBE REGION”

Call for Papers

Journal of Environmental Geography

Print Version: ISSN: 2060-3274

Online: ISSN 2060-467X

### Journal Introduction

Journal of Environmental Geography (JoEG) is a peer-reviewed open access online journal with two issues on yearly basis. Publisher is the University of Szeged, Department of Physical Geography and Geoinformatics.

The Journal's aim to publish original academic research of high scholarly standard in the fields of Geography and Environmental Science with special emphasis on human-related processes in its broader sense.

Submitted papers are refereed, and are evaluated based on their scientific quality, originality and contribution to the advanced understanding of human-environmental interactions. A distinguished Editorial Board with experts in the field of Geography and Environmental Science guarantees the scientific quality of papers published in the Journal. Rejection rate of submitted manuscripts is around 30-40%.

JoEG provides

- double-blind peer review
- rapid publication
- NO publishing costs and article processing fees
- FREE open access for readers
- larger audience and more citations due to the increasing number of abstracting and indexing services

The Journal is covered by several abstracting and indexing services e.g. Directory of Open Access Journals (DOAJ), EBSCO, GeoRef, and Google Scholar and published on De Gruyter's online platform.

### About the Thematic Issue

Publication of the present thematic issue of JoEG is supported by the EU Strategy for the Danube Region (EUSDR) Priority Area 5 (PA5 - Environmental risks) composed by the representatives of 14 Danube countries. Financed from the Interreg project DTP-PAC1-PA5.

In line with one of the actions of EUSDR PA5 “to support anticipating local and regional impacts of climate change regarding the Danube Region through research”, we are intent to collect the results of finalized or ongoing research projects and best practices within the Danube basin in the field of climate change adaptation.

The thematic issue aims to encompass articles from different fields, analysing among others the vulnerability of water bodies, soil mass, different ecosystems and the human environment of the region to climate change impacts and helps to identify potential adaptation measures. The issue will facilitate to raise awareness and gather stakeholders to share knowledge and focus on the better preparedness and resilience of the Danube countries against the adverse effects of climate change. It also gives a great opportunity to trace the Danube basin research progress in order to stimulate further investigation topics.

For more information about the aims and objectives of EUSDR PA5 please visit our website:

<https://www.danubeenvironmentalrisks.eu/>

# EUSDR PA5 potential role for project support

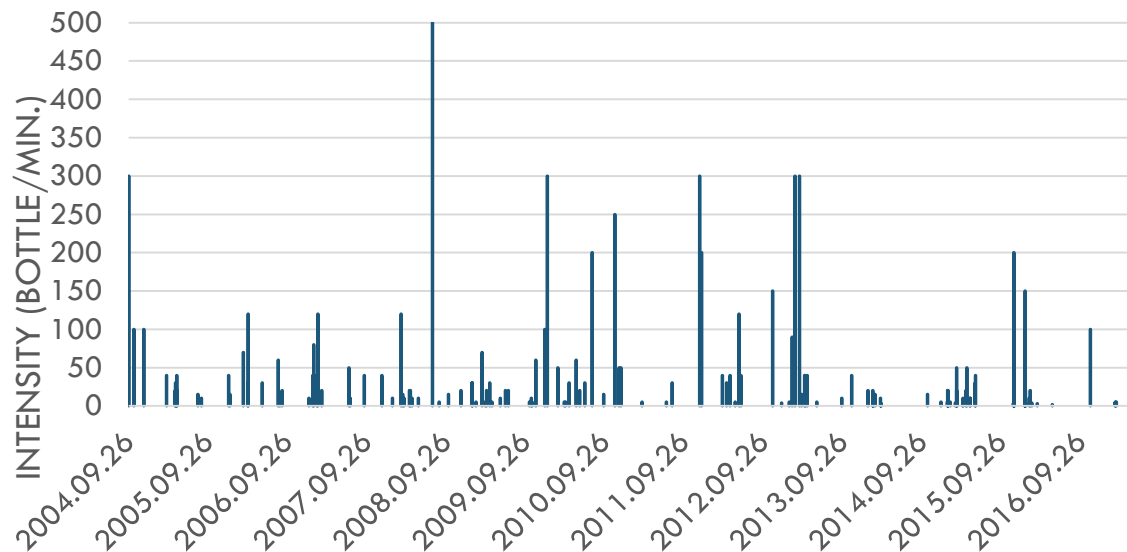
- Applying for LoR/LoM based on the interest results in appearance on the website, action plan review will consider new findings and new fields of interest of the projects in scope
- Dissemination of the results, communicating findings via SG meetings and organized events, plus by website and article
- Channelize the results into education, via InterFloodCourse project and e-learning material with solid input
- Difficulties of different level of involved organisations - stakeholder involvement via EUSDR network





# Plastic waste pollution of the Tisza River – a common Pillar-B challenge?

- Solid waste **pollution mostly from upstream countries** (& microplastic problem)
- **Exchange of experiences** (UA National Waste Management Strategy - Odessa in 2017)
- **Identification of any possible funding sources**
- Support of **awarness raising campaigns** from 2018 – **PET Cup** and **International Danube Day** event



Source: FETIVIZIG



# EUSDR PA<sub>5</sub> - challenges of plastic waste

- **Danube Day event 2018.06.28. – „Challenges of plastic waste in the Danube region and beyond. Let's act together!”** Supported by the DTP JOINTISZA project MFAT share. Aims to call attention to the mounting problems of plastic waste pollution in line with offering a networking platform in policy and NGO level to find joint solutions for the emerging waste problem.
- **„Plastic Cup – Waste collection As Adventure 04-12.08.2018”** JOINTISZA boat take part in the contest with Indian, American, British, Italian, Slovene, Serbian, Ukrainian, Moroccan and Hungarian experts on board by the support of the MFAT of Hungary.



# For more information please visit our website:

[www.danubeenvironmentalrisks.eu](http://www.danubeenvironmentalrisks.eu)



EUROPEAN UNION



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### EVENTS

<< June 2018 >>

Mo	Tu	We	Th	Fr	Sa	Su
			1	2	3	
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	

[Show all events](#)

### INTERNATIONAL DANUBE DAY 2018 – Let's act together!

#### Registration opened

Posted by Éva Fehérvári, Wednesday, 30th May 2018 @ 3:10 pm

28 June 2018: a day dedicated to stop plastic floods in the form of an international workshop and round table discussion taking place in Budapest. Signs of pollution are intensely present in the whole Tisza basin. Plastic waste can be observed in the main protected areas of the Danube Delta and has an impact on the Black Sea environment as well, resulting in cross-border complaints from downstream countries. The Danube Day event organized with the support of the JOINTISZA project under the patronage of EUSDR PA4 and PA5 aims to call attention to the mounting problems of plastic waste pollution in line with offering a networking platform in policy and NGO level to find joint solutions for the emerging waste problem. Preliminary registration to the event is open until 20 June 2018 and limited up to 80 participants.

[READ MORE](#)

### InterFloodCourse Kick-off conference

Posted by Viktor Oroszi, Wednesday, 30th May 2018 @ 11:36 am

EUSDR PAS would like to announce the InterFloodCourse project (received a Letter of Recommendation in 2017 from PAS) Kick-off conference to be held in Baja, Hungary, 25-26 June 2018 in frame of the Danube Strategic Project Fund programme.

[READ MORE](#)

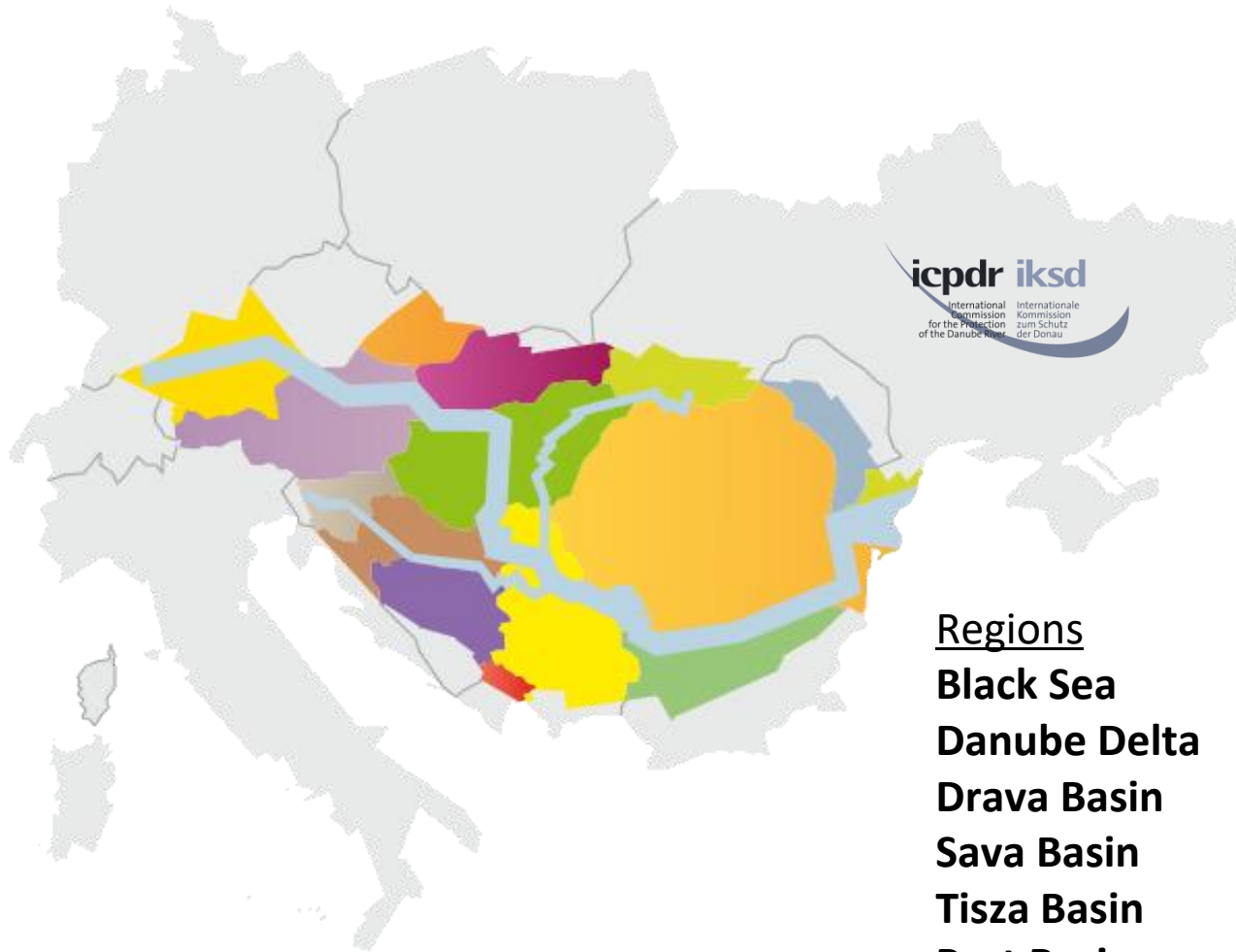
### JOINTISZA project 2nd Ad-Hoc Task Group Meeting and Shared Vision Planning Stakeholder Workshop was held in Szolnok (HUN)

Directed by Éva Fehérvári, Monday, 28th May 2018 @ 9:44 am



# ICPDR

A legal frame for co-operation to assure the protection of water and ecological resources and their sustainable use in the Danube River Basin (from 1994)



## Countries (14)

**Austria**  
**Bosnia-Herzegovina (non-EU)**  
**Bulgaria**  
**Croatia**  
**Czech Republic**  
**Germany**  
**Hungary**  
**Moldova (non-EU)**  
**Montenegro (non-EU)**  
**Romania**  
**Serbia (non-EU)**  
**Slovakia**  
**Slovenia**  
**Ukraine (non-EU)**

## Regions

**Black Sea**  
**Danube Delta**  
**Drava Basin**  
**Sava Basin**  
**Tisza Basin**  
**Prut Basin**



***www.icpdr.org***

**AEWS: Accident Emergency  
Warning System**



Task Groups



Expert Groups



[www.icpdr.org](http://www.icpdr.org)

**AEWS: Accident Emergency  
Warning System**



Task Groups



Expert Groups





# Recent catastrophic floods

icpdr ikisd

International  
Commission  
for the Protection  
of the Danube River

Internationale  
Kommission  
zum Schutz  
der Donau



C. Weinberger, Ach

2002

2005

2006

2010

2013

2014



ISRBC



Zsófia Kugler - BME



Zsófia Kugler - BME

Three steps of flood risk management:

- a) Preliminary flood risk assessment (PFRA),
- b) Flood risk and flood hazard maps
- c) Flood risk management plans.

- ICPDR has a mandate to design flood risk management policies and propose respective measures and is responsible for preparation of the Flood risk management plan for the DRBD (*level A*), reported to EU
- **Solidarity principle = one should not pass on water management problems in one region to another (unless they agree on)**
- **Key priority on level A = measures with downstream effect** (*flood & natural water retention, warning systems, reduction of risk from contaminated sites in floodplain areas*);

# Flood Risk Management Plan for the Danube River Basin District

## - structure and content



- The plan itself is around 100 pages of text, tables and maps
- General threshold for sub-basin appearance > 4.000 km<sup>2</sup>

### • Title:

## Flood Risk Management Plan for the Danube River Basin District

### • Annexes:

1. Flood hazard and risk maps
2. FRMP measures
  - Avoidance of new risks
  - Reduction of existing risks
  - Strengthening resilience
  - Raising awareness
  - Solidarity principle+ *Project list (living list, no prio)*
3. List Competent Authorities
4. Bilateral Agreements



Aspects of flood risk management	Type	Description	Measures by countries
Prevention	Removal or relocation	Measure to remove receptors from flood prone areas, or to relocate receptors to areas of lower probability of flooding and / or of lower hazard	<p>GERMANY</p> <ul style="list-style-type: none"><li>• Removal/relocation</li><li>• Information and training</li></ul> <p>AUSTRIA</p> <ul style="list-style-type: none"><li>• Incorporation of hazard zone plans</li><li>• Relocation and reallocation</li></ul> <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"><li>• Removal or relocation of buildings</li><li>• Spend the rest of buildings and functional use life</li></ul> <p>HUNGARY</p> <ul style="list-style-type: none"><li>• Removal or relocation of dykes</li></ul> <p>SLOVENIA</p> <ul style="list-style-type: none"><li>• Setting a regulation on flood resilient construction (F)</li></ul> <p>SERBIA</p> <ul style="list-style-type: none"><li>• Re-asses legalisation of illegally built structures on flood-prone areas</li><li>• Remove structures illegally built on flood-prone areas</li></ul>




# Flood Risk Management Plan for the Danube River Basin District

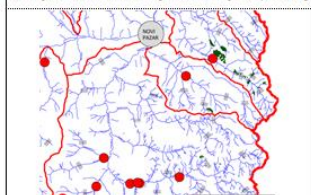
## - structure and content




- The textual part has 75 pages with the available/provided national information
  - **The document has structured into 13 main chapters ➤**
  - The aim of the plan is to have a horizontal overview of the national methodologies and results and sum up on the catchment level
  - With the continuous update of the document it is possible to follow the development of the basin
  - ICPDR member countries are providing good practices
1. Introduction
  2. Conclusions of the preliminary flood risk assessment
  3. Flood hazard maps and flood risk maps
  4. Objectives
  5. Measures
  6. Water retention (NWRM)
  7. Cost-benefit analysis
  8. Coordination with DRBMP
  9. Impacts of climate change
  10. International coordination
  11. Solidarity principle
  12. Public information and consultation
  13. Conclusions and next steps.

# Best practice examples

	<b>SERBIA</b>	Status: Implemented
Target area: South-western Serbia (the area of Novi Pazar city)		
Project: Erosion and torrent control measures		
A number of torrents endanger the area of the Novi Pazar city, inducing damages on houses and infrastructure after every rain episode. The designed system for erosion and torrent control includes construction of 13 check dams, and afforestation of degraded areas on about 300ha.		
Construction of 8 check dams was finished in 2013 and in early spring of 2014. The total investment was only 400,000€. The system of dams had a major role in May 2014, when it prevented disaster caused by extreme rainfalls.		




	<b>GERMANY</b>	Status: Under implementation
Werrach Donauwörth		
Project: Werrach vital		
The Werrach, formerly a widely branched wild river was straightened in the second half of the 19th century. The so constricted river dug deep into his bed. Thus the groundwater level sank, bridges and bank reinforcements were undermined by water. The lack of flood plains intensified additionally the flood hazard. In the lowland forest were hardly any natural habitats, numerous barrages prevented the fish on their passage in the river.		
Therefore in 1997 the water management office Donauwörth launched the project "Werrach vital". The plan is to transform the Werrach on the 14 kilometers from the mouth of the Lech river ecologically. At the already completed sections dikes protect the residents against flooding. Stone ramps, in some areas open ground protection, prevent the river from further erosion. In the broadened sections, the Werrach can shape their bank multilaterally, fish have again free passage and in the flood plains develop numerous habitats. In some sections new dikes have been moved back from the Werrach to create additional retention area. With these measures Werrach vital combines the goals of Water Framework Directive and the EU Flood Directive. Even as a recreational area the river is now attractive again.		



	<b>ROMANIA</b>	Status:
Prut River		
Project: Cioharciu Wetland Restoration		
In the valley of the Prut river, the objectives were to create 250ha of wetland by raising the w of deep spots with deep water. The project was implemented by a Romanian regional water as Dutch partners and it served as a good experience in the field of ecological restoration, involve participatory planning and cooperation with other organizations. It was evaluated at the end of period of five years by the project team and by a Romanian University.		






	<b>AUSTRIA</b>	Status: Implemented
Austrian Danube		
Project: Floodplain evaluation matrix (FEM): An interdisciplinary method for evaluating river floodplains in the context of integrated flood risk management		

During last decades, river floods accounted for enormous damages especially in highly developed and or densely populated regions worldwide. Moreover, due to anthropogenic alterations of hydrology and river morphology (climate change, land use changes in the catchment, channelling and constricting rivers) and due to the ongoing accumulation of values (such as settlements, infrastructure facilities, etc.) in flood prone areas, this amount of damages is likely to rise in future. Integrated flood risk management is legally in force and aims at reducing the negative effects of floods by combining structural and non-structural flood protection measures. Non-structural measures such as the preservation or restoration of floodplains are considered by the EU Floods Directive as an effective tool for reducing flood risks. For most of the rivers, however, very little is known about the effectiveness of floodplains in regard to hydrological and hydraulic flood hazard reduction. This lack in knowledge often obstructs the integration of these natural flood retention processes into the concepts of integrated flood risk management. In the present study, the Austrian Danube was investigated along its entire 350 km length, determining reaches and floodplains with high relevance for flood water retention and thus for reducing flood hazards downstream. A novel analysis based on one-dimensional and two-dimensional hydrodynamic-numerical modelling, using hydrological and hydraulic parameters defined under the so-called floodplain evaluation matrix method (FEM, Habersack et al. in Nat Hazards, in print, 2013), was carried out to evaluate retention effectiveness on various spatial scales. The results illustrate the magnitude and the variability of flood retention and hydraulic parameters with respect to different hydrological settings (flood wave shape, recurrence probability).

Peak wave reduction:



  	<b>AUSTRIA, SLOVAKIA, HUNGARY</b>	Status: Implemented
Target area: AT, SK, HU		
Project: SONDAR (Soil Strategy Network in the Danube Region)		

Sustainable soil management has its impacts on managing flood risks. If it is done properly soil management can slow and retain floodwaters in the opposite case the soil management can contribute to floods by increasing run-off or silting rivers.

Lower Austria and its neighbouring countries Czech Republic, Slovakia and Hungary cooperated in three bilateral European Territorial Cooperation projects from 2010 to 2014. The main aim of these projects under the framework of SONDAR was to establish a network of increasing responsibility for soil, between science and practice, between administration and users of land, between education, arts and the entire population. One of the issues in the focus of the project was to explore the potential of soil as an indicator of flood occurrences. Soils have a long-term memory, and they store the history of their formation like an archive. This stored information can be used in order to deduce the occurrence of rare historical floodings. Therefore soils can be used for localizing potential flooding areas. The project aimed at preparation of soil maps as an instrument of forecasting and sensitization and for creation of awareness.

Another key aspect of the project was improving quality of soil by raising soil awareness. Soil is the starting point for all life on Earth, and it provides for more than 90% of our food but it is endangered by multiple impacts. Soils can only perform their functions within the ecosystem if their qualities are largely intact. The awareness of population about this fact is decreasing. A sustainable cultivation of land in the Danube region can significantly contribute to soil fertility, preventive flood protection, and to the use of soils as carbon storage tanks – thus to climate protection.

Further information [www.sondar.eu](http://www.sondar.eu)




	<b>HUNGARY</b>	Status: Ongoing
Tisza River		
Project: New VÁSÁRHELYI Plan (VTT)		

VTT is expected to raise the level of flood safety along the Tisza in harmony with the overall flood control improvements in Hungary by focusing on two problems, increasing the conveying capacity of the flood bed and the use of emergency reservoirs. The studies on increasing the conveying capacity of the flood bed have succeeded in identifying the potential and necessary measures needed to lower the flood peaks to the necessary extent. In the program of implementation the following key measures have been envisaged: removing the obstacles from, and keeping clear of, the flood conveying channel, proposal on retaining, relocation or complete demolition of summer dykes, solving the problems associated with parallel bars, river training works, realignment of the main defences (where unavoidable).

Improvement of the conveying capacity of the flood bed has been envisaged in combination with the environmental revitalisation thereof. The study on the emergency storage scheme in the Tisza Valley (flood plain revitalisation by means of controlled diversion) has revealed no obstacle to establishing the reservoirs at the proposed sites. Eleven potential reservoirs studied were found viable – with some restrictions – in the VTT. The sites were ranked by sections. The reservoirs Cigánd, Tiszakarad, Nagyunság, Hany-Tiszarüll, Tiszaröf has already in operation, the reservoirs Szamos, Kraszna, and Bereg are under construction. These reservoirs have a total capacity of 537 ml<sup>3</sup> + 186 ml<sup>3</sup>.

In the event of the thousand-year flood the impact of the six emergency reservoirs identified would extend to the full length of the Hungarian Tisza section. The local and cumulated effect would lower the peak stage by the set target of 60 cm. The final plan with 11 reservoirs will be to reduce by 1,0 m the thousand-year flood, with a capacity of 1 500 ml<sup>3</sup>.



	<b>SLOVENIA</b>	Status: Implemented
Target area: Floodplains in Slovenia		
Project: Preventing increase of damage potential of floodplains through conditions and limitations for constructions and activities		

Besides protecting the floodplains without significant damage potential and with important effect on flood extent, an important element of a preventive flood risk management is limiting the introduction of additional damage potential on flood areas. Since 2008 Slovenia is achieving this goal through legal restrictions for public or private investments by conditioning and limiting different types of constructions and activities on flood risk areas. Also the Decree on conditions and limitations for constructions and activities on flood risk areas (Official Gazette of the RS, no. 89/08) presumes that in case of changed hydrological conditions the compensatory measure must be provided to keep the retention capacity and not to worsen the hydraulic situation downstream. This legal measure has been applied on local, municipal and national level of planning and therefore the spatial data needed are continuously provided by hydrologic and hydraulic studies which are made by investors according to the Rules on methodology to define flood risk areas and erosion areas connected to floods and classification of plots into risk classes (Official Gazette of the RS, § 60/07). The state, municipalities and private investors are obliged to map the flood hazard classes in the process of preparation of spatial planning documents or projects for obtaining water and building permits for the area of interest being located on a floodplain.

Based on studies decisions are being made whether or under what conditions the planned construction or activity is allowed. In the period 2008-2015 over 300 hydrologic - hydraulic studies modelling water depth and speed were made and certified for more than 1000 km<sup>2</sup> of valid result areas. Data from studies are collected in the form of polygon data layers and published in the Environmental atlas for extents Q10, Q100 and Q500, four hazard classes and three water depth classes for Q100 ([gis.arso.gov.si/atlasokolja/profile.aspx?id=Atlas\\_Okolja\\_AXL@Arso](http://gis.arso.gov.si/atlasokolja/profile.aspx?id=Atlas_Okolja_AXL@Arso)).

Preparation and publication of flood hazard maps made according to the methodological rules represents also a non-structural measure raising awareness of flood hazard in the area.



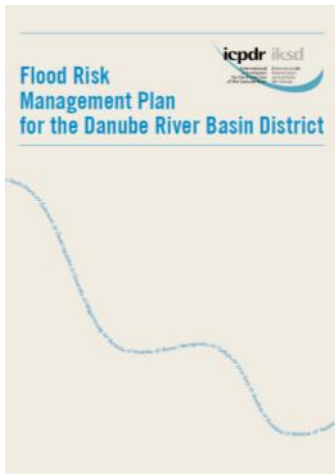
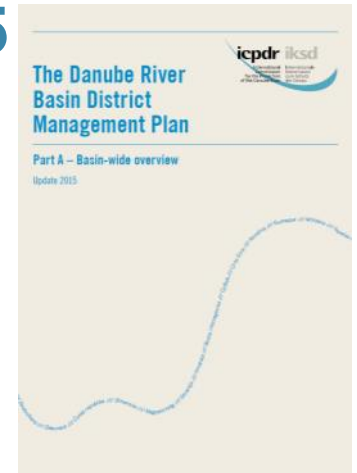


# Roadmap to cleaner, healthier & safer water



**Adopted in 12/2015**

## **Danube RBM Plan Update 2015**



## **1<sup>st</sup> Danube Flood Risk Management Plan**







# Outlook to Hungary

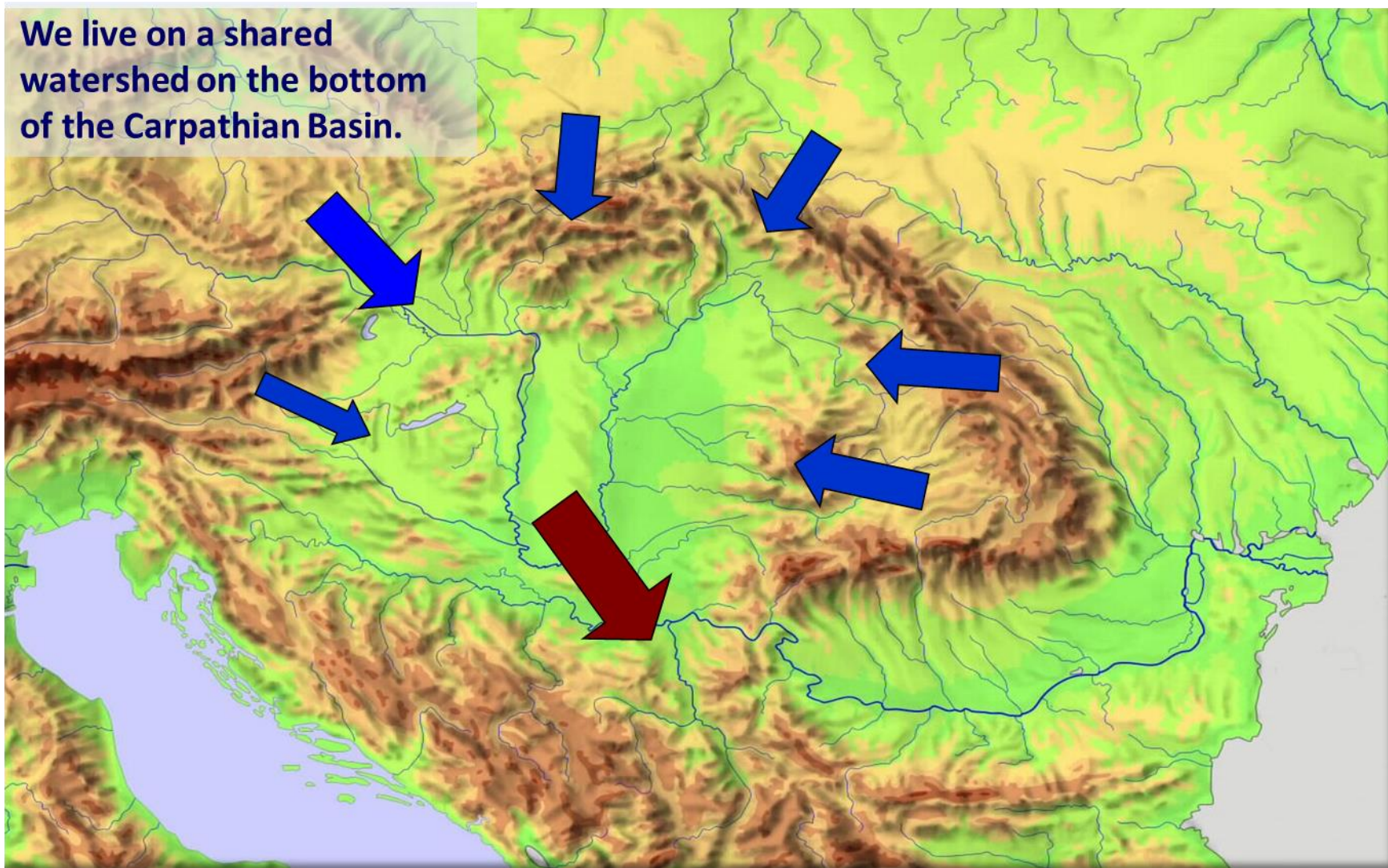




# Hungary: The Land Endangered by Floods

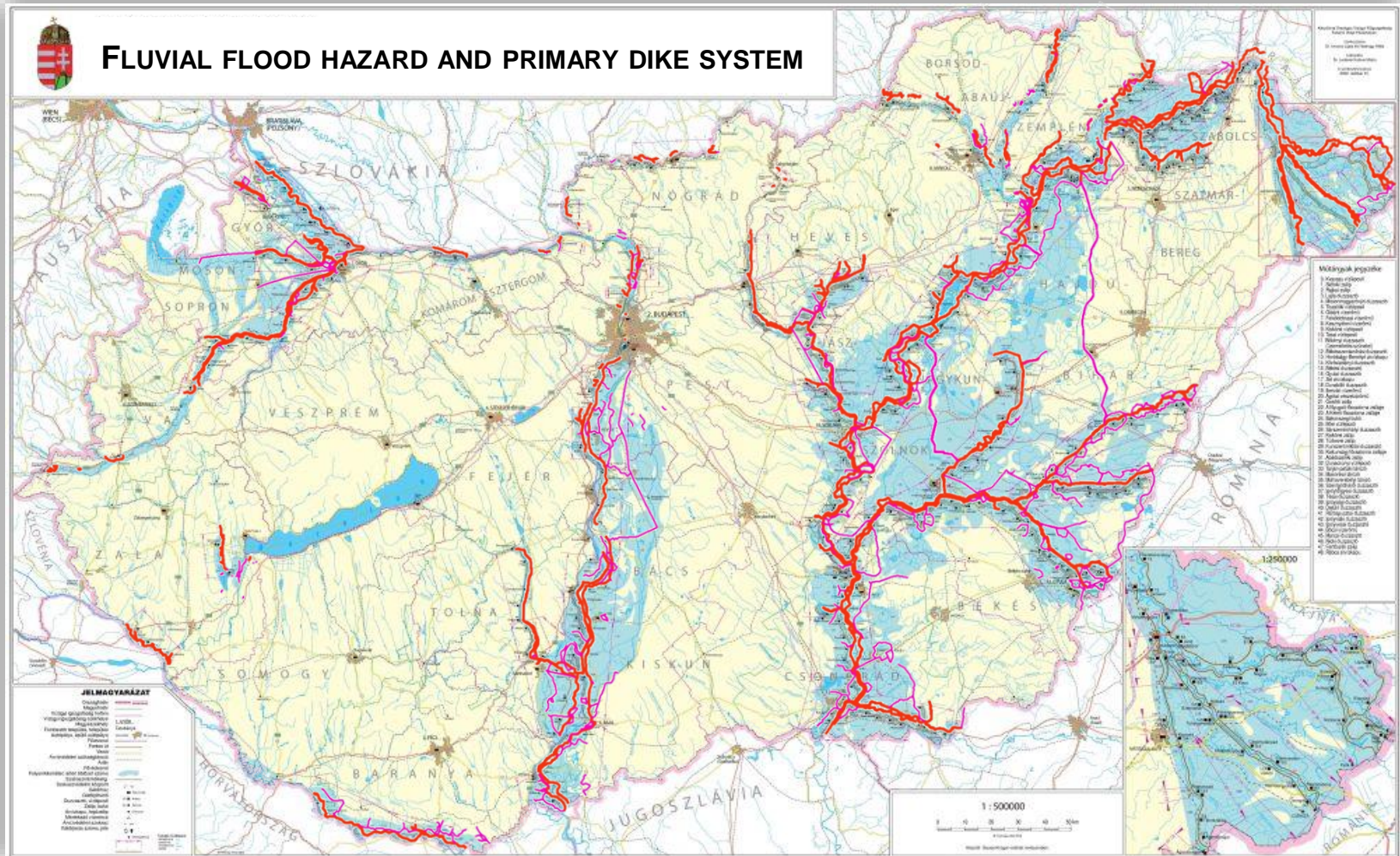


We live on a shared watershed on the bottom of the Carpathian Basin.





Obviously not. 25 % of the whole national territory is endangered by fluvial floods. EU Flood Directive APSFR areas.







## Structural measures:

- **Heightening the dikes** – KEOP, KEHOP projects (EU cohesion)
- **Building reservoirs** – Vásárhelyi plan along the Tisza

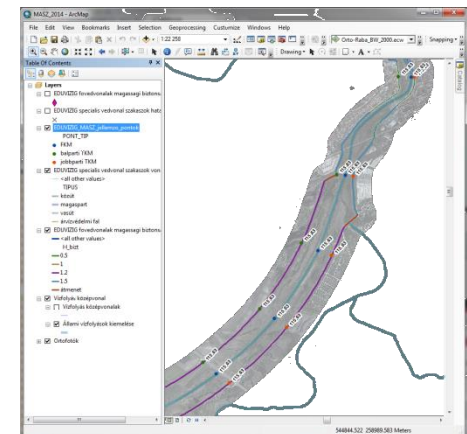
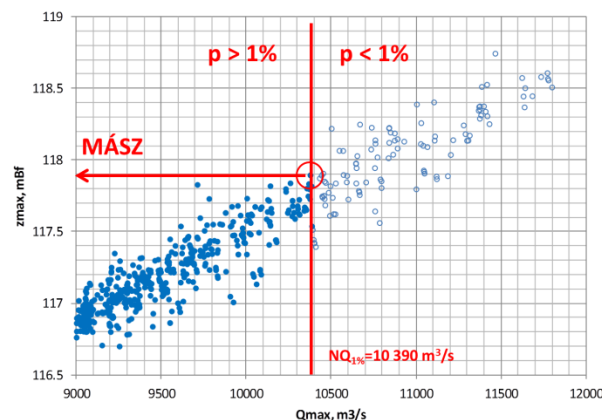
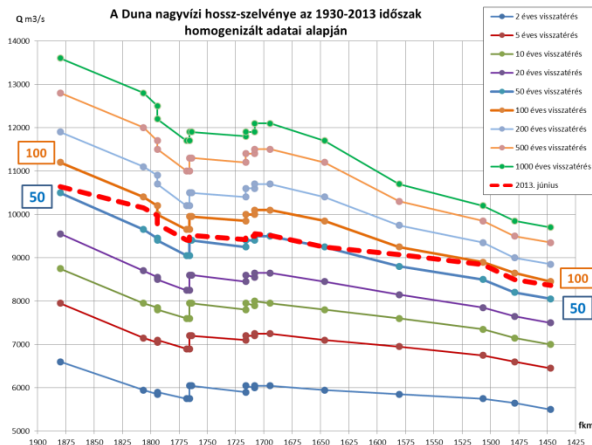
## Non-structural, legal and regulatory measures:

- **Good national and international cooperation** (WG-F, ICPDR FP-EG, Border Comm.)
- **Precise flood forecasting:** continuous development
- **Raising awareness:** municipality flood defence plans + new schema (MMK)
- **Actualization of localization plans** (dike overtop/failure havaría management)
- **Recalculation of the design flood level (MÁSZ):** legal update on 100y defence
- **Development of hazard and risk maps, risk management plan** (EU FD)
- **Sustainable floodplain management (plans):** short and long term measures
- **Re-organization of irrigation subsidies and strategy**
- **Enhanced state ownership of access water drainage system**

## Recalculation of the design flood level (MÁSZ - 2014)

2014 Accomplished for all 2800 km diked rivers (!):

- 2013 Danube flood – calls attention to flood propagation changes
- Scientific approach, even considering groundwater inflow and infiltration loss
  - Definition of discharge probability in certain water gauges based on 100-130 years data series;
  - Generation of long-term discharge curves as boundary conditions and choosing HQ100
  - 1D modeling with calibration of the recent events, calculation of longitudinal profiles
- **Came to legal force on 01/01/2015 – 0...1,5 higher levels on all reaches!**
  - Water level with coordinate points and rivers+dike section, 6 y update





## Developing concept of sustainable fluvial flood damage protection

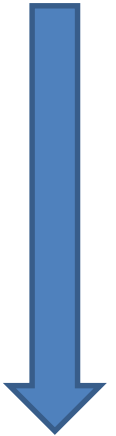
Experience and technical knowledge lead to conceptual progress.

Classic fluvial flood protection: emerging dikes, forming floodplains with embankments, dealing with high ground water (excess water)

- limitations: sedimentation, side-arm separation, riverbed lowering, subsoil problems and seepage, excess water pumping capacity, aerial sensitivity

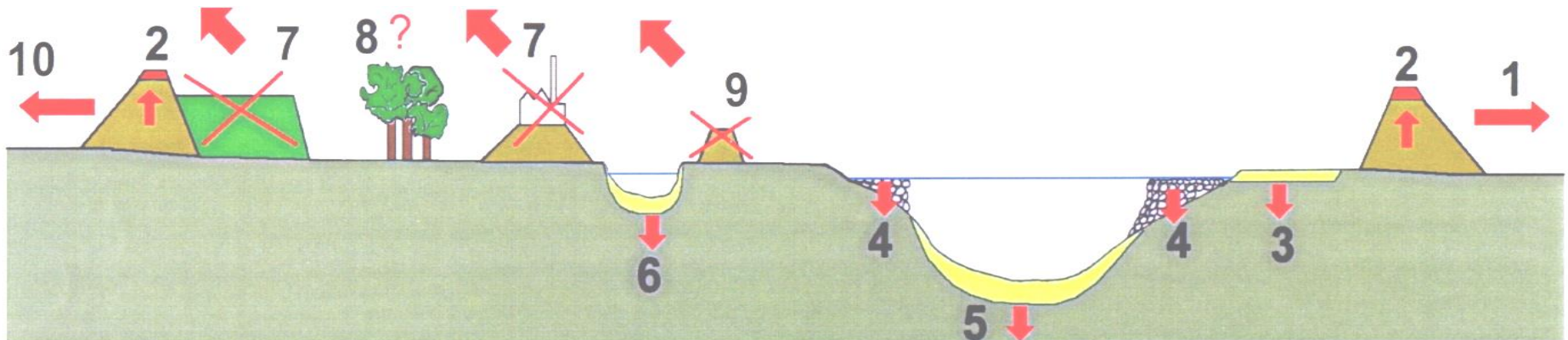
Retention: creating controlled reservoirs and retention ponds

- limitations: large areas needed, new defense and maintenance lines, volume



### Sustainable floodplain management

Get aware and improve of the conveyance capacity of the floodplain, controlling artificial and natural processes among the dikes. Main purpose is to keep or reduce the MÁSZ level







# Basin wide common projects



# Ongoing DTP projects related to climate change adaptation

## **JOINTISZA – Strengthening cooperation between river basin management planning and flood risk prevention to enhance the status of waters of the Tisza River Basin**

- Contains a drought and climate change pilot action and an urban hydrology pilot action
- <http://www.interreg-danube.eu/approved-projects/jointisza>

## **DRIDANUBE – Drought risk in the Danube region**

- Aims to increase the capacity of the Danube region to adapt to climatic variability by enhancing resilience to drought
- <http://www.interreg-danube.eu/approved-projects/dridanube>

## **CAMARO-D – Cooperating towards advanced management routines for land use impacts on the water regime in the Danube river basin**

- One of the main goals is harmonizing and improving the protection of water resources against negative impacts of land use and climate change as well as reduction of flood risk.
- <http://www.interreg-danube.eu/approved-projects/camaro-d>

# Ongoing DTP projects related to climate change adaptation

**WateratRisk project** – innovative and harmonised monitoring solutions and water management operational plans to facilitate early warning; Drought and Excess Water Management Centre in Szeged (HU)

- <http://www.geo.u-szeged.hu/wateratrisk>

**Danube Floodplain** – to support wetland and floodplain restoration as an effective mean of enhancing flood protection, and more generally to analyse and identify the best response to flood risk (including “green infrastructure”)

- <https://www.danubeenvironmentalrisks.eu/danube-floodplain>

**DAREFFORT** – to enhance the access to the recorded water data and to provide coherent distribution for all the countries in the Danube catchment. The aim is to support the realisation of the DanubeHIS (ICPDR) and provide long-term development perspective for the sufficient conditions of proper basin-wide hydrological forecasting)

- <https://www.danubeenvironmentalrisks.eu/dareffort>



# Ongoing DTP projects related to hazard and risk mitigation

**InterFloodCourse** - A curriculum and training material for an international postgraduate course on flood risk management to harmonize methodologies and foster academic mobility of engineers in training within the Danube region - operative flood management bodies will be involved.

- <https://www.danubeenvironmentalrisks.eu/interfloodcourse>

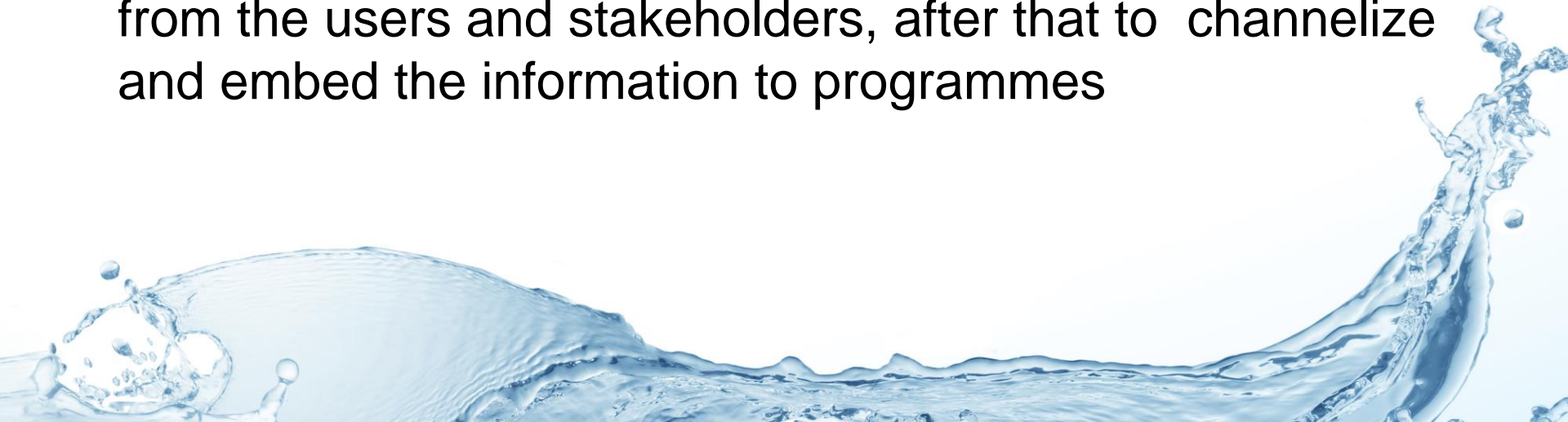
**MUNIPARE** - Harmonized municipality risk management plans, common databases; UNISDR campaign trial for the DRB: Disaster Resilience Scorecard for Cities, Quick Risk Estimation-QRE investigation

**REVITAL I.** – Environmental Assessment for Natural Resources Revitalization in Solotvyno to prevent the further pollution of the Upper-Tisza Basin through the preparation of a complex monitoring system (EUCPT Advisory Mission's objective)

# Some conclusions



- Established and institutionalized collaborations brings their added value that are manifested in common projects, financed by joint budget
- Shared visions discussed and adjusted to national and international strategic purposes leads to the possibility to form common management plans
- Adequate coordination is necessary to collect the needs from the users and stakeholders, after that to channelize and embed the information to programmes



# Thank you for your attention!



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**EUROPEAN COMMISSION**