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Overview of the flood risk strategy at Tisza River Basin level

Deliverable 5.2.3

Final Version, October, 2018

Project co-funded by the European Union (ERDF, IPA funds)

DANUBE REGION strategy

Acknowledgements

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Contents

Abbreviations

EC	European Commission
EU	European Union
FRMP	Flood Risk Management Plan
GD	Governmental Decision
ICPDR	International Commission for the Protection of Danube River
ITC	Information and communication technology
L&R	Lakes and Reservoirs
PFRA	Preliminary Flood Risk Assessment
N(S)WRM	Natural small water retention measures

Chapter 1 Introduction

The Tisza River is the main tributary of the Danube River. Having the spring in the Maramureș Mountains (sometimes called Carpații Păduroși, as a continuation of the Oriental Carpathians) in Ukraine, the Tisa River is flowing in Romania, Slovakia, Hungary and mouthing into the Danube in Serbia, above Belgrade.

The Tisza River Basin has an important impact in the Danube River Basin either in socio, cultural, environmental or economical aspects, taking into account that is the largest sub-basin in the Danube River Basin and the longest tributary (966 km) of the Danube. The number of inhabitants of Tisza river basin is about 12,6 million living there. The catastrophic floods of the last decades have been caused not only by the Tisza river, but also by its tributaries. High water levels during the last 15 years in the catchment area of the Tisza River proved that they were critical ones in 1998, 1999, 2000, 2001, 2006 and 2010.

Due to the fact that Tisza is a transboundary river a rigorous transboundary flood management is necessary, in accordance with the principles of European Directives 2000/60/EC and 2007/60/EC.

The current situation shows us that it is necessary to develop joint actions in the future, that will lead to a good management, for example:

- Studies, regarding the climate change effects, with scenarios for the Tisza River basin such similarly the Danube River Basin;
- Common understanding/methodology regarding the designation of historical significant floods and the areas with potential significant flood risk, which should be developed for the Tisza River in accordance with the national laws from each country and the European Directives;
- Quantitative common approach/method, taking into account the hazard in terms of probability of exceedance of maximum discharge, water depth, type of element, degree of damage etc. and common scenarios in which should be agreed.

Chapter 2 ICPDR Flood Risk Management objectives

Being aware of the importance and assuming the coordination role among the Danube countries in the process of the Water Framework Directive and the Floods Directive implementation, and in line with the deliverable 5.2.1 “Report on Description flood risk management objectives at Tisza River Basin level”, the flood risk management in the Tisa River Basin should follow the ICPDR approach.

It has been agreed that Flood risk management objectives set out for the Tisza River Basin will have to follow the same objectives (strategic objectives) set out at level of Danube River basin, respectively:

- Avoidance of new risks;
- Reduction of existing risks;
- Strengthening resilience;
- Raising awareness;
- Solidarity principle.

Setting the same objectives for the Tisza River flood management as for the Danube River may ensure the framework for a joint working effort of all Tisza countries in achieving the ICPDR goals. This approach will eventually lead to reduction of the risk of adverse consequences for human health and life, environment, cultural heritage, economic activity and infrastructure associated with floods all over the Danube River Basin.

Chapter 3 Strategies and objectives in Tisza River Basin

Romania, Hungary and Slovakia as Member States of the European Union have assumed the implementation of Directive 2007/60/EC on the assessment and management of flood risks. Serbia and Ukraine are in the process of implementing this directive, although there are states that have not joined the EU.

The implementation of Directive 2007/60/EC involves three steps of implementation, as follows: Preliminary Flood Risk Assessment (PFRA), Flood Hazard and Risk Maps, Flood Risk Management Plan (FRMP).

Romania

In order to have a clear picture of flood risk management at the level of Tisza River Basin a short description of the strategies and laws that transposes the Floods Directive from each country at Tisza basin is presented below.

The transposition into national legislation of this Directive, for example in the case of Romania, was achieved through the Waters Law no. 107/1996 with subsequent modifications and supplements, and by the elaboration of the National Strategy for Flood Risk Management on medium and long term approved by GD no. 846/2010.

According to this strategy, "a good flood risk management must be the result of inter-sectoral and interdisciplinary activities that include water management, land planning and urban development, nature protection, agricultural and forestry development, transport infrastructure protection, construction protection and protection of tourist areas, community and individual protection, assuming the responsibilities of each sector in the implementation of specific activities".

The aim of the strategy is to define the framework for a coordinated, cross-sectoral orientation of all actions to prevent and reduce the consequences of floods on socio-economic activities, human life and health and the environment.

The long-term objective of the Flood Risk Management Strategy is to ensure the protection of the localities with probability of flooding between once in 100 years and once in 1000 years differentiated according to the rank of the localities.

Serbia

The Flood Directive has been partially transposed through the Law on Water (2010), the Rulebook on the Establishment of a Methodology for the Preparation of a Preliminary Flood Risk Assessment (2012) and the Rulebook on Determining the methodology for preparation of flood hazard and flood risk maps (2017), while full transposition will be done in new Law on Water (planned for the end of 2018) and bylaws in 2020.

Strategic objective of flood risk management set in draft Water Management Strategy (adopted in 2016) is: Decrease the adverse effects of water, followed by a number of detailed (operational) objectives.

Planning and realization of protection measures against adverse effects of water require operative and coordinated cross–sectoral activities among water sector and other relevant sectors and stakeholders. Structural activities and measures for flood prevention are the water sector primary task, while the implementation of the nonstructural measures will encompass active involvement of the other sectors (Sector for emergency management and response, hydro-meteorological service,

health services, environmental protection, spatial planning), municipalities and local authorities, citizens, NGOs, industries, entrepreneurs, and others living or working in potential flood hazard areas.

Hungary

Main law that transposes the Floods Directive:

- The EU Flood Directive was implemented into the national legislation in 2010 by the 178/2010 (V.13.) Governmental Decree for the fulfilment of the requirements a national project started with a name "Flood risk mapping and development of strategic risk management plan (KEOP-2.5.0.B)", also called Hungarian as 'ÁKK'. The values of the Flood Risk Management Plan on the basis of highly scientific method were recalculated for all the approximately 2.800 km main river sections in 2013-2014 and the new longitudinal profiles were legally adopted on 1st of January 2015.
- Making of the riverbed management plans in case for flood (further on Flood Riverbed management) specifying in Act LVII of 1995 on water management and the preparation of the planning ordered by the 83/2014. (III.24.) government regulation. Flood Riverbed Management Plans: The not-suitable process taking place in riverbed caused higher flood levels and decreased our flood protection facilities. This fact and high cost of flood protection developments needed to improvement of the conveyance capacity of the flood riverbed. The aims of the flood riverbed management plans are reducing flood levels, keeping or repairing capacity of riverbed and ensure the flood protection safety. The flood riverbed management plans are made for 67 river section. In the plans determined in flood perspective primary, secondary, temporary, ox-bow zones in the flow. The technical content of the flood riverbed management plan documentation has been completed. The registration of the flow zones into the parcel numbers is in progress. The action plans in the riverbed management plans are implemented after the law enforcement, which action is not depends on the water sector.
- The new designed flood level 74/2014 (XII.23) according to the Ministry of Interior Decree (so called Hungarian 'MÁSZ') is based on statistically determined discharge value and represents the actual conditions of the riverbed with numerical modelling. The update is obligatory in every 6 years or after any remarkable event. The Flood risk management plans and measures cover all aspects of the management of risk from the flood hazards. The risk management measures are reducing the risk of flooding, and sensitivity of land use in case of flood.
- 1022/2003. (III.27.) Gov. Decree includes the New Vasarhelyi programme: 30 flood control reservoirs, 6 of them built in frame of the New Vasarhelyi programme (721 million m^3). In the Körös valley 5 reservoirs are operating with a volume of 386 million m3. The flood control reservoirs are situated along the rivers as the parts of flood control system. Such a reservoir is planned along the Tisza-Túr tributary, as well.

Slovakia

The Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks entered into force on 26 November 2007. Transposition of the Directive 2007/60/EC into the legal order of the Slovak Republic occurred in the Act No. 7/2010 on the flood protection, and has come into force since February 1st 2010.

According to the Act no. 7/2010 Coll. on flood protection will be developed the first flood risk management plans and their followed revaluation and updates coordinated with revaluating and updating of river basin management plans elaborated according to the Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for Community action in the field of water policy). WFD is transposed into law No. 51/2018 Coll. on water which amends the law No. 364/2004 Coll. and amends the Act of the Slovak National Council No. 372/1990 Coll. about offenses.

Ukraine

Implementation of EU Flood Directive is a part of the EU-Ukraine Association Agreement. The schedule of the implementation of the EU Flood Risk Directive, stated in the EU-Ukraine Association agreement is as follows:

- Adoption of national legislation and designation of competent authorities (by Nov 2016). The law “On Amendments to Some Legal Acts of Ukraine regarding the introduction of integrated approaches in water resources management following the river basin principle” № 3603 was adopted in autumn 2016 and came in force from 2017. The document gives legal definitions to the number of terms used in Flood Risk Directive, namely “flood risk management plan”. The competent authority – the State Service of Emergency Situations under the Ministry of Interior is appointed by Decree of the Cabinet of Ministers dated on 25th of February 2015 “About approval of Cabinet of Ministers of Ukraine dated 25th of February 2015 # 132 “On Approval of developed by State Service on Emergency Situations EU Directive specific implementation plans”.
- Undertaking preliminary risk assessment (by Nov 2018) –Order "On Approving the Methodology of the Preliminary Flood Risk Assessment" is being drafted;
- Preparation of flood risk and flood hazard maps (by Nov 2020) – Order “On Approving the Methodology of the Flood Risk and Flood Hazard Maps Development” is being drafted;
- Establishment of flood risk management plans (Nov 2022) – Resolution of Cabinet of Ministers “On Approving the Procedure for the Development of Flood Risk Management Plans” is being drafted.

Ukraine is at the stage of legal approximation to the EU Flood Risk Directive, whereas implementation (preparation of flood risk and flood hazard maps and development of the Flood Risk Management Plan) is planned for later.

Chapter 4 Flood risk management proposed measures in the Tisza River Basin

The floods risk is characterized by its nature and probability of occurrence, the degree of exposure of the receptors (population and property number), susceptibility to flooding of the receptors and their value.

Reducing the consequences of floods is the result of a broad mix of measures and actions preceding the phenomenon (prevention, protection and preparedness activities), flood management (flood response actions, known as management emergency situation) and post-flood (reconstruction and lessons learned as a result of the phenomenon).

The Tisza River Basin Flood Risk Management Plan is a strategic vision for flood risk management based on areas with potential significant flood risk, hazard and flood risk maps associated with these floods, flood risk management objectives, the proposed measures and their prioritization.

The program of proposed measures for Tisza River Basin includes structural and non-structural measures whose implementation requires a long period of time and requires a comprehensive analysis of several views (technical, economic, environmental, social, etc. criteria).

The establishment of measures at Tisza River Basin level were done taking into account the Common Catalog of potential measures in order to achieve the strategic objectives of flood risk management. The common catalog of potential measures has been established to answer of the specific needs with which are confronted each of the countries involved in the flood risk reduction activity.

Implementation of the proposed measures assume the involvement of all factors (institutions, local authorities, county, basin, population, etc.) of those with decisional responsibilities as well as those with executive responsibilities and establishing clear lines of responsibility at the level of all organizational and decisional structures.

According to the deliverable 5.2.2 “Report on Summary of the Flood Risk Management proposed measures for Tisza River Basin (aggregated measures), including their orientative prioritisation (High, Medium, Low)” the following measures might be further developed and included in common projects within Tisza River Basin.

For the Tisza River Basin, measures for all five fields of action (prevention, protection, public awareness, preparedness, response and recovery/reconstruction) have been proposed. For each field of action different types of measures applicable to national/basin/local level have been proposed. The centralizing situation regarding the proposals of measures by field of action, measure category and type of measure for the countries located within the Tisza River Basin is shown in next table.

Flood risk management proposed measures in Tisza River Basin

Field of action	Measure Category	Type of measure	Countries				
			RO	SK	HU	RS	UK
Prevention	Organizational measures (legislative, institutional ...)	The definition of a legislative, organizational and technical framework for Floods Directive implementation	x	x	x	x	x
		Reviewing and updating plans for flood risk management	x	x	x	x	x
		Coordination of territorial planning strategies (plans for development of planning at national, county and regional) and urban plans (Regional/Urban/Zonal/Plans) with plans for flood risk management	x	x	x	x	x
Protection	Natural water retention measures - associated to watercourses, wetlands, natural lakes, in accordance with Directive 2000/60 /EC	Measures to restore retention areas (flood plains, wetlands etc.)	x	x	x	x	-
	Change or adapt land use practices (partial recovery of ecosystem functions or structures modified by changing or adapting land use practices) in urban areas	Natural water retention measures in urban areas	-	-	-	x	-
	Change or adapt land use practices (partial recovery of ecosystem functions or structures modified by changing or adapting land use practices) for forest management	Natural water retention measures by changing or adapting land use practices in forest management	x	-	-	-	-
	Other water retention measures	Other measures to reduce water levels	x	-	x	x	-
		Measures to improve retention capacity at the level of river basin by construction of polders and small retention reservoirs (made in the upper part of the river basin)	x	x	x	x	x
		Measures to improve retention capacity at the level river basin by increasing the safety of existing large dams / increasing the attenuation capacity of reservoirs towards projected capacity	x	x	-	-	x
		Structural protection measures (planning and accomplishing)	x	x	-	-	x
	Measures for increasing population resilience	Measures for increasing resilience of population (Implementation and adaptation of protection measures at multiple objectives - buildings, constructions)	-	x	-	-	-

Field of action	Measure Category	Type of measure	Countries				
			RO	SK	HU	RS	UK
Protection	Inspection measures and maintenance of watercourses and of the hydraulic flood defense infrastructure	Surveillance, behavior monitoring, expertise, strengthening interventions, rehabilitation and maintenance of watercourses and hydraulic flood defense infrastructure	x	x	x	x	x
	Adapting of the existing defense structures at climate change conditions	Adapting of the construction, infrastructure and existing defense structures in terms of climate change	x	x	-	-	-
Public awareness	Measures to increase community awareness	Activities regarding adequate public information and promotion of the public participation	x	x	-	x	x
		Education / training activities of the population	x	x	-	x	x
Preparedness	Preparedness measures /Improvement preparedness to reduce the adverse effects of floods	Measures for monitoring, forecasting and flood warning	x	x	x	x	x
		Development / reviewing of the flood defense plans in correlation with other emergency situation management plans (GIES- General Inspectorate for Emergency Situations)	x	x	-	x	-
		Simulation exercises activities involving interinstitutional parties	-	x	-	x	x
		Providing the human, financial and materials needed in emergency situation and stimulating the voluntary actions	-	x	-	x	x
Response and Recovery/ Reconstruction	Post event recovery measures	Response actions in case of emergency situations	-	x	-	x	x
		Damage assessment and restoration	-	x	-	x	x
		Documentation and Analysis	-	x	-	x	x

Chapter 5 Conclusions

The flood risk management strategy at the Tisa River Basin level should promote new joint projects as well as the existing ones at different stages of implementation/realization for the Tisza River Basin. These are part of the flood risk management strategy at Tisa River Basin level.

The major common projects that are going or are ongoing to be develop/implemented in the next period of time are presented below.

Table 1 EUSDR PROJECTS / PA5 DTP PAC PROJECT[1]

Countries	Hungary, Romania, Slovenia, Serbia
Status:	Intention for submit an application
Target area	Danube River basin (Tisza river basin)
Project duration	-
Project:	**LAREDAR**
Description (maps and images ...)	
Hazard and risk mapping, risk management planning of the LAkes and REservoirs in the DAnube River basin shall focus on: Inventory of potential flood-problematic lakes and reservoirs (L&R), realization of problems, GIS database and bed geometry data with supplying rivers (sub-catchments); Hydrologic assessment of the events that cause inundation around the lake or failure of defense system; Hazard and risk mapping of the L&R, risk management strategies for L&R; International consequences and conditions in the operation, good practice or agreements for the future.	
Countries	Danube countries
Status:	
Target area	Danube River basin
Project duration	-
Project:	**Information exchange on the operation of hydraulic structures**
Description (maps and images ...)	
Common understanding among Danube countries and the operators of flow control structure to make their operational rules and real time data available for the national flood forecasting institutes and for the flood management organizations. Elements of the cooperation have to: identify relevant structures, make the real-time operational parameters available to forecasters, make the operational rules (operational manuals) of the flow control structures available for flood forecasters and flood managers, establish procedures and ICT infrastructure to warn flood forecasters when the pre-emptying or filling up of the reservoirs start (e.g. changes in discharge), develop cooperation among the operators and flood managers to ensure that flood protection has got priority in the operation of flow control structures in peak periods (e.g. flood managers shall have the possibility to ask the operators to change the operational state if flood situation requires it), prepare a unilateral framework agreement based on previous steps for the Danube Basin.	
Countries	Danube countries
Status:	

[1] www.danubeenvironmentalrisks.eu/

Target area	Danube Region
Project duration	
Project:	**Coordination of operative flood management plans**
Description (maps and images ...)	
The objectives are: to coordinate the operative flood management and civil protection plans (evacuation plans and procedures, safeguarding people, goods, emergency rescue plans, etc.) considering the benefits of the civil protection mechanisms for the shared flood basins or stretches of common interest to better use the available resources.	
Countries	Danube countries
Status:	
Target area	Danube Region
Project duration	
Project:	**Exchange of flood protection techniques, technologies and experiences**
Description (maps and images ...)	
The objective is to collect and exchange information of the new equipment both from design and operational point of view, creation of a kind of network project by organizing workshops and or seminars	
Countries	Danube countries
Status:	
Target area	Danube Region
Project duration	
Project:	**Enhance coordination of operative flood protection methods and equipment**
Description (maps and images ...)	
The objectives are: 1: Coordination of the regional disaster risk assessment/damage data recording methods and measures, taking into account the specific effects of the climate change phenomena in the region, for better disaster prevention. 2: Build advanced training and appropriate capacity of the flood rescue teams and civil protection operative units 3: Establishment of the cooperation forum of the Danube basin municipalities and/or relevant institutions for better preparedness, awareness and data sharing during flood related interventions and other regional disasters.	
Countries	Ukraine, Slovakia
Status:	submitted application
Target area	Uzh river basin (sub-basin of Tisza basin)
Project duration	30 months
Project:	**FLOODUZH – Joint activities for the prevention of natural disasters in the transboundary Uzh river basin**
Description (maps and images ...)	Ukraine, Slovakia
The specific objectives are: 1) Reduce the vulnerability of target territories to flooding by improvement of flood risk management in Uzh River basin. 2) Increase the resistance to droughts in Uzhhorod by establishment of regulating weir on river Uzh. 3) Strengthening cooperation of water management authorities and stakeholders' involvement to the process of natural disasters prevention in cross-border area.	
Countries	Poland, Slovakia, Hungary, Slovenia, Croatia, Austria
Status:	implementation of the project
Target area	Slovak pilot area is on Slaná river (Tisza tributary)

Project duration	36 months
Project:	**FramWat – Framework for improving water balance and nutrient mitigation by applying small water retention measures**
Description (maps and images ...)	Poland, Slovakia, Hungary, Slovenia, Croatia, Austria
The specific objectives are: 1) Improvement of Natural small water retention measures (N(S)WRM) planning knowledge on a basis of better identification of needs for N(S)WRMs in the river basins in order to support decision making process. 2) Increased knowledge and understanding of synergetic cumulative effectiveness of the system of N(S)WRM on the river basin scale for more efficient decision making. 3) Improved integrated water resource management capacities of public sector for development of the N(S)WRM as part of water management planning process.	
Countries	Romania, Austria, Bulgaria, Croatia, Czech republic, Germany, Hungary, Slovakia, Slovenia, Serbia, Ukraine,
Status:	implementation of the project
Target area	Danube river basin
Project duration	30 months
Project:	**Danube Floodplain – Reducing the flood risk through floodplain restoration along the Danube River and tributaries**
Description (maps and images ...)	Romania, Austria, Bulgaria, Croatia, Czech republic, Germany, Hungary, Slovakia, Slovenia, Serbia, Ukraine,
The specific objectives are: 1) Improved knowledge on floodplain restoration and preservation. 2) Agreement of further actions on floodplain restoration, preservation. 3) Improved stakeholder cooperation in floodplain management in DRB.	
Countries	Hungary, Germany, Austria, Slovakia, Croatia, Romania, Bulgaria, Slovenia, Ukraine, Belgium, Czech republic, Serbia, Moldova
Status:	implementation of the project
Target area	covering nearly the whole Danube region
Project duration	36 months
Project:	**DAREFFORT – Danube River basin Enhanced Flood FORcasting cooperation)**
Description (maps and images ...)	
The specific objectives are: 1) Identify and promote the state of the art forecasting techniques. 2) Enhance cooperation towards better forecasting basin wide. 3) Create the basis of the ICPDR DanubeHIS.	
Countries	Hungary, Austria, Slovakia, Romania, Serbia, Ukraine, Netherlands
Status:	submitted application
Target area	Tisza region
Project duration	36 months
Project:	**FloodEx – Joint Preparedness and Integrated Flood and Excess Water Risk Management in the Tisa region**
Description (maps and images ...)	
The specific objectives are: 1) Improving flood protection planning and operation in the Tisza Region. 2) Improving preparedness and emergency response to flood disasters. 3) Enhancing public awareness and self-responsible attitude on flood risk.	

Countries	Hungary, Serbia, Slovakia
Status:	submitted application
Target area	Danube region
Project duration	12 months
Project:	**DEVICE Danube – DEVelopment of the ICE management project concept for the Danube Region**
Description (maps and images ...)	
The "DEVICE" project's main objective is to create a sound Ice management master plan(s) for Danube and main tributaries (Tisza, Sava etc.) for reducing adverse effects. In line with this purpose the procedures and locations of monitoring ice in the Danube basin would be explored as status quo with knowledge sharing afterwards. The national and basin-wide operative resource management plans for icy flood or other certain situations shall be examined to extract the basin wide relevant information.	

These projects contribute to create a good organizational framework for integrated flood risk management, which depends on the serious involvement of all "actors" and the efficient use of available resources.

These projects aim to reduce the negative consequences of floods that are the result of a large combination of measures and actions preceding the phenomenon (prevention, protection and preparedness activities), flood management (response actions taken during floods, known as emergency management) and post floods (reconstruction and lessons learned as a result of the phenomenon).

The implementation of these proposed projects implies the involvement of all states, those with decision-making responsibilities, and those with executive responsibilities and the establishment of clear lines of responsibility at the level of all organizational and decision-making structures.

Through these projects the following are considered:

- a gradual reduction in the flooded areas the flood flow rates with different probabilities of overflow, accompanied by compensatory measures required to retain adequate water volumes;
- reducing the number of people exposed to the potential flood risk to floods with flows having different probabilities of overtaking;
- reducing social vulnerability of communities exposed to the potential flood risk through integrated river basin management, the gradual reduction of flood damage on infrastructures crossing watercourses;
- rehabilitation in areas with high vulnerability / annual relocation of flood protection dams;
- increase the transit capacity of the river channel through maintenance measures for clogged areas and bring the river to its original state;
- the correlation between development works for river channel and terracing slopes in all river basins and sub-basins;
- modification of the regulations of exploitation of reservoirs with multiple uses, establishing a better correlation between volumes of water required for use and those for mitigate floods, contributing to the increase of their mitigation capacity;

- annual rehabilitation of diverting channels;
- rehabilitation of dams and reservoirs with an important role in mitigating floods;
- to reduce the areas with very strong an excessive erosion through reforestation measures in river basins that will be implemented to reduce runoff on slopes as well as for soil conservation.

The proposed projects lead to a common flood risk management strategy that includes a set of actions at international, national and basin level, including: planning, programs, framework policies, coordination, facilitation, awareness raising and social consolidation, resilience.

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ICPDR – Flood Risk Management Plan for the Danube River Basin District
ICPDR – ICPDR Flood risk Management Plan: ANNEX 2 Overview of measures
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Károly Gombás - Implementation of the Flood Directive in Hungary Flood risk management plan 10th of May in 2016, 29th FP-EG meeting, Belgrade
ICPDR – Integrated Tisza River Basin Management Plan

Project co-funded by the European Union (ERDF, IPA funds)

Partners: General Directorate of Water Management, Hungary | Global Water Partnership Central and Eastern Europe, Slovakia | International Commission for the Protection of the Danube River | Ministry of Water and Forests, Romania | Ministry of Foreign Affairs and Trade, Hungary | National Administration "Romanian Waters", Romania | National Institute of Hydrology and Water Management, Romania | Public Water Management Company "Vode Vojvodine", Serbia | Regional Environmental Center for Central and Eastern Europe, Hungary | The Jaroslav Černi Institute for the Development of Water Resources, Serbia | Water Research Institute, Slovakia | World Wide Fund for Nature Hungary

Associated Partners: Interior Ministry, Hungary | Republic of Serbia Ministry of Agriculture and Environmental Protection – Water Directorate | Secretariat of the Carpathian Convention (SCC), Austria | State Agency of Water Resources of Ukraine | Tisza River Basin Water Resources Directorate, Ukraine