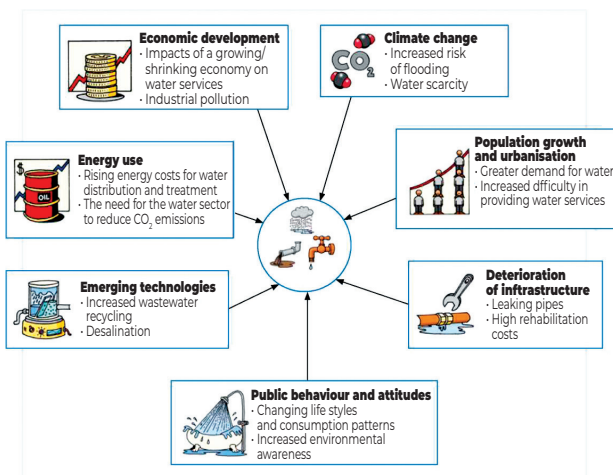


Urban Hydrology Management

The JOINTISZA project – Strengthening cooperation between river basin management planning and flood risk prevention to enhance the status of waters of the Tisza River Basin – focused on interactions of two key aspects, the river basin management (RBM) and flood protection. The project also developed improved methods for urban hydrology management procedures through pilot actions on selected cities, investigated the possible climate change impacts on drought and water scarcity and assessment of dam failure cross border effects. Moreover, a pilot activity on drought management in light of climate change was also included.

Urban Hydrology Management – Best management on urban water management in Debrecen and Oradea



Developments challenging water management in cities (Source: SWITCH)

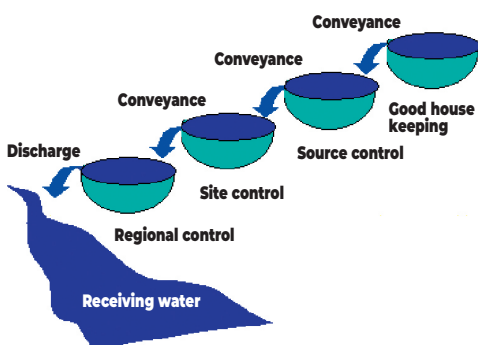
protecting ecosystems and biodiversity, including adopting healthy lifestyles in harmony with nature, by promoting sustainable consumption and production patterns, by building urban resilience, by reducing disaster risks and by mitigating and adapting to climate change, together with SDG 6 adopted by UN, as well.

Urbanization one of the twenty-first century's most transformative trends. 75% of the population of the EU live in big cities and 80% of it will do so by the year 2020. In case of the Tisza River Basin (1,088 agglomerations with 2000 PE, and 22 larger cities more than 100,000 PE) the number of the total population is stagnating or slightly decreasing while the number of urban populations is increasing – an internal migration towards larger cities can be observed.

The New Urban Agenda, referred 'the right to cities', adopted by United Nations (UN) in 2016, declares to ensure environmental sustainability by promoting clean energy and sustainable use of land resources in urban developments, by



Water-related stakeholders consist of sometimes heterogeneous and fragmented pressure groups (Source: SWITCH)



Cascade stormwater management at the local, sub-catchment and catchment levels (Source: CIRIA 2000)

According to the EU New Urban Water Agenda 2030 the following new targets are: leakage reduction (target 10%), consumption reduction (20% compared to 2015), water reuse (50% of urban use), energy efficiency of urban water systems (50% reduction), recovery of materials from waste water (75% of nutrients and 50% of organic matter), raising awareness and empowering citizens.

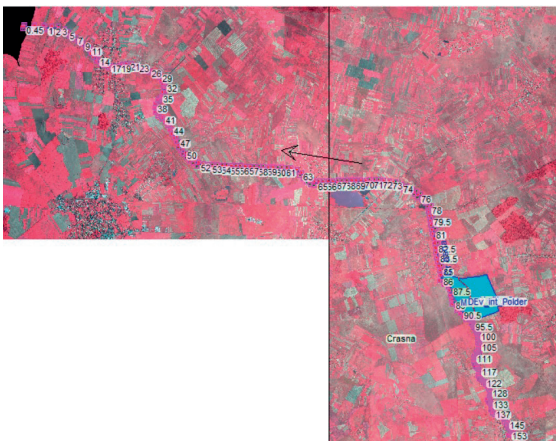
Both documents, **the Manual and Guidance for Urban Hydrology (UH)** elaborated in the project help the implementation of EU WFD and EUFRD in urban areas, where climate change enforces harmful effects on water status due to extreme weather.

These documents collected new relevant information with which application urban decision makers can reach that their cities can become 'smart' and green' to ones.

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

Simulation of dike failure with transboundary effects on Crasna River

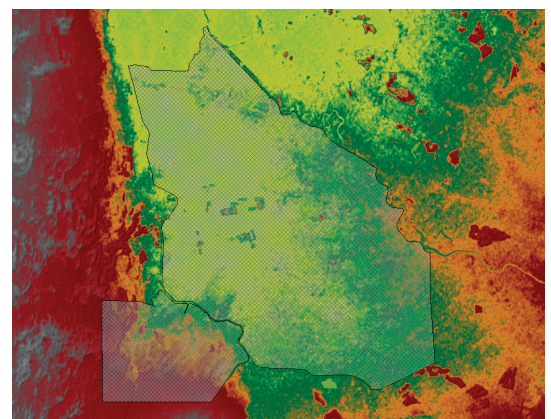
The JOINTISZA project – Strengthening cooperation between river basin management planning and flood risk prevention to enhance the status of waters of the Tisza River Basin – focused on interactions of two key aspects, the river basin management (RBM) and flood protection. The project also developed improved methods for urban hydrology management procedures through pilot actions on selected cities, investigated the possible climate change impacts on drought and water scarcity and assessment of dam failure cross border effects. Moreover, a pilot activity focused on dyke failure's simulation with transboundary effects on the Crasna River next to the Hungarian-Romanian border.



General layout of 1D river model of Crasna

As a result of the collaboration between the Romanian and Hungarian Parties in frame of JOINTISZA project, the HEC-RAS 1 and 2-dimensional hydraulic model was completed. During the assessment of terrain data near to the RO-HU border have been shown to be inconsistent, unfortunately there were significant altitude differences between field data. As a result, the HU-RO experts have agreed to use the freely access EUDEM will be used for flooding simulations, and the Parties have agreed to focus on 1D HEC-RAS hydraulic modeling.

Another important conclusion is that the development of data exchange and the organization and implementation of joint surveys are of great importance in the areas of common interest within EU Member States.



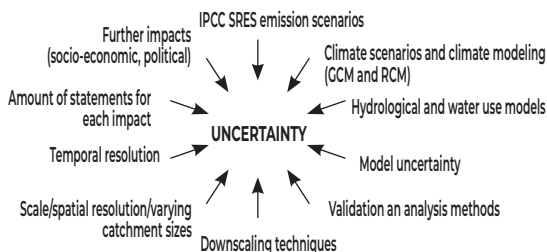
Unstructured flexible computational mesh

In the future, similar studies should be organized with more working group meetings to discuss the modeling methods and the results. Furthermore, more attention shall be paid to the data preparation and checking as well. In spite of the data weaknesses, the results of the project can be considered as informative and useful in the modeling of polder inundation with national borders during the preparation of the flood risk and hazard mapping.

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

Pilot action on climate change induced specific water quantity issues (Tisza River – Nagykunság subcatchment, Hungary)

The JOINTISZA project – Strengthening cooperation between river basin management planning and flood risk prevention to enhance the status of waters of the Tisza River Basin – focuses on interactions of two key aspects, the river basin management (RBM) and flood protection. The main aims of the project were to further improve the integration of the water management and flood risk prevention planning and actions while elaboration the Updated Integrated Tisza River Basin Management Plan, in line with the relevant EU legislations as well as to provide improved methods on urban hydrology management procedures through pilot actions on selected cities and to investigate also the climate change issues taking into account relevant four types of stakeholder groups, namely the national water administrations, water research institutes, international organisations and other interested stakeholders as well as NGOs, who play key role in the Tisza River Basin management planning process.



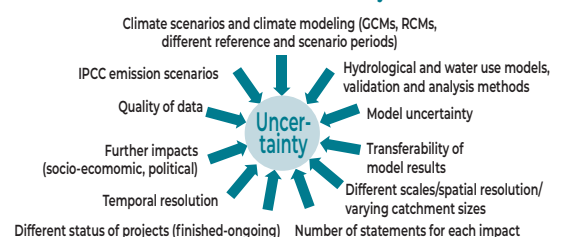
One of the focus themes of the project involved a **pilot action on climate change induced specific water quantity issues**, which included three major tasks, such as **Task 1: Ad-Hoc Task Group (AHTG) activities; Task 2: Elaboration of the Guidance paper on climate change induced specific water quantity issues to overcome challenges; Task 3: Application of Shared Vision Planning method, based pilot action on a selected pilot area. (Tisza River – Nagykunság subcatchment, Hungary)**

This Guidance paper is a joint product of the AHTG members who were invited from the experts of the Project Partners of the JOINTISZA project to work in the group as well as some internationally recognised external experts were also invited to join the AHTG.

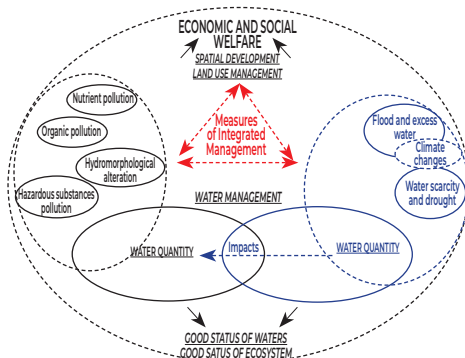
The AHTG hold three meetings in the duration of the project. The Group discussed and determined the aim and content of the Guidance paper, taking into account that the paper was planned to be one of the main outputs of the JOINTISZA project. The AHTG members were also responsible for writing the chapters of the Guidance paper as well as for facilitating the test work on how the Shared Vision Planning method should be used in the selected pilot area.

The Guidance paper aims to provide a practical document for stakeholders who are going to be involved in the next term river basin management planning in a significantly climate change influenced river basin. First, the paper provides an overview on i) core principles and approaches of the EU policies on climate change adaptation; ii) how the issue is tackled in the Danube River Basin and in the Carpathian Basin and iii) the integration way of the river basin management.

Treatment of Uncertainty



- Variables to determine a specific **certainty category** for each impact:
1. Certainty of statements
 2. Level of agreement of different statements
 3. Amount of studies



After setting the scene, Chapter 3 gives a summary on information and monitoring needs on climate change and water quantity aspects of the river basin management planning. Chapter 4 discusses how changing climate impacts the hydrology and water resources and what are the induced problems in the Tisza River Basin.

The next chapter is a concise summary of tools that stakeholders engaged in river basin management planning could use to enhance consideration of climate change adaptation.

Chapter 6 introduces the pilot work and experiences of Shared Vision Planning application on a selected Tisza River sub-basin located in the middle part of the Tisza Basin.

Interlinkages between the water quality and quantity related management issues identified by the ICPDR Tisza Group

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