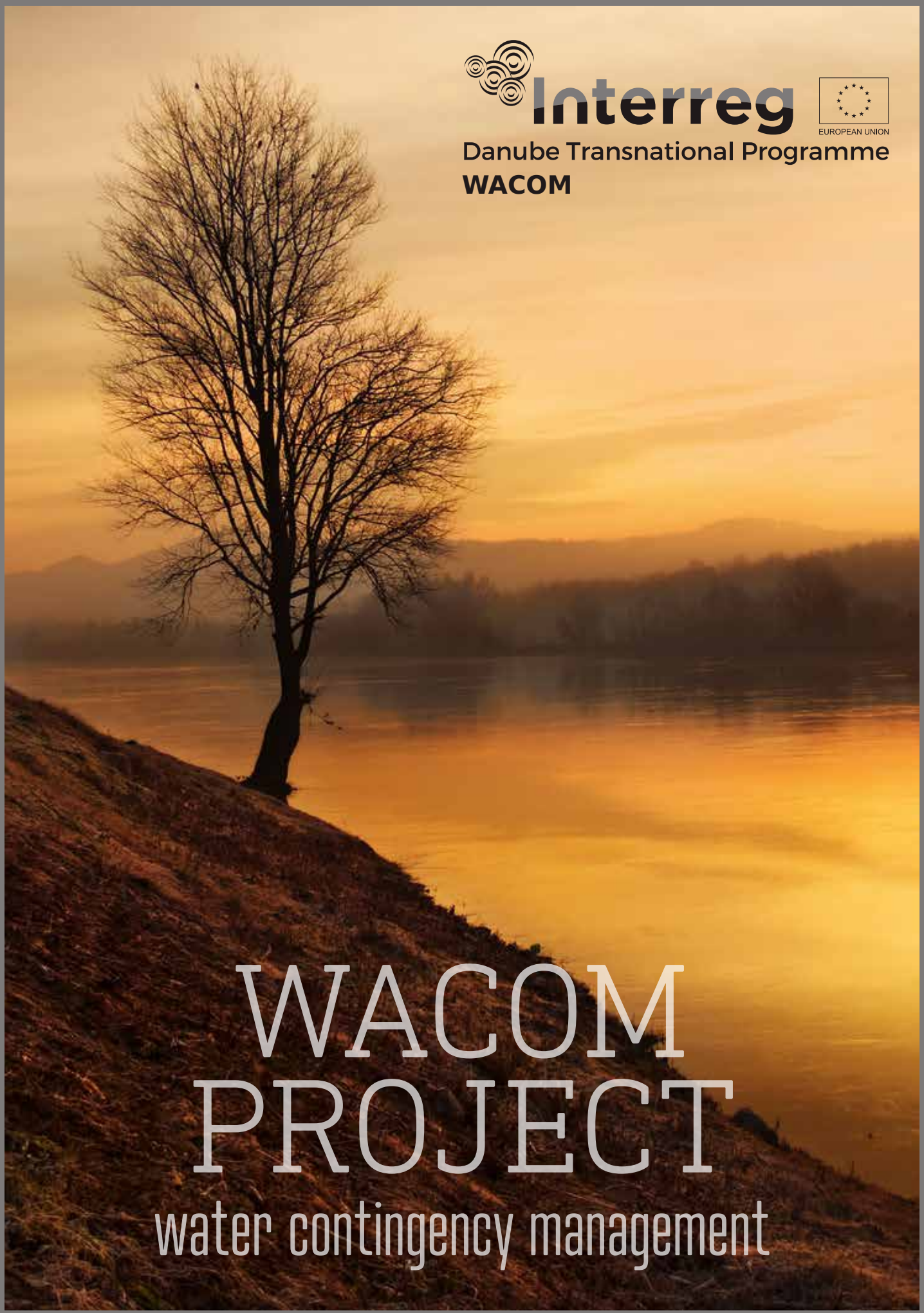

Photo: **Ivica Brlić**

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The **WACOM booklet** is available at the website: www.interreg-danube.eu/approved-projects/wacom

Photo: **Boško Tintor**

Photo: **Vladimir Đinić**

Let's MANAGE water disasters better!

It may seem that everything is under control in our lives, but the apparent calm can change in the blink of an eye. Heavy rains, such as we sometimes experience, can turn a gentle stream into a raging torrent and a peaceful river into a destructive watercourse. Industries using and transporting hazardous substances can result in large-scale accidental water pollution. Such events are not limited to the local environment, so their effects can threaten a much larger area and, in many cases, even cross state borders. To address these and other challenges, four countries, i.e. Bosnia and Herzegovina, Croatia, Serbia and Slovenia, have signed the Framework Agreement on the Sava River Basin (FASRB), which aims at sustainable water management and implementing measures to prevent and reduce the negative consequences of these disasters. For further implemention of the FASRB, it is necessary to actively involve institutions at different levels and sectors and develop tools and procedures to improve the management of such events.

The WACOM project, co-funded by the EU, is a good example of a transboundary project that improves cooperation between institutions and contributes to implementing improved management and response procedures in cases of disasters and accidents.

Based on an inventory, tools and procedures were developed to enhance information exchange before and during disasters in the Sava River Basin. They were tested in tabletop exercises involving water managers, civil protection, police, rescue forces, and others. Based on the analysis of the exercises and several workshops, a strategy is proposed to improve the implementation of the FASRB and related protocols at the transnational level.

We hope that the developed and reviewed project results will be fully implemented after the end of the WACOM project. To support this, the WACOM project provides an implementation framework for the developed tools and protocols aiming to improve the management of these disasters that threaten people and the aquatic ecosystem of our beautiful rivers.

BASIC FACTS
of the WACOM project

MAIN OBJECTIVE
Reduction of environmental risks related to accidental pollution and floods.

SPECIFIC OBJECTIVES
Improved transnational procedures for response in the case of accidental pollution and floods
Improved transnational cooperation among civil protection, water management and navigation agencies
More efficient joint response in the case of accidental pollution/flood emergencies on international Sava River Basin

MAIN RESULT
Reduced risk induced by the accidental pollution and floods of transnational dimension by strengthening the transnational and trans-sectoral cooperation

TIMELINE
July 2020 – December 2022

BUDGET
1,570,581.00 EUR

PROJECT PARTNERS

Slovenia:
University of Ljubljana (UL-Lead Partner), Slovenian Water Agency (DRSV), Hydro power plants of Lower Sava River (HESS)

Croatia:
Croatian Waters (HV), Ministry of the Sea, Transport and Infrastructure (MMPI)

Bosnia and Herzegovina:
Association for Risk Management AZUR, Civil Protection Administration of the Republic of Srpska (RUCZ)

Serbia: Jaroslav Černi Institute (IJC)

International:
International Sava River Basin Commission (ISRBC)

ASSOCIATION STRATEGIC PARTNERS

Croatia:
Croatian Meteorological and Hydrological Service, Port Authority Slavonski Brod

Bosnia and Herzegovina:
Sava River Watershed Agency, Republic Hydrometeorological Service of Republic of Srpska, Public Institution Vode Srpske, Port of Brčko

Serbia:
Public Water Management Company Srbijavode, Republic Hydrometeorological Service of Serbia, Ministry of Agriculture, Forestry and Water Management - Republic Water Directorate

International:
International Commission for the Protection of the Danube River

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

Connected by WACOM

Dr. Primož Banovec (UL)

The project's primary purpose is to develop tools supporting efficient and effective transnational response in the case of emergency events, considering the complexity of institutions and processes in different countries.

Suzana Stražar (DRSV)

With the WACOM project, we could improve the procedures and protocols which should be performed in case of accidental pollution and floods.

Dr. Ambrož Božiček (HESS)

HESS is strongly involved in emergency events on the Sava River. It is essential to strengthen the effective joint response in emergencies.

Tomislav Novosel (HV)

WACOM can undoubtedly help improve and enhance cooperation between participants in the contingency management system.

Photo: **Ivica Brlić**

Dr. Duška Kunštek (MMPI)

The ministry's role in the project is to harmonize national regulations and procedures in intersectoral and international frameworks to improve operational response in case of accidental situations.

Jovana Rašeta Bastić (ISRBC)

The WACOM project is considered one of the significant steps towards the further improvement of cross-border cooperation in implementation of measures based on the strategic framework of the Sava Commission.

Haris Delić (AZUR)

The project will significantly contribute to preventing, protecting, and managing floods and pollution by developing mechanisms, tools and exercises.

Dr. Robert Mikac (AZUR)

The tabletop exercises in the WACOM project have been performed, representing an excellent tool for checking procedures, plans, coordination, and communication between different institutions.

Milan Novitović (RUCZ)

It is essential to increase regional connectivity, which contributes to faster and more effective, response, communication, and understanding between different institutions during floods and accidental pollution.

Photo: **Ivica Brlić**

Territorial needs and CHALLENGES

Floods and pollution are among the most frequent and expensive disasters. Such situations are accompanied by destructive events that negatively affect human lives, property, and the environment

The Sava River Basin is a central river basin of Southeastern Europe with a total area of around 97,700 km^2. It comprises 12% of the Danube River Basin area and represents the most significant sub-basin. The Sava River Basin contributes to the characteristics of the Danube River Basin with its outstanding biological and landscape diversity. It hosts the largest complex of alluvial wetlands and large lowland forest complexes. The Sava River is a unique example of a river with some floodplains still intact, thus supporting flood alleviation and biodiversity. The basin area is shared among six countries: Slovenia, Croatia, Bosnia and Herzegovina, Serbia, Montenegro, and Albania. The total population of the five riparian countries is approximately 18 million, and half of this number resides in the Sava River Basin. Albania is omitted since only a negligible part of the basin area belongs to its territory.

In modern times, the Sava River Basin, like the rest of the world, is accompanied by increasingly rapid climate changes, which are reflected in the frequent form of extreme weather conditions and the floods consequently. At the same time, pollution represents a major environmental risk. Also, floods and pollution are among the most frequent and expensive disasters. Such situations are accompanied by destructive events that negatively affect human lives, property, and the environment. It could be recognized that the aging infrastructure, economic growth, and especially increasing transport of dangerous goods via roads, railways, and rivers would worsen the danger of accidents impacting the environment, including water and aquatic eco-system.

The most recent catastrophic floods in the Sava River Basin were caused by heavy precipitation in a large area in mid-May 2014. At that time, the Sava flood wave had a surprisingly quick rise for such a large river and lasted until the beginning of June. During the floods, more than 2,5 million people were affected, with 79 death casualties. The estimated damage from 2014's floods was more than 3,8 billion EUR.

In the last few years, two major accidental pollutions impacting the water and aquatic ecosystem occurred

Photo: **Predrag Zec**

on the Spreča River in Bosnia and Herzegovina in 2018 and on the Rižana River in Slovenia in 2019. The recent investigation in the Spreča River shows that the biodiversity is in real danger because of the decrease in fish numbers and the distinction of fish species. At the same time, the accident on the railway Ljubljana-Koper threatened the Rižana River, which is a drinking water resource for the Slovenian Coastal Karts Region.

All recent disasters related to floods and pollution highlight the need for good cooperation between institutions at the national and cross-border levels, effective response, and management of the situations that arise. It is essential to include thoughtful and proactive policies that monitor and plan for the risk of flooding and pollution. The challenge for emergency management in the future is the development of resilient systems, mechanisms, and solutions that perform well in uncertain and changing conditions.

Some mechanisms for exchanging information during emergencies already exist at the basin level. The Sava Geographical Information System (SavaGIS), Sava Hydrological Information System (SavaHIS), Sava Flood Forecasting System (Sava FFWS) at the Sava River Basin, and the Accident Emergency Warning System (AEWS) at the Danube River Basin level. Those systems provide basic data and information on river basin and flood risk management, online data on water levels and discharges, and forecast and warning messages in case of transboundary pollution. But during recent accidental pollution and extreme floods, it has been proven that the response mechanisms are still missing. Additionally, transnational and cross-sectorial interaction between the water management and civil protection administrations has also been identified as an area in which cooperation would need to be raised to higher and more efficient levels.

Photo: **Branislav Stanković**

ALL RECENT DISASTERS RELATED TO FLOODS AND POLLUTION HIGHLIGHT THE NEED FOR GOOD COOPERATION BETWEEN INSTITUTIONS AT THE NATIONAL AND CROSS-BORDER LEVELS

WACOM project
LEGAL BACKGROUND

The Parties of the Framework Agreement on the Sava River Basin should undertake measures to prevent or limit hazards and reduce and eliminate adverse consequences of floods and incidents involving substances hazardous for water

Recognizing the vital importance of transboundary cooperation, the Parties of the Framework Agreement on the Sava River Basin (FASRB) - Slovenia, Croatia, Bosnia and Herzegovina, and Serbia should undertake measures to prevent or limit hazards and reduce and eliminate adverse consequences of floods and incidents involving substances hazardous for water. They are also obliged to establish a coordinated or joint system of measures, activities, warnings, and alarms for extraordinary impacts on the water regime. Based on the FASRB, the Parties have concluded protocols covering protection against floods and prevention against water pollution caused by navigation among others.

The WACOM project supports implementing two protocols in force: Protocol on Prevention of Water Pollution Caused by Navigation and Protocol on Flood Protection, while the Protocol on Emergency Situations is foreseen to be harmonized in the near future.

In the field of civil protection, transboundary cooperation is characterized by three different but mutually complementary mechanisms. First, each country individually has signed bilateral agreements on cooperation with other countries in assisting in the event of major accidents and disasters. The second level of collaboration is a regional mechanism called the Disaster Preparedness and Prevention Initiative, through which countries exchange experiences and best practices. The third cooperation framework is the EU Civil Protection Mechanism, which includes all countries from the Sava River Basin.

All above mentioned documents represent strong legal background for the implementation of the WACOM project.

Photo: **Jadranko Markoč**

Photo: **Predrag Zec**

MAPPING

of the institutions and procedures

Institutions in the countries of the Sava River Basin have been mapped and introduced with the existing procedures in force regarding the response in the case of emergencies in the civil protection field, water management, and river navigation

The status identification process is of crucial importance in the implementation of the WACOM project. The main reason is the necessity to analyze in depth the existing state of all procedures, activities, and coordination, in order to upgrade the existing ones and complete the missing ones.

The above activity was carried out at the beginning of the project. The mapping process refers to mapping the institutions and procedures related to coordinated planning and response. Institutions in the countries of the Sava River Basin that are of strategic, tactical, and operational significance have been mapped and introduced with the existing procedures in force, regarding the response in the case of emergencies in the civil protection field, water management, and river navigation.

The mapping process has been implemented through three different approaches. At the first level, qualitative desktop research of all publicly available web pages of institutions has been conducted. At the second level, the list of all relevant institutions and procedures for preparedness, response, and mitigation stages in the case of accidental pollution, floods, and civil protection-related issues has been developed. At the third level, the database has been established. In the end, the mapping process has resulted in an extensive database of collected and processed data that served for the realization of subsequent project tasks linked to the data collected and analyzed.

Photo: **Ivica Brlić**

Development of WACOM

TOOLBOX

The response in the reality of water emergencies is highly heterogeneous. It requires the participation of different sectors and levels of government, as well as private stakeholders and water users

The WACOM project also addresses a specific challenge of improved response in the case of water emergencies - accidental pollution and floods. The response in the reality of water emergencies is highly heterogeneous. It requires the participation of different sectors (water management, civil protection, navigation, police, special units, etc.), different levels of government (national/entity, regional and local), private stakeholders, water users, and even more could be listed.

A specific challenge of the WACOM project was the identification of a suitable framework in a plethora of transnational frameworks for the exchange of information and improved coordination, where we found that three of the four participating countries were using U.S.-defined incident management processes - the National Incident Management System (NIMS) and its specific component - the Incident Command System (ICS). The context of ICS IAP – "Incident Action Plan", was identified as suitable for defining the key transnational emergency processes addressed in the WACOM project, certainly with several adaptations. The development of the reporting system toolbox (WACOM toolbox) was focused on

THE DEVELOPED WACOM TOOLS PRESENT A BASIS FOR IMPROVEMENTS AND FURTHER DEVELOPMENT OF SAVAGIS AS A COMMON PLATFORM OF THE ISRBC COMMUNITY

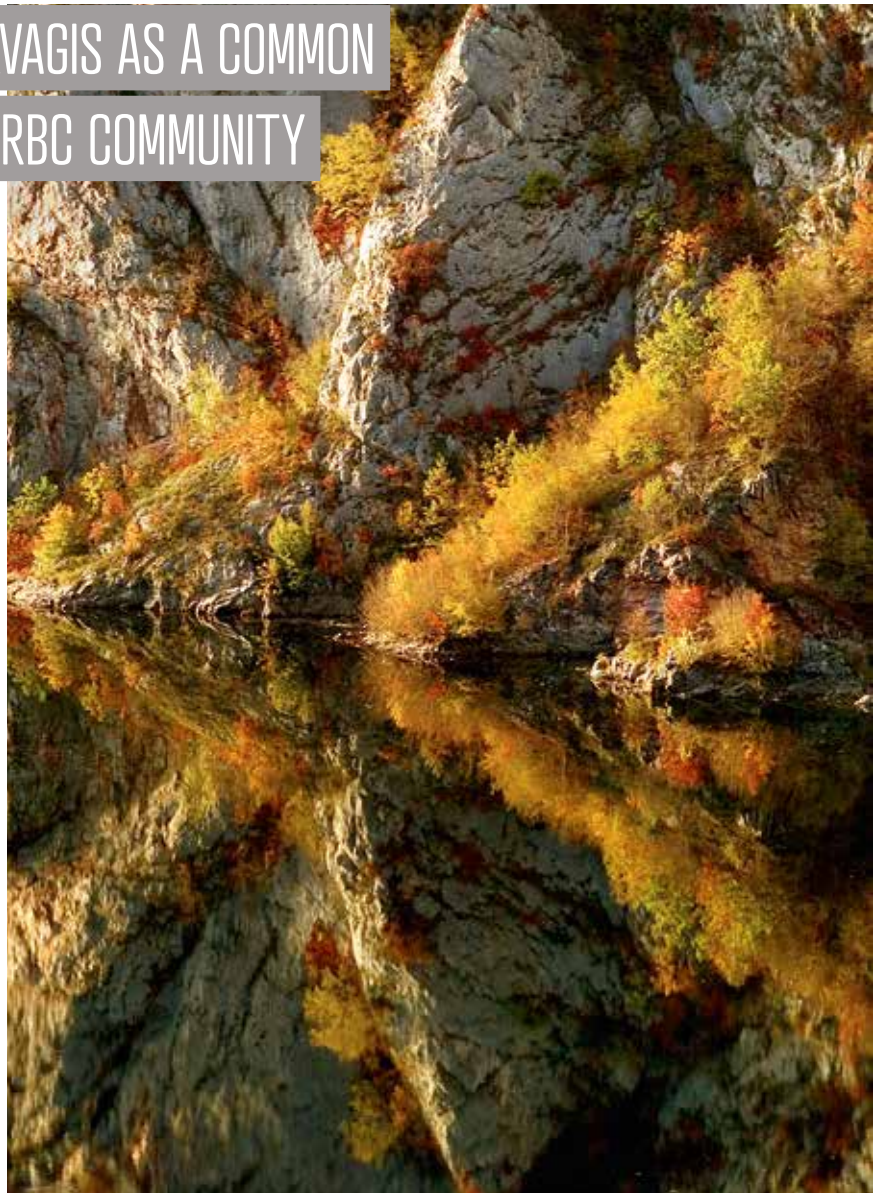

Photo: **Miroslav Jeremić**

enabling the exchange of information on ICS 207 (Incident Organization Chart), and ICS 209 (Incident Status Summary) on the target website supported with the GIS user interface.

WACOM toolbox, addressing three key components (situational awareness, communication, and modeling-forecasting), was developed and tested during the five table-top exercises. Three key components of the tool are:

1. **Transnational incident coordination tool** – enabling efficient and effective communication among the stakeholders (institutions) involved in the flood/accidental pollution response. The tool brings together information on the organization of the activated headquarters. Their activity reports can serve as a reference source of information on the activities taking place in the intervention. Sharing the activities of each individual HQ helps to improve overall disaster response and overall contingency management.
2. **Transnational modelling tool** – enabling modelling (forecasting) of the flood/accidental pollution event based on real-time data on river discharges. The flood forecasting module was operational before the WACOM project (Sava FFWS). Together with the WACOM-developed module, which supports modelling of accidental pollution propagation, both emergencies are addressed.
3. **The transnational situational awareness tool** integrates the dynamically supplied information on the development of the incident providing the transnational partnership common status of the ongoing incident, which is the basis for the deployment of national contingency measures, as well as measures coordinated on the transnational level. This WACOM tool is used as a management tool. Daily reports are produced at the end of each operational period for each organization headquarters (the ICS 201 and 209 form) for reporting at the end of each operational period.

The developed WACOM tools present a basis for improvements and further development of SavaGIS as a common platform of the ISRBC community to enable sharing and dissemination of information and knowledge about navigation management and accident prevention and control activities in the Sava River Basin.

The goal of WACOM SavaGIS upgrade activities was to develop the Navigation module (NAV) and the Accident prevention and control module (APC) as integral parts of the platform:

- The APC module combines the functionalities of managing information on the risk of pollution, information on accidents, measures to mitigate the consequences of pollution, and information in the context of emergency management and incident command systems.
- The NAV module unifies the information management and visualization functionalities for Electronic Navigational Charts and the information of the Album of Bridges on the Sava River and its navigable tributaries.

Table-top EXERCISES

Each WACOM exercise has been organized as a hands-on international tabletop exercise, a guided event with elements of interactive discussion among the narrator and participants from different response institutions and headquarters

Photo: **Josip Ušaj**

Following particular project objectives, which are to share the new ideas and upgrade of procedures based on the new WACOM tools and to test the usability of the new tools, the project partners developed and executed a set of five hands-on training events for stakeholders – the five table-top exercises (TTX).

In general, TTX is an event that can be carried out at several complexity levels, from introductory seminars to complex field-oriented exercises. Each WACOM exercise has been organized as a hands-on international tabletop exercise, a guided event with elements of interactive discussion among the narrator and participants from different response institutions and headquarters. Each TTX was based on its specific scenario of the disaster event, three events of accidental pollution, and two events of severe floods, all occurring in the Sava River Basin.

The first preparations for implementing TTXs began in early 2021 when the project partners formulated what they wanted to achieve with the TTXs. After selecting the most proper method of the exercise further preparation of exercise implementation documents began. The key documents delivered for the implementation of TTXs were the Event Scenarios, Contingency plans, and Reports on the requirements of the TTX, which were all prepared based on project objectives and methodologies described in other supporting deliverables.

The TTX scenario describes the disaster events, oil pollution of the Sava River due to the freight train derailment in Zidani Most, a tanker accident in Slavonski Brod, an accident at the gasoline station in Zvornik, and the two cases of floods in rivers Una and Vrbas in first, and Bosna and Drina in the second flood scenario. The Contingency Plans describe the response activities for individual events and combine existing plans and well-established procedures for the coordination and activation of stakeholders. At the same time, they provide new instructions on utilizing the WACOM tools in coordination and response to accidents. The Report on requirements of the TTX, the implementation report, specifies the execution details, execution location, agenda, execution steps, and content of the TTX and MSEL (Master Scenario Event List) timeline, providing a detailed schedule of the response of individual exercise participants.

International partnership in the WACOM project allowed the execution of the TTXs in different countries combining the international response in several combinations.

The first TTX on the train derailment and accidental pollution was executed in Brežice, Slovenia. It gathered several stakeholders and headquarters participants from Slovenia and Croatia. The scenario of massive pollution of the Sava River with oil leakage from the freight train under severe weather allowed participants to get involved and study the response of

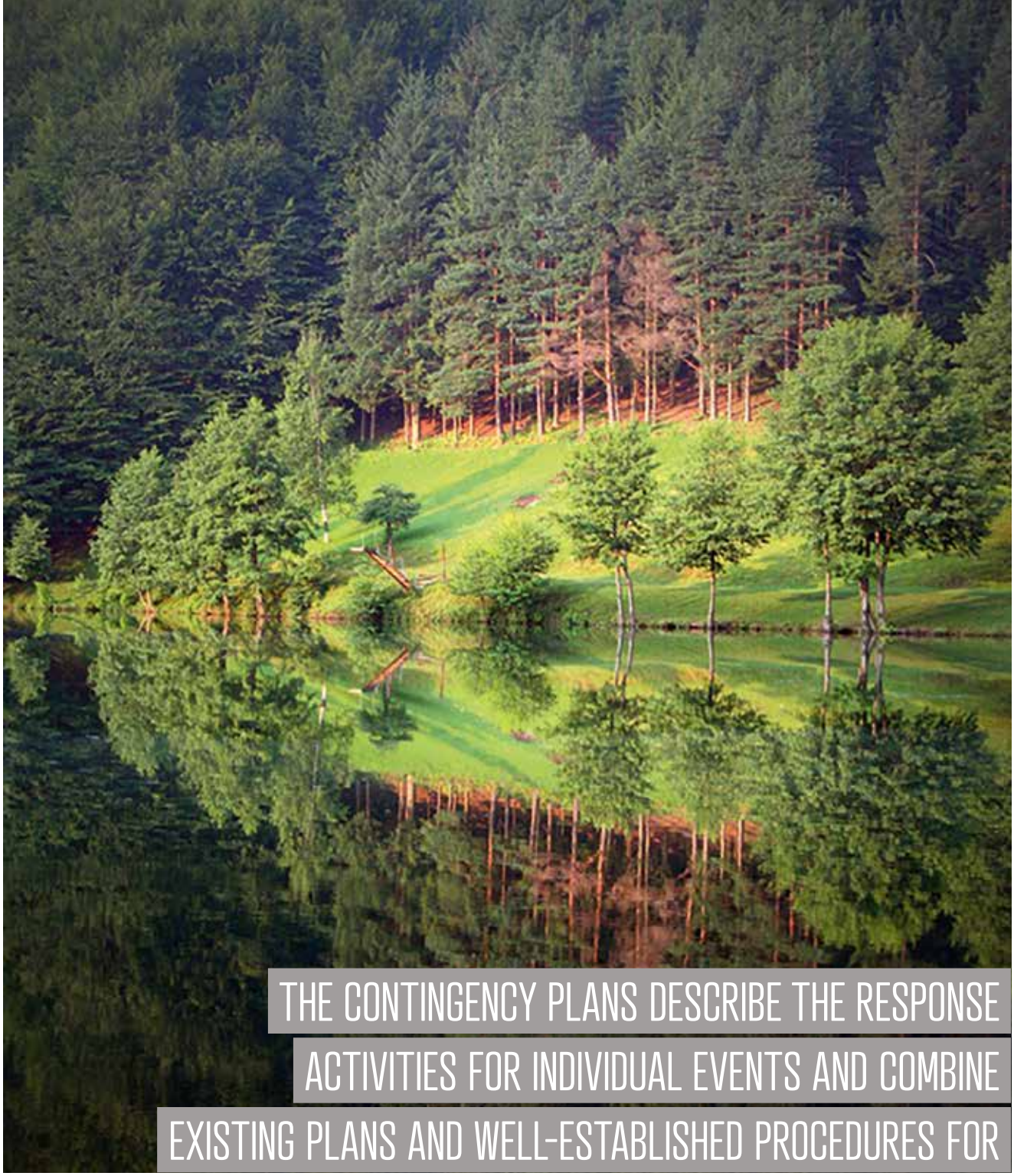

Photo: **Zoran Lazić**

THE CONTINGENCY PLANS DESCRIBE THE RESPONSE ACTIVITIES FOR INDIVIDUAL EVENTS AND COMBINE EXISTING PLANS AND WELL-ESTABLISHED PROCEDURES FOR THE COORDINATION AND ACTIVATION OF STAKEHOLDERS

individual institutions, operational forces, and headquarters. Meantime, the participants tested new WACOM tools which enable the utilization of new activities and procedures to improve transnational coordination in disaster responses, to improve situational awareness during disasters, and to provide support in modelling pollution propagation. At the TTX, the WACOM tools were implemented and utilized during simulated emergency cases for the first time.

The first TTX was followed by two TTXs in Slavonski Brod and two in Brčko, each covering one accidental pollution and one flood event. TTX in Slavonski Brod was visited by stakeholders (headquarters) from Croatia and Bosnia and Herzegovina, while TTX in Brčko by stakeholders from Bosnia and Herzegovina and Serbia. The implementation of all TTX was based on a common methodology, interactive elaboration of the response to the accidental event scenario, defining and explaining the role of an individual institution, and utilization of the new WACOM tools.

All TTXs successfully reached the objectives set by the project program. The analysis showed that the execution of the TTXs is a great example of good practice for improving the preparedness and awareness of the institution's response and for verifying and applying new protocols and tools to disaster management.

Development of the STRATEGIES for preparedness and emergency response

The strategy's main objective is to create the conditions for improved and coordinated institutional mechanisms that will lead to less environmental damage and reduced public health risk in Sava countries in the case of water-related incidents

The final phase of the WACOM project is to develop a proposal for a strategy to implement coordinated preparedness and response planning. This is a crucial bridge component to achieving the project objectives - reducing environmental risks associated with accidental pollution and flooding while improving response capabilities. The strategy developed and agreed upon among the project partners will put the project results on their broader application and activation path. The strategy's main objective is to create the conditions for improved and coordinated institutional mechanisms that will lead to less environmental damage and reduced public health risk in Sava countries in the case of water-related incidents. The strategy considers all existing bilateral protocols in the field of civil protection, bilateral protocols in the field of water management, as well as the EU Civil Protection Mechanism and other multilateral agreements.

The strategy was developed through a bottom-up process that incorporated the experience and work of the entire WACOM project. At the heart of the strategy is a set of nearly 100 best management practices needed for a more efficient and effective response to accidental pollution and floods. It combines aspects of water management, civil protection, and navigation. These 100 practices were identified during project development, but most importantly, during interactive learning experiences such as the

Photo: **Predrag Zec**

WACOM national workshops, regional workshops, and table-top exercises in close collaboration with target group participants. In that way, a comprehensive catalog of measures for improved preparedness and transboundary coordination, and interoperability was developed as the basis for the strategy. The catalog measures are clustered in 13 work areas: Education, Governance, Human Resources Management, Information, and Communications Technology, Information Management, Infrastructure, Knowledge, Logistics, Organization, Planning, Monitoring, Finance, and others. The implementation status of each specific measure in each participating country was assessed and surveyed individually, and the priority of the measure was evaluated. In this way, the priorities included in the strategy were identified for each country and as common transnational priorities. In addition, some guiding principles were agreed upon and confirmed in a WACOM Declaration on Floods and Accidental Pollution (FAP). According to this declaration, the strategy and implementation framework should:

- Closely relate to existing national legislation, EU legislation, and bilateral and multilateral agreements.
- Recognize the importance of the preparatory stage in the disaster risk management cycle, building on effective transboundary cooperation already at this stage.
- Aim at improved situational awareness, continuously improving and working on the exchange of information sharing in the response phase, creating an adequate common understanding of the ongoing emergency.
- Aim at improved communication and collaboration among the various institutions involved in emergency preparedness, response, and recovery/mitigation.
- Build on improved data/information exchange, modeling, and forecasting, recognizing the central position of the existing SAVA GIS, SAVA HIS, and SAVA FFWS, with continued maintenance and development of ICT tools at multilateral and national levels.
- Support the implementation of the SAVA STEER - Strategies for emergency response in the Sava RB and its implementation guidelines, recognizing that a wide range of measures should be implemented to ensure efficient and effective disaster risk reduction in the area of accidental pollution and flooding in the Sava River basin.

For improved resolution, two strategies were developed (1) for flood response cooperation and interoperability and (2) for accidental pollution response cooperation and interoperability. Both strategies establish the main rationale for implementing the proposed toolbox and, in particular, the procedures related to coordination, modelling, and situational awareness.

Photo: **Ivica Brlić**

AT THE HEART OF THE STRATEGY IS A SET OF NEARLY 100 BEST MANAGEMENT PRACTICES NEEDED FOR A MORE EFFICIENT AND EFFECTIVE RESPONSE TO ACCIDENTAL POLLUTION AND FLOODS

Interreg
EUROPEAN UNION
Danube Transnational Programme
WACOM

Water Contingency Management in the Sava River Basin

Photo: Hvala Jože

Knowing upstream preparedness and response mechanisms improves the efficiency and effectiveness of the preparedness and response downstream!

University of Ljubljana

REPUBLIKA SLOVENIJA
MINISTRSTVO ZA OKOLJE IN PROSTOR
DIREKCIJA REPUBLIKE SLOVENIJE ZA VODE

HIDROELEKTRARNE NA SPODNJI SAVI

REPUBLIKA HRVATSKA
Ministarstvo mora, prometa i infrastrukture

INTERNATIONAL SAVA RIVER BASIN COMMISSION

HRVATSKE VODE

JAROSLAV ČERNI
WATER INSTITUTE

Vlada Republike Srpske
Republička uprava civilne zaštite

AZURI

Project duration: July 2020 - December 2022

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