



*Water Contingency Management in the Sava River  
Basin*

**Transnational check list of priorities for  
the implementation of the Sava STEER**

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## 1 Introduction

In order to develop a tool that allows a methodical and systematic follow up of the Sava STEER (Strategies for emergency response in the Sava River Basin), a well-structured list of necessary steps need to be taken prior to the implementation stage. With this regard to the Strategies for emergency response in the Sava River Basin, the first step was to identify the deficiencies in the area of Contingency management.

As a basic prerequisite to map the status of key measures for the reduction of flood risks and accidental pollution risk reduction measures in all countries of the Sava River Basin was developed. A catalogue of measures was developed in a harmonized and thus comparable way in order to identify common experiences with these measures, but also to identify differences between countries with respect to the same measure. The WACOM catalogue of measures was developed through a multi-stage, process involving multiple stakeholders. A comprehensive list of measures was developed, for all countries involved: Slovenia, Croatia, Bosnia and Hercegovina and Serbia.

With the classification of the proposed key measures for the efficient and effective response in the case of accidental pollution and floods, considered within the disaster management cycle (preparedness, response, and recovery). The WACOM Transnational best management practice catalogue includes 94 measures divided into 14 Key intervention areas. The intervention areas were recognised as priority areas for emergency response and planning in the Sava River Basin (i.e.: Education, Finance, Human resources, Infrastructure, Logistics, Organizational, Planning, etc.)

The catalogue was used as a questionnaire with several categories to capture further similarities and differences. The evaluation of the Transnational best management practice catalogue was performed in two rounds. In both rounds the evaluators were project partners and associated project partners.

In addition, we conducted the evaluation of the measures at the project workshops to get a broader picture of the proposed measures. The involvement of target groups in the WACOM project is crucial, and through the project workshops, stakeholders contribute to the analysis of the pilot measures and to the overall quality of the project and project outcomes. Target groups were actively involved in the third national workshops in all countries (SI, HR, BA and RS),

## 2 Tool

The tool for mapping the status of key measures for the reduction of flood risks and accidental pollution risk reduction measures in all countries of the Sava River Basin the Sava STEER (Strategies for emergency response in the Sava River Basin),

The evaluation of the Transnational best management practice catalogue was performed in three steps:

**First step** was review and evaluation by the project partners of the Transnational best management practice catalogue. The purpose of evaluation was to define the level of implementation in the country involved (partners were evaluating the measures for their country only). Since the partners are experts from the field of civil protection and water management, they made an overview it the catalogue identifies all deficiencies in the area of Contingency management and few additional measures were added to the catalogue.

**The second step** was to review and evaluate the additional measures for their country. within this step assessment of priority of the measure – is it short term and should be implemented in the next

6 years or is the assessment of priority of the measure long term and should be implemented within the next 20 years. The measures were evaluated by project partners and associated partners for each of the involved country: Slovenia, Croatia, Bosnia and Hercegovina and Serbia.

**The third step** was the evaluation by the target groups. This was done during the third national workshop at which we presented a set of measures and strategies, which would contribute to an approach for improved response and cooperation in case of such disasters at the national or transnational level. We conducted the evaluation of the measures at the project workshops via Polls to gather a broader picture of the proposed measures. The measures were presented one by one in two rounds as a starting point for setting priorities in relation to:

- Status of implementation of the measure in each country (SLO, HRV, BiH, SRB): measure already implemented - partly implemented - measure not implemented;
- Priority to introduce the measure in the short term or long term: the measure is urgent short-term in the next 6 years - urgent long-term in the next 20 years - immediate and long-term application is necessary - application of the measure is not necessary.

The involvement of target groups in the WACOM project is crucial due to their specific knowledge in the field, mostly practical knowledge from their daily work. Through the project workshops stakeholders contributed to the analysis of the pilot measures quality and to the overall quality of the project and project outcomes. Target groups gathered several times during the whole lifetime of the project and were actively involved in all steps, as well as at the above mentioned third national workshops in all countries (SI, HR, BA and RS).

After completing all three steps of the evaluation the analysis of the results took place. The results were collected, analysed, and interpreted for each country separately. The analysed results were aggregated into a traffic light according to the rating from 1 to 5, which largely corresponds to the third evaluation step performed by stakeholders at the national workshops, accordingly:

Rating 1. And 2. Step	Rating 3. Step (Polls voting)	Final Rating
1 - 2	0 – 20 %	■ not implemented
2 - 4	20 – 70 %	■ partly implemented
4 -5	70- 100 %	■ implemented
?	?	□ undefined

The final result of the analysis in the

Table 1 presents the level of individual measure implementation for each country.

Table 1: Level of implementation of specific measure in the country

ID	Key intervention area	Measure	Legend: ■ implemented; ■ partly implemented, ■ not implemented; ■ undefined			
			SI	HR	BA	SR
1	EDUCATIONAL	Education on all levels	■	■	■	■
2		Social, educational and awareness work with the youth	■	■	■	■
3		Education of general public and promotion activities	■	■	■	■
4		ICS 100 - incident command system standardized framework protocols	■	■	■	■
5		Micro-credentials and continuous education	■	■	■	■
6		Education of special ICS functions (IC, Safety officer, PR, Operations, Planning, Logistics, Administration/finance)	■	■	■	■
7		Other education, research oriented	■	■	■	■
8		Supporting Flood and Accidental pollution emergencies	■	■	■	■
9	FINANCIAL	Enforcing the polluter pays principle (compensations for the floods)	■	■	■	■
10		Securing public financial resources	■	■	■	■
11		Improved insurance practices and stimulations for wider penetration of insurance for floods and accidental pollution	■	■	■	■
12		Individual understanding of financial responsibilities in the case of floods and accidental pollution (education)	■	■	■	■
13		Education of water users (abstractions) on emergency procedures (floods, accidental pollution)	■	■	■	■
14	GOVERNANCE	Elective representatives for long-term challenges after the accident	■	■	■	■
15		Participatory decision-making process - water democracy	■	■	■	■
16	HUMAN RESOURCES MANAGEMENT	Individual communication and indirect education	■	■	■	■
17		Employee satisfaction	■	■	■	■
18	ICT	GIS based situational awareness	■	■	■	■
19		Communication equipment and protocols	■	■	■	■
20		Nowcasting and forecasting systems	■	■	■	■
21		Early identification of accidental pollution and alerting	■	■	■	■
22		Discharge/level monitoring	■	■	■	■
23	Flood management centres	■	■	■	■	
24	INFORMATION	Improved data integration	■	■	■	■
25		Improved supervision and control over the transport of pollutants	■	■	■	■
26		Improved supervision and control over the production, use and storage of pollutants	■	■	■	■
27		Registry of water uses (abstractions)	■	■	■	■
28		Floods situational awareness system	■	■	■	■
29	Mutual notifying about hazards, disasters, manners of border crossing	■	■	■	■	
30	INFRASTRUCTURAL	Safe river access locations (rescue)	■	■	■	■
31		Safe river access locations (booms)	■	■	■	■
32		Additional measures from the Sava flood risk management plan (structural measures, non-structural measures)	■	■	■	■
33		Other emergency management related structural measures	■	■	■	■
34		Waterways	■	■	■	■
35	Reception facilities	■	■	■	■	
36	KNOWLEDGE	National and international (EN) standards	■	■	■	■
37		Knowledge base of the polluters	■	■	■	■
38		Knowledge base of the pollutants and procedures	■	■	■	■
39	LOGISTICS	Availability of the emergency equipment (pollution)	■	■	■	■
40		Availability of the emergency equipment (floods)	■	■	■	■
41		Rescue tools and resources availability	■	■	■	■
42		Identification of service providers for emergency response	■	■	■	■
43		Costing units supporting administration and finance processes	■	■	■	■
44		Identification of service providers (short listing), contracts with the service providers (companies) supporting the emergencies with their specific services	■	■	■	■
45	ORGANIZATION	UN protocols	■	■	■	■











### 3 Priority to introduce the measure in the country

During the evaluation of the measures in each country, we recognized a lack of attention on importance of several measures. The measures which were not implemented were analysed with regard to the Priority to introduce the measure in the country. Assessment of priority of implementation of the measure was assessed during the National Workshops (shown in a graphical form) and by the project partners/associated partners.

Priority to introduce the measures in the short term means that the measure was assessed that is urgent to be implemented in the next 6 years. Long term prioritisation of the measure implementation means that the measure is important for the long-term functioning of the country and has to be implemented in the next 20 years, mostly those measures need also longer time to implement them in the system. Some measures were assessed as short and long-term meaning that the application is urgent but must be also maintained in a long-term manner.

#### 3.1 Implementation priority for the measures implemented in Slovenia

		Number of responses in Polls: 18		
Key intervention area	Proposed measure	Assessment of priority		Implementation needed in the short/long term
ID 1	<b>EDUCATIONAL</b> Other education, research oriented	Short term and long term		
ID 9	<b>FINANCIAL</b> Enforcing the polluter pays principle (compensations for the floods)	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  94% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  6%	Short term	
ID 11	<b>FINANCIAL</b> Improved insurance practices and stimulations for wider penetration of insurance for floods and accidental pollution	Short term and long term		
ID 13	<b>FINANCIAL</b> Education of water users (abstractions) on emergency procedures (floods, accidental pollution)	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  94% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  6%	Short term	
ID 14	<b>GOVERNANCE</b> Elective representatives for long-term challenges after the accident	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  82% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  18%	Short term	

ID 17	HUMAN RESOURCES	Employee satisfaction mechanisms	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  35% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  65%	Long term
ID 21	ICT	Early identification of accidental pollution and alerting	Short term	
ID 29	INFRASTRUKTURAL	Safe river access locations (rescue and pollution control)	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  83% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  17%	Short term
ID 34		Reception facilities	Long term	
ID 42	LOGISTICS	Costing units supporting administration and finance processes	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  44% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  56%	Short term and long term
ID 46	ORGANIZATIONAL	Clear positioning of the MACS (Multi Agency Coordination System) being in the core of complex response	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  88% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  12%	Short term
ID 53		Protocols enabling involvement of insurance companies	Long term	
ID 55		Improved integration of the levels of MACs and of governmental sectors	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  50% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  50%	Short term and long term
ID 62		EU whistle blower directive (2019/1937)	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  67% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  33%	Short term
ID 63		Certification process for risk management (ISO 33000 family)	Short term and long term	
ID 64		Certification process for asset management (ISO 55000 family)	Short term and long term	
ID 65		Certification process for continuous operation management (ISO 22300 family)	Short term and long term	
ID 90		OTHER	Adaptation to climate change	Ukrep je nujen (KRATKOROČNO) - in bi se moral izvajati v naslednjih 6 letih  44% Ukrep je nujen (DOLGOROČNO) - in bi se moral izvajati v naslednjih 20 letih  56%

The Slovenian WACOM partners and stakeholder have during the development process of the situational assessment identified following outstanding measures which are lagging behind the optimal and will be included in the overall WACOM strategy:

## 1. Education in Slovenia

Education regarding flood management and accident pollution management is currently focused on the tertiary level – universities, where actually only study programmes at the University of Ljubljana – Faculty of Civil and Geodetic Engineering. Comparing both areas far more attention is given to flood management. There is little or actually no education on this subject on other levels of education. Similar is the situation relative to continuous education, there are no continuous education programmes and target courses with micro-credentials<sup>1</sup>. Contents related to the continuous educational process could be identified in the framework of civil protection educational programmes, and in the framework of the Slovenian Chamber of Engineers, both rather limited and focused on floods.

In Slovenia education on protection, rescue and disaster relief is carried out by the Administration for Civil Protection and Disaster Relief, which is a body within the Ministry of Defence, however, the exercises are outdated, not frequent and only for a specific audience (firefighters, policemen, paramedics). Education is recognized as a very important step in the contingency management, and the process should begin with targeted youth outreach, public relations, and awareness training for the general public.

Accidental pollution is not addressed. Slovenian Water Agency does not provide any educational services whatsoever.

As a strategic measure an education at all levels should be improved, from early education to universities and research, including lifelong learning – continuous education. In Slovenia, education of staff on emergency situations, is carried out, but education of training for the general public and all professional levels is lacking, especially research-oriented training, which should be both short- and long-term. Some improvements in this area could be observed recently as improvement of tertiary education is one of the components of Slovenian Reconstruction and Recovery Plan EU funds (Načrt za obnovo in okrevanje). Reconstruction of syllabus on primary and secondary level was initiated by the National Education Institute Slovenia (Zavod za šolstvo Republike Slovenije).

In order to improve water management related to flood response procedures and accidental pollution management, professional level training, especially training of water users on procedures in emergency situations, should be trained according to ICS procedures (SVOD) and practical training ( staff exercises for flooding and accidental pollution).

## 2. Finance in Slovenia

The financing of the water management in the recent years has significantly improved, but the long term financing stability has yet to be ensured. The financing regarding both flood management and accidental pollution prevention has two main sources:

**Flood management** is by the Slovenian water act financed mainly through the central state institutions – Ministry of Environment and Spatial Planning and corresponding Water Agency (Direkcija Republike Slovenije za vode). Two financing sources are available: (1) central state

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<sup>1</sup> EU COMMISSION (2021) Proposal for a Council Recommendation on a European approach to micro-credentials for lifelong learning and employability  
(<https://data.consilium.europa.eu/doc/document/ST-9237-2022-INIT/en/pdf>)

budget and (2) Water Fund (defined by the article 162 of the Water Act). The funds of the Water Fund shall be used to finance the following:

- water infrastructure, including the purchase of land required for its construction,
- the construction of state and local infrastructure required for the construction of water infrastructure,
- the performance of individual expert tasks of the Ministry associated with the formulation of water management plans, expert tasks associated with the granting of water rights and water approvals and determining the boundaries of water land and waterside land, and expert tasks related to the identification of water land plots,
- the construction and modernisation of reservoirs intended for the irrigation of agricultural land that constitute state-owned water infrastructure,
- the purchase of water land and waterside land and co-financing the purchase of waterside land by local communities pursuant to Article 16 of this Act,
- expert and development tasks for the implementation of this Act that are carried out by legal persons governed by public law established for this purpose by the Republic of Slovenia,
- inter-municipal or regional projects for the construction of water pumping, filtering and abstraction facilities and water transmission pipelines for the provision of public drinking water supply in accordance with operational programmes regarding environmental protection, and other particular expert and development tasks required for the implementation of this Act.

Water Fund is a special state level budgetary mechanism which is reserved for the funding of these tasks. The income of the Water Fund are:

- proceeds from the sale of water land and waterside land whose status of natural water public good has terminated,
- payments for established real easements or building titles pursuant to this Act, and
- water right payments in the part attributable to the State, and water use fees.

Court of Audit of the Republic of Slovenia has issued several revisions (last in 2022) regarding the tariffing, supervision and operational procedures related to the Water Fund, many of them are not addressed yet.

More detailed information regarding the financing of the water management, with specific focus on the financial sources are available in Flood risk reduction plan for the Republic of Slovenia (NZPO), with two publications (draft Flood risk reduction plan 2022-2027<sup>2</sup> and valid Flood risk reduction plan 2017-2021<sup>3</sup>).

Beside the state budget and Water Fund following sources of financing of flood risk reduction are envisaged by the NZPO:

- EU Cohesion funds 2014-2020 in 2021-2027;
- Funds allocated for flood risk reduction and climate change adaptation within Slovenian Reconstruction and Recovery Plan EU funds (NOO);
- Budgets of local communities ;
- INTERREG transnational cooperation programmes: Europe, Alpine Space, MED, Adrion, Central Europe, Danube
- INTERREG cross-border cooperation programmes: ITA-SLO; AT-SLO; SLO-HU; SLO-CRO,

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<sup>2</sup> [https://www.gov.si/assets/ministrstva/MOP/javne-objave/javne-obravnavne/NZPO\\_II/NZPO\\_II.pdf](https://www.gov.si/assets/ministrstva/MOP/javne-objave/javne-obravnavne/NZPO_II/NZPO_II.pdf)

<sup>3</sup> [https://www.gov.si/assets/ministrstva/MOP/Dokumenti/Voda/NZPO/606504549e/nzpo\\_2017\\_2021.pdf](https://www.gov.si/assets/ministrstva/MOP/Dokumenti/Voda/NZPO/606504549e/nzpo_2017_2021.pdf)

- Climate Change Fund<sup>4</sup> (Sklad za podnebne spremembe).

Relative to the existing sources of financing, which cover relatively well several flood management tasks, some challenges remain:

- Penetration of the insurance against the flood damage is relatively low.
- There are limited cases where financial liability for the floods is identified and paid to the persons which were flooded.

**Financing framework for the accidental pollution prevention** and improved response in the case of accidental pollutions is not defined on the same level as for the flood management.

### 3. Water Governance in Slovenia

Water governance is an important pre-condition for a successful implementation of any measures. It provides a general framework for efficient and effective allocation of limited resources, protection of public good, and achievement of the objectives, which are defined in two key documents:

- (1) River Basin Management Plan for the Danube River basin district<sup>5</sup>, following the planning requirements of the EU Water Framework Directive 2000/60, and
- (2) Flood Risk Reduction Plan - following the planning requirements of the EU Floods Directive 2007/60.

For the implementation of both complex governance institutions and processes shall be defined in each country. In this way a basic precondition for the implementation (transposition) of foreseen processes defined in more detail by the Common Implementation Strategy (CIS) could be met. Out of more than 36 guidance documents following are more important for the improved governance procedures:

- N° 1 - Economics and the Environment - The Implementation Challenge of the Water Framework Directive
- N° 3 - Analysis of Pressures and Impacts
- N° 7 - Monitoring under the Water Framework Directive
- N° 8 - Public Participation in Relation to the Water Framework Directive
- N° 11 - Planning Processes
- N° 20 - Exemptions to the environmental objectives
- N° 24 - River Basin Management in a changing climate
- N° 26 - Risk Assessment and the Use of Conceptual Models for Groundwater
- N° 27 - Deriving Environmental Quality Standards – version 2018
- N° 29 - Reporting under the Floods Directive
- N° 31 – Ecological Flows (final version)
- N° 31 – Ecological Flows Policy summary ( Original English version)
- N° 34 - Water Balances Guidance (final version)
- N° 36 - Article 4(7) Exemptions to the Environmental Objectives

One of the listed CIS documents – CIS No. - N° 8 - Public Participation in Relation to the Water Framework Directive is especially important for the improved governance procedures as it

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<sup>4</sup> Ordinance on the Climate Change Funding Programme for the period 2021 – 2023 - <http://www.pisrs.si/Pis.web/pregledPredpisa?id=ODLO2330>

<sup>5</sup> Načrt upravljanja voda na vodnem območju Donave za obdobje 2016–2021

defines recommended open and transparent procedures supporting water management aiming at higher levels of it - participatory management.

In Slovenia participatory management in line with the WFD was introduced in the water act of 2002 (after the adoption of the WFD, as a part of the transposition process), but the articles on the participatory management supporting efficient and effective water governance were abolished by the change of the Water Act (57/12) in 2012.

Specific target regarding the improvement of overall governance processes related to flood management and accidental pollution management are improved participatory processes and greater involvement of elected representatives of key institutions (state, regions, local communities, e.g., mayors) is needed for the long-term post-accident challenges. This should be implemented the short term.

<sup>1</sup> Načrt upravljanja voda na vodnem območju Donave za obdobje 2016–2021

#### **4. Human resources in Slovenia**

Human resources in the field of water management are historically very limited probably due to the limited awareness of the general public on the mostly engineering professions that are necessary to provide the related services.

Work in the field of human resources were assessed as critical, there is no long-term planning for the development of human resources in this area, carrier development, job satisfaction etc.

Mechanisms to monitor employee satisfaction is necessary to improve organizational climate, the Employee satisfaction mechanisms should be implemented in the long-term.

In Slovenia, under the auspices of the Slovenian Chamber of Commerce, companies have been working on projects to research and monitor organizational climate since 2001; the project was called SiOK (Slovenian Organizational Climate).

Specific activities related to the career development, motivation, continuity of services, are currently not existent in the field of water management.

With the overall lack of educated and skilled professionals, related also to the general demography in Slovenia available human resources present a significant bottleneck in the implementation of the services necessary for the implementation of overall strategy.

#### **5. Information and communication technologies in Slovenia**

With necessity to follow this very dynamic area in Slovenia we can say that most measures are at least partly implemented, for example systems for forecasting and warnings and flood management centres and flood situational awareness system, water management information systems. The system should be improved and better implemented in all parts of the country, for example better monitoring and control over the production, use and storage and transport of pollutants.

In Slovenia early identification of accidental pollution and alerting should be implemented short term.

Administration of the Republic of Slovenia for Civil Protection and Disaster Relief has built a system for monitoring the observation network, called the SMOK system, which includes the

Water Monitoring application, which monitors flows and water levels of watercourses and the sea, and in which the intervention values of water levels and flows of watercourses are determined. The system pumps data from Slovenian Environment Agency water condition monitoring systems and displays and supplements it with its own data. The system SMOK is available on the [SMOK](#) website. However, the system SMOK is not in use in practice.

The newest National flood protection and rescue plan in Slovenia is from 2019.

## 6. Information in Slovenia

In Slovenia in the field of information, the necessary measures were in generally assessed as satisfactory. Floods situational awareness systems are implemented and functional as well as mutual notifying about hazards and disasters.

With the aim of contributing to greater resilience and responsiveness in flood risk management, the Administration of the Republic of Slovenia for Civil Protection and Disaster Relief participated in a project [Better prepared than flooded](#) (2019 - 2021). The aim of the project was to renew and establish a public alert system to ensure timely alerting and notification of flood-prone facilities in areas with significant flood impacts and to contribute to proper behaviour and action before, during and after a flood through information and awareness-raising activities for the population, with the aim of implementing personal and mutual protection.

## 7. Infrastructure in Slovenia

Four factors are responsible for the ever-increasing flood damage: inadequate spatial planning, inadequate supervision, inadequate insurance policy, and settlement in areas threatened by natural disasters (despite the Spatial Planning Act and settlement development strategies, building permits are issued in such areas).

The need for continued maintenance of flood infrastructure was emphasised during project events. This includes establishing sites for safe access to the river (rescue) and establishing sites for safe anchorage of equipment and for operation in the watercourse.

In Slovenia, half a billion euros has been earmarked for flood protection measures in 2021, for example for new embankments, retaining walls and other measures. What is needed is to promote adaptation to living with floods, to control construction in flood-prone areas more strictly, and to demand more responsibility from investors (and owners) of risky buildings (e.g., through mandatory insurance). Especially because the last decade has shown very graphically that "floods of the century" can occur every few years. And each time, they cause damage amounting to several hundred million euros.

## 8. Knowledge in Slovenia

Knowledge base in Slovenia was assessed as extremely critical, as there are almost no technical guidance documents in the field of floods and accidental pollution. The need of implementation of national and international (EN) standards, ISO standards and guidelines (ISO 31.000 Risk management, ISO 45.001 Workplace safety, ISO 55.000 Facility management) and establishment of knowledge base for pollutants and contaminants.

In Slovenia we have Regulations on education and training in the field of protection against natural and other disasters<sup>6</sup>, however, the knowledge and training are not constantly improved because they do not meet the standards of ICS framework.

## 9. Logistics in Slovenia

Logistics in Slovenia is overall assessed as satisfactory, with assessment that there is numerous emergency equipment available (pollution and flooding). Missing are costing units supporting administration and finance processes.

The Program for the Creation of National Reserves of Resources for Personal and Group Protection stipulates that the Republic of Slovenia must ensure personal protection from radiological and biological hazards for 10 percent of the population in the reserves of resources for protection and rescue on the basis of plans for the protection and rescue of residents in the event of accidents involving hazardous substances and mass occurrence of animal diseases or acts of terrorism<sup>7</sup>.

## 10. Organization in Slovenia

Domain of organization has the highest number of individual measures. The organizational framework should be improved, recognized especially in the field of improved cooperation among the sectors (water management, civil protection, health, ...). Several measures were assessed as not implemented and have to be implemented short term and long term:

- Clear placement of MACS (Multi Agency Coordination System) at the centre of the complex response
- Protocols that establish response mechanisms with key water uses/removals
- Protocols that allow insurance companies to work together
- Strategic crisis communications, preparation of protocols, TTX
- Better integration of MACS level and better integration of government sectors
- Improved communication with companies as part of response
- EU Whistle-blower Protection Directive (2019/1937)
- Forensic accident investigations
- Maintenance of emergency management plans at different levels and targeted flood management during a flood (e.g., for cultural heritage and for people with special needs)

It is necessary to upgrade operational planning, which must become the basis for action in the event of accidents or operational management and at the same time a cue for improving or introducing preventive measures, and connect it with operational planning for other emergency situations.

According to Resolution on the national program of protection against natural and other disasters in the years 2016 to 2022<sup>8</sup> the starting points for the operationalization of the information centre will be created, which will be activated in the event of natural and other disasters with a large number of injured or affected persons, or when the evacuation

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<sup>6</sup> Regulations on education and training in the field of protection against natural and other disasters ([Official Gazette of the Republic of Slovenia, no. 102/09 and 45/12](#)),

<sup>7</sup> Resolution on the national program of protection against natural and other disasters in the years 2016 to 2022 (ReNPVNDN16-22) - [Official Gazette of the Republic of Slovenia, No. 75/16](#)

<sup>8</sup> Resolution on the national program of protection against natural and other disasters in the years 2016 to 2022 (ReNPVNDN16-22) - [Official Gazette of the Republic of Slovenia, No. 75/16](#)



of a large number of people will be necessary, this was planned in period 2016-2022 but unfortunately in 2023 we are still waiting for this improvements.

## 11. Planning in Slovenia

Planning in Slovenia is addressed by current legislation and practices, but should be significantly improved. For example: exercise planning, execution and improvement (practical, theoretical and combined) also hazard definition and risk assessment.

The development of the system of protection against natural and other disasters in the normative and organizational spheres is aiming to enforce a comprehensive approach to protection against disasters, focusing on preventive measures, reducing the risks of accidents, reducing the number of operational structures while increasing the efficiency and appropriate response of all protection, rescue and relief forces, and strengthening the capacity for mutual provision of rescue assistance within the framework of the European Union and with countries in the region<sup>9</sup>.

## 12. Supervision in Slovenia

Monitoring and assessing the state of Slovenian water quality is in accordance with the Act on environmental protection responsible for the Environment Agency of the Republic of Slovenia. Monitoring programs are prepared in accordance with the regulations that summarize the content of the provisions of the European directives and in accordance with the assessment of the situation and analysis of loads on individual water bodies. They include river quality monitoring, lakes and seas, groundwater and areas of special regimes.

However, supervision in Slovenia is assessed as lacking, because the water act does not stipulate strong, independent supervisory body. Also monitoring wastewater discharges and establishment of an inventory of water uses/withdrawals at risk of accidental pollution is needed. We also found a need for establishment of an integrated inspection service (specialised inspection body).

## 13. Navigation in Slovenia

Navigation in Slovenia is not prioritized due to small amount of water transport and short sea coastal area. The most important point of Slovenian shipping is the Port of Koper, as it is considered the most successful port on the Adriatic, while the Sava river in Slovenia is still too small for more extensive river transport.

The most important actions were recognized in relation to improved procedures, intervention and cooperation in accidental pollution caused by shipping, and the implementation of measures to protect waters due to the impact of shipping. And in relation to oil pollution, the ship owner is responsible for damage caused by a tanker carrying oil or by pollution of the sea by the ship<sup>10</sup>

## 14. Other measures in Slovenia

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<sup>9</sup> Resolution on the national program of protection against natural and other disasters in the years 2016 to 2022 (ReNPVNDN16-22) - [Official Gazette of the Republic of Slovenia, No. 75/16](#)

<sup>10</sup> [Maritime Code - Official Gazette of the Republic of Slovenia, No.21/21 – corr.](#)

Several other measures were recognized as unimplemented in Slovenia:

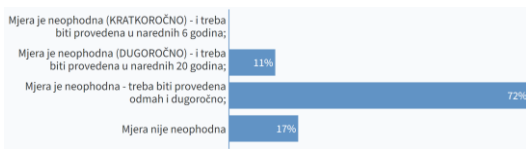
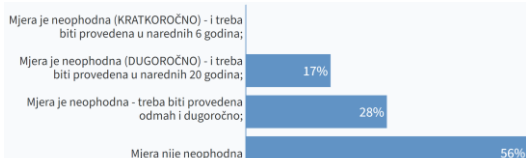
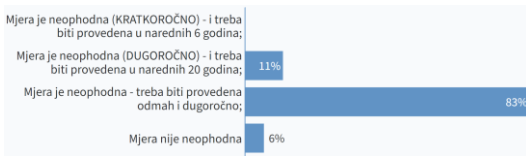

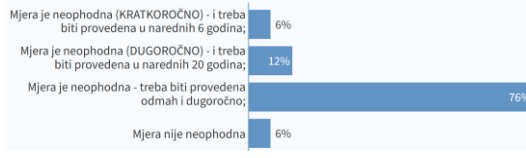
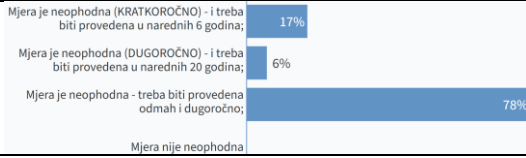
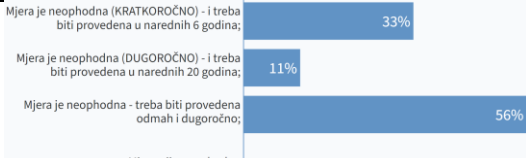
- Adaptation to climate change
- Maintenance - water infrastructure, water facilities, regulated watercourses
- Demining activities along the river corridors

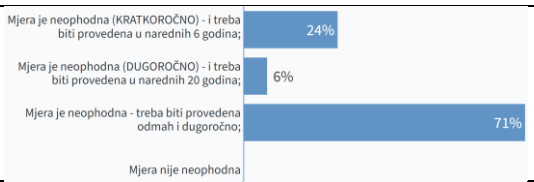

With regard to adaptation to climate change in Slovenia, according to available documents, we adapt the best practices of European countries. The strategic goals in the area of adaptation are to reduce exposure to climate change impacts, reduce Slovenia's sensitivity and vulnerability to these impacts, and increase the resilience and adaptive capacity of society, but the strategic framework for climate change adaptation is unfortunately only from 2016.

The key intervention areas are listed randomly, based upon their development during the WACOM project. Thus, their position in this list does not represent their dominant or subordinate position.

### 3.2 Implementation priority for measures in Croatia

Number of responses in Polls: 18

Key intervention area	Proposed measure	Assessment of priority	Implementation needed in the short/long term	
ID 1	EDUCATIONAL Education on all levels, including the general public, promotion activities and work with the youth, as well as ICS 100 and practical education		Short term and long term	
ID 7				Other education, research oriented
ID 12	FINANCIAL Individual understanding of financial responsibilities in the case of floods and accidental pollution (education)		Implementation is not needed	
ID 14	GOVERNANCE Elective representatives for long-term challenges after the accident and participatory decision-making process		Short term and long term	
ID 17	HUMAN RESOURCES Employee satisfaction mechanisms		Short term and long term	
ID 24	INFORMATION Improved supervision and control over the production, use, storage and transport of pollutants and information on hazards, disasters and manners of border crossing		Short term and long term	
ID 29	INFRASTRUCTURAL Safe river access locations (rescue and pollution control)		Short term and long term	
ID 31				Additional measures from the Sava flood risk management plan (structural measures, non-structural measures)
ID 34				Reception facilities
ID 53	ORGANIZATIONAL Protocols enabling involvement of insurance companies		Short term and long term	

ID 55		Improved integration of the levels of MACS	Short term and long term	
ID 71		Prohibition of burning waste on board	Short term and long term	
ID 77	PLANNING	Planning, execution and improvement of exercises	 <p>Mjera je neophodna (KRATKOROČNO) - i treba biti provedena u narednih 6 godina; 24%</p> <p>Mjera je neophodna (DUGOROČNO) - i treba biti provedena u narednih 20 godina; 6%</p> <p>Mjera je neophodna - treba biti provedena odmah i dugoročno; 71%</p> <p>Mjera nije neophodna</p>	Short term and long term
ID 90	OTHER	Adaptation to climate change	 <p>Mjera je neophodna (KRATKOROČNO) - i treba biti provedena u narednih 6 godina; 6%</p> <p>Mjera je neophodna (DUGOROČNO) - i treba biti provedena u narednih 20 godina; 19%</p> <p>Mjera je neophodna - treba biti provedena odmah i dugoročno; 75%</p> <p>Mjera nije neophodna</p>	Short term and long term

The WACOM partners have during the development process of the situational assessment identified following outstanding measures which are lagging behind the optimal and will be included in the overall WACOM strategy:

## 1. Education in Croatia

Croatia has a long tradition of protection against adverse effects of water, i.e. flood defence.

The measure of education of professional and general public about flood risks as been continuously conducted in Croatia through a series of programmes aimed at awareness raising of the population (education brochures, educational workshops for professionals and educational workshops for the citizenry). For this purpose, the communication strategy with a public information programme and stakeholder education has been developed.

It is necessary to establish and continuously carry out a similar education programme for sudden water pollution as well.

In addition, there is a programme for children in the field of flood defence and sudden water pollution that includes workshops for kindergartens and schools (educational workshops, computer games, posters and models).

It is necessary to carry out this education programme continuously in the future, particularly at the school level.

At the national and international levels, it is necessary to continuously conduct simulation and field exercises in collaboration with the Civil Protection Directorate in order to exchange acquired experiences and lessons learned with colleagues from other countries in the field of flood defence and protection from sudden water pollution.

## 2. Finance in Croatia

The sources of funds for the financing of water management are determined under the Water Management Financing Act.

The sources of funds for the financing of water management are water fees (public contributions), the price of water services, state budget, budgets of local and regional self-government units and other sources (credits, loans, grants, EU funds).

The Water Management Plan at the annual level anticipates, among other things, funds for the implementation of preventive, regular and emergency flood defence, construction of regulation and protection water facilities, preparation of water protection plans and organisation of their implementation, including water protection measures in the event of sudden water pollution.

The flood defence system in Croatia is quite comprehensive and has, therefore, high maintenance costs at the annual level. On the other hand, the impact of climate change in recent times has become ever more noticeable, with recorded increasing damages. For this reason, it is necessary to invest additional large financial resources for the reconstruction of old and construction of new embankments and other water facilities.

Regarding the implementation of measures in the event of sudden water pollution, the "polluter pays" principle is increasingly in operation, i.e. the costs of taking all necessary measures are borne by the polluter. However, if the polluter is unknown, the costs of taking measures are borne by Hrvatske vode.

Naturally, it is not possible to solve the problem of lacking funds by simply increasing the amount of water fees, i.e. by transferring the burden to taxpayers.

It is, therefore, necessary to permanently, continuously and fully use all available EU funds.

## 3. Governance in Croatia

Both in the EU and in Croatia, there is a clearly defined legislative framework for management in such situations: EU Water Framework Directive, EU Directive on the assessment and management of flood risks, Water Act, Water Management Financing Act, Civil Protection System Act, and a number of supporting documents and plans (Water Management Strategy, Flood Risk Management Plan, National Flood Defence Plan, Main Flood Defence Implementation Plan, Detailed Flood Defence Implementation Plans according to defended areas, State Plan of measures for emergency and sudden water pollution, lower-order plans of measures in the event of emergency and sudden water pollution ((Operational Plans)), as well as Civil Protection Action Plans at the national, regional and local levels).

All these documents are regularly updated according to the determined legal deadlines or as needed.

In Croatia, there are also defined bodies and institutions competent for the implementation of flood defence measures (Hrvatske vode, the Ministry in charge of water management, Croatian Meteorological and Hydrological Service, Civil Protection Directorate, regional and local self-government units, the Red Cross, Croatian Mountain Rescue Service, fire-fighting and police units and, if necessary, the Armed Forces,), each with its own authorities and obligations. In

these bodies and institutions, there are also special departments (e.g. Main Flood Defence Center).

During flood occurrences, Civil Protection Headquarters are established according to clearly defined protocols, whereby a number of other participants get involved in flood defence in addition to Hrvatske vode.

As such, the flood defence system is very complex.

The Main Centre for the implementation of the State Plan of measures for emergency and sudden water pollution consists of members from the Ministry in charge of water management (Ministry of Economy and Sustainable Development) and the State Inspectorate, the central state administration body responsible for protection and rescue (Ministry of the Interior, Civil Protection Directorate) and Hrvatske vode as permanent members. Other members (scientific and professional institutions, authorized laboratories) get involved in the work of the Main Centre as needed.

The work of the Main Center is managed by the Head of the Main Center, who makes decisions on the taking of necessary measures, declares the water endangerment level and coordinates the work of the Main Centre's functional units.

The slow accumulation of management experience due to the relatively rare occurrences of catastrophic events, as well as large fluctuations in management and staff, creates a problem in water management. The problem of the transfer of the competent bodies and institutions from one ministry to another has been recorded as a problem as well, leading to a stagnation and slowdown in the management process.

For this reason, it is necessary to continuously and systematically perform capacity building and education of managers and decision-makers about the professional issues, with clearly defined decision-making and management levels and areas.

#### **4. Human resources in Croatia**

Human resources (along with finances) are definitely slowly becoming a big, if not the biggest, problem in the system.

As the main problem, the loss of the most professional staff and knowledge in the competent institutions due to outsourcing has been observed. The interest of employees in activities related to flood defence and water protection is decreasing due to relatively low salaries, poor working conditions and increasing administrative and bureaucratic overload.

As a solution to this problem, it is necessary to develop a system of attracting and retaining staff, i.e. continuously working on the improvement of human resources, both by increasing the number of staff and by conducting targeted and well-designed educational activities that should involve a greater understanding of the staff's actual needs and define a clearer advancement perspective.

At the same time, it is necessary to facilitate easier employment of young persons and beginners (perhaps through a scholarship programme for university and high school students).

In conclusion, more work should be done on the management approach to human resources. Employees should be seen as people to invest in and sources of competitive advantage. By

strengthening this approach, the general goal of human resource management, i.e. achievement of success through employees, can be achieved.

## 5. Information and communication technologies in Croatia

Within the framework of the Main Flood Defence Center, a system for up-to-date monitoring of the hydrological regime on watercourses and other waters in the Republic of Croatia has been established. For this purpose, Hrvatske vode forms its own network of automatic hydrological stations and other hydrological stations relevant for immediate flood defence, whose data is collected in real time and stored in the Water Information System.

The collection and processing of hydrometeorological data and the preparation of forecasts and warnings for flood defence purposes are the responsibility of the Croatian Meteorological and Hydrological Institute.

The Main Flood Defence Centre is connected with the Croatian Meteorological and Hydrological Institute and managers of multi-purpose reservoirs, with whom it exchanges measured data, forecasts and warnings for flood defence purposes in real time, while also storing the received data in the Water Information System.

In addition, the Water Information System collects data from hydrological stations in other countries in the greater basin area, which are connected into a shared system of data exchange in real time. The exchange of hydrometeorological data with other countries in real time is conducted through the mechanisms of international multilateral and bilateral water management commissions and the World Meteorological Organization.

Hydrometeorological data, forecasts and warnings of importance for flood defence are forwarded to flood defence sub-centers at the level of sectors and defended areas, where operational decisions on flood defence management are made. All relevant hydrometeorological data and information are available to all competent persons in the flood defence system via smart phones.

Hrvatske vode and the Croatian Meteorological and Hydrological Institute contain systems and hydrological models for flood forecasting.

It is necessary to carry on the continuous collection and storage of all data important for flood defence, to modernize the existing system of automatic hydrological stations, and to improve and calibrate the old hydrological models and to develop the new, more reliable ones to facilitate more successful forecasting, monitoring and evacuation of flood waves.

At the same time, it is necessary to develop systems for early detection and warning of sudden pollution.

The system should be improved through the monitoring and control of the use, storage and transport of pollutants.

## **6. Supervision in Croatia**

The supervision over the enforcement of the provisions of the Water Act and by-laws regulating flood defence and sudden water pollution is performed by the central state administration body responsible for inspection activities in the field of water management.

The problems observed in the implementation of the supervision are limited human resources and the staff's heavy workload, as well as the changes in the corresponding competences of the water rights inspection bodies (transfer from one ministry into another).

## **7. Information in Croatia**

Croatia has a system of reporting on implemented activities (daily, periodic, full and annual reports).

Unfortunately, the system does not provide a sufficiently detailed insight into all processes. For this reason, it is necessary to develop analytical tools as a support management that enable insight into all processes in the system.

However, the issue of limited human resources and a heavy workload of the staff who would have to additionally implement new analytical tools poses a problem.

It is necessary to carry out a detailed digitalisation of the reporting and to improve the reporting system in terms of faster information flow system as soon as possible.

## **8. Infrastructure in Croatia**

Croatia needs to continuously maintain the flood defence system and, in view of climate change, to carry out the extension of the existing flood defence system and the construction of the new ones, which clearly requires large financial resources.

Along with construction measures to reduce flood risks, increasing emphasis has recently been placed on preventive non-structural measures, which include planning and implementation of flood defence measures, development of measurement systems at meteorological and water measuring stations, management and coordination of the operation of multi-purpose reservoirs and other water facilities, revitalization of water surfaces and old channels, hydrological forecasts development and notification for competent services in real time, improvement of the alerting and communication system, education of the public and the population, improvement of spatial planning with the introduction of flood hazard and flood risk maps and green infrastructure, training of the population for active participation during operational flood defence, implementation of self-protection, etc.

It is necessary to define the locations of safe access to the rivers as soon as possible in order to facilitate access for rescue operations from the water and to take measures to bring the resulting pollution under control and prevent its further spread (suitable locations are the existing ferry crossings, but their number is definitely insufficient).



## 9. Knowledge in Croatia

As already mentioned in point 3, there is a clearly defined legislative framework in Croatia for management both during flood defence and in the event of sudden pollution (including strategic plans and documents), as well as clearly defined institutions and bodies in charge of water management in such situations with clearly established authorities and obligations.

The Flood Risk Management Plan contains the conclusions of the Preliminary Flood Risk Assessment, a presentation of flood hazard maps and flood risk maps, objectives of flood risk management with a programme of measures to achieve these objectives, including preventive measures, protection, preparedness, flood forecasting and notification and warning systems, with the aim of reducing potential adverse effects of floods on human health and safety, valuable goods and property, as well as aquatic and terrestrial environment.

The two mandatory elements of the Preliminary Flood Risk Assessment are:

- description of floods that have occurred in the past and had major adverse effects on human health, environment, cultural heritage and economic activity and for which the probability of similar future events is still relevant, including a description of the areas they affected, the flood water drainage routes and the assessment of adverse effects they had caused;
- description of major floods in the past when it is possible to predict that similar events in the future could have major adverse consequences.

The Register of Flood Events contains data on all potential sources of flooding (flooding by groundwater, direct pluvial flooding, flooding from natural watercourses and lakes, as well as from wastewater systems, and flooding by seawater).

In order to fulfil all requirements and provide the most relevant information about flood events, the Register of Flood Events is permanently and continuously improved, supplemented with new information, observed errors are corrected and reports are generated, as necessary.

It is important to note that floods from public wastewater system are not presently included in the Register. It would be advisable to make them an integral part of the Register in the future, given the noticeably growing threat from urban floods.

The prevention of sudden water pollution is carried out continuously, according to established plans, and based on the assessment of risk from sudden water pollution.

The document "Risk assessment from sudden water pollution for the planning period from 2022 to 2027", which has been completed, focuses on industrial accidents, traffic accidents, disasters concerning warehouses and Seveso plants, waste disposal sites and "black spots".

As part of their Water Information System, Hrvatske vode have a database of polluters discharging wastewater, and the composition of this wastewater is monitored according to the environmental /water rights permit, thus we have information about dangerous substances and pollutants that may enter water in quantities that are not permitted and that may cause sudden water pollution.

It is still necessary to continuously collect and store all data relevant to the prevention of sudden water pollution and the implementation of measures if sudden pollution occurs.

It would be preferable if the methodology for calculating the risk of sudden pollution is upgraded with additional elements of risk associated with both flood occurrences and low-water level hydrological conditions.

## 10. Logistics in Croatia

Regarding logistics (both for floods and for sudden water pollution), it can be said that it is at a satisfactory level in Croatia. Sizeable equipment and machinery are available and strategically distributed throughout Croatia.

Hrvatske vode have the obligation to store and replenish material and equipment for the implementation of regular and emergency flood defence in flood defence warehouses, and to organise their storage. A company certified for flood defence works has an equal obligation to store and replenish equipment and materials in local centres and special warehouses in a defended area where it operates for the duration of its contract.

In the same manner, a company certified for remediation of sudden pollution, which possesses special cleaning equipment, is selected in a public procurement procedure for an individual area.

There is a potential problem that, depending on the company's seat and the location of the incident, it may take several hours before the taking of measures.

In conclusion, it is still necessary to continuously replenish, and with time to also replace outdated equipment with the new one..

## 11. Organization in Croatia

The organizational framework in Croatia is well established through implementing regulations and a 24-hour on-call system of competent institutions, which enables quick communication and response to take measures.

Certified companies that perform flood defence operations are subject to the principles of permanent immobilization and mobilization, i.e. they have the obligation to involve all their equipment and personnel in the implementation of flood defence measures in the defended area where they operate, and also to engage their equipment and personnel in the implementation of flood defence measures in other defended areas in the event of their greater flood danger level.

If the flood danger is such that the defence cannot be ensured only with material resources and employees of Hrvatske vode and certified legal entities, the Civil Protection Directorate initiates the activation procedure for civil protection headquarters, i.e. direct protection and rescue participants (if necessary, the Armed and Police Forces of the Republic of Croatia) for the purpose of their inclusion in the implementation of flood defence measures.

Likewise, in the event of cross-border cooperation, the existing civil protection mechanisms are activated. There is well-established international cooperation at the EU level through international commissions, but also bilaterally through Contracts and Agreements between the Governments of the Republic of Croatia and Hungary, Slovenia and Bosnia and Herzegovina.

The existing organization can be improved through several measures, namely:

- Strengthening of mutual connection among competent institutions
- Protocols allowing insurance companies to work together

## **12. Planning in Croatia**

Planning in Croatia is relatively well covered, with clearly defined strategies and management plans in emergency situations.

The only evident lack is the shortage of capacity to implement these plans (both human and financial).

It is necessary to work systematically on increasing the capacity, i.e. withdrawing financial resources from EU funds and attracting new, young and promising personnel.

The development of emergency protection systems in the area of planning should have a greater emphasis on preventive measures, reducing the risk of accidents, reducing the number of operational structures while increasing efficiency and the appropriate response of all stakeholders involved in the implementation of measures.

## **13. Navigation in Croatia**

The internal waterways of the Republic of Croatia are part of the European Transnational Transport Network, where the importance of the Danube River, which is located on the corridor of the main TEN-T Rhine-Danube network, is particularly emphasized. There are four river ports for international traffic in Croatia: Vukovar, Osijek, Slavonski Brod and Sisak. The port of Vukovar and the port of Slavonski Brod are classified as ports of the basic TEN-T network.

Despite the favorable geographical position of the Republic of Croatia in the European transport network and the coverage of the network of inland waterways, the significant potential of the inland navigation sector in the Republic of Croatia has not been sufficiently utilized. Regarding the navigation of inland waterways, the WACOM project recognizes the importance of improving the procedures, interventions and intersectoral and international cooperation in case of accidental situations, such as pollution caused by navigation.

## **14. Other measures in Croatia**

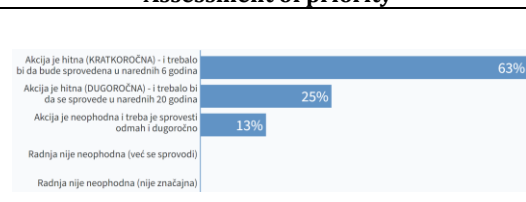
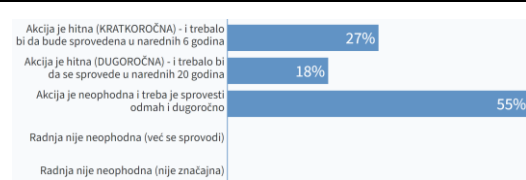
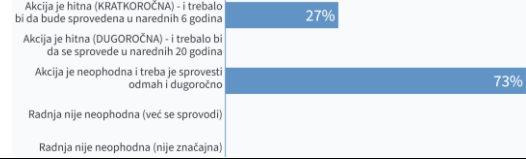
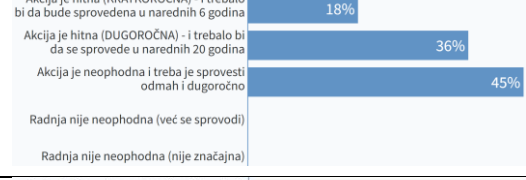
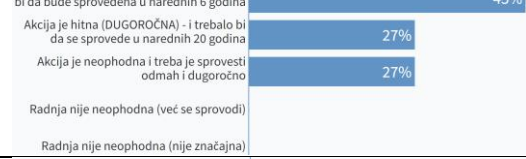
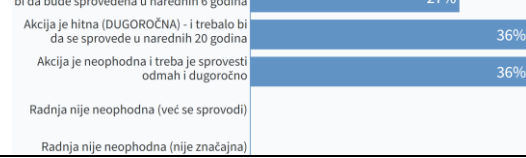

In recent times, climate change has become more frequent and noticeable throughout Europe and the world, including Croatia. Extremely dry and rainy periods frequently alternate, so a growing damage from extreme hydrological conditions has been recorded.

In general, we have been most threatened by flash floods, when a large amount of rain falls locally in a very brief time, creating flash floods within only about 15 minutes. In such conditions, flood defence is significantly more difficult, if not impossible, and all that often remains is to repair the damage after the storm. The only protection against floods of quality is the construction of mountain retentions. In cooperation with the counties and cities, i.e. local self-government units, spatial plans need to be supplemented and amended to allow for retention storage construction wherever possible.














In addition, it is necessary to improve and create new hydrological models for flash flood forecasting in cooperation with Croatian Meteorological and Hydrological Service.

Sustainable development should be taken into account as one of the measures. The main goal is to ensure the sustainable use of natural resources at the national and international levels. This should apply to the development of plans for all aspects of everyday life, i.e. to always carefully take into account the effects on the environment and on the resources.

### 3.3 Implementation priority for measures in Bosnia and Hercegovina

Key intervention area		Proposed measure	Assessment of priority	Implementation needed in the short/long term
Number of responses in Polls: 11				
ID 1	EDUCATIONAL	Education on all levels, including the general public, promotion activities and work with the youth, as well as ICS 100 and practical education		Short term
ID 7		Other education, research oriented	Short term	
ID 9	FINANCIAL	Enforcing the polluter pays principle and individual understanding of financial responsibilities in the case of disasters		Short term and long term
ID 10		Securing public financial resources		Short term and long term
ID 11		Improved insurance practices and stimulations for wider penetration of insurance for floods and accidental pollution		Short term and long term
ID 17	HUMAN RESOURCES	Employee satisfaction		Short term
ID 18	ICT	GIS based situational awareness		Short term and long term
ID 19		Communication equipment	Short term	
ID 20		Nowcasting, forecasting and early identification systems and alerting		Short term

ID 26	INFORMATION	Registry of water uses (abstractions) and discharge/level monitoring	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 27%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina 18%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 55%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Short term and long term
ID 29	INFRASTRUCTURAL	Safe river access locations (rescue and pollution control)	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 56%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina 11%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 33%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Short term
ID 36, 37	KNOWLEDGE	Knowledge base of polluters, pollutants and emergency procedures	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 22%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 78%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Short term and long term
ID 39	LOGISTICS	Availability of emergency equipment (pollution and floods)	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 67%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 33%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Short term
ID 40		Rescue tools and resources availability, identification of emergency response service providers	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 44%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 56%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Short term and long term
ID 42		Costing units supporting administration and finance processes	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 33%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 67%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Short term and long term
ID 45	ORGANIZATIONAL	PIAC centres and AEWs	Short term and long term	
ID 46		Clear positioning of the MACS (Multi Agency Coordination System) being in the core of complex response	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 22%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina 22%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 56%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Short term and long term
ID 53		Protocols enabling involvement of insurance companies	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 27%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina 55%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 18%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Long term
ID 54		Strategic crisis communication	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 18%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina 64%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 18%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Long term
ID 55		Improved integration of the levels of MACS and of governmental sectors	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina 18%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina 18%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno 64%</p> <p>Radnja nije neophodna (već se sprovodi)</p> <p>Radnja nije neophodna (nije značajna)</p>	Short term and long term

ID 59		<b>Improved communication in response framework (companies)</b>	Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  27% Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina  9% Akcija je neophodna i treba je sprovesti odmah i dugoročno  64% Radnja nije neophodna (već se sprovodi) Radnja nije neophodna (nije značajna)	Short term and long term	
ID 62		<b>EU whistle blower directive</b>	Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  18% Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina  82% Akcija je neophodna i treba je sprovesti odmah i dugoročno Radnja nije neophodna (već se sprovodi) Radnja nije neophodna (nije značajna)	Long term	
ID 63		<b>Certification process for asset management (ISO 55000 family)</b>	Short term and long term		
ID 64		<b>Certification process for continuous operation management (ISO 22300 family)</b>	Short term and long term		
ID 65		<b>Disaster forensics after the incident</b>	Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  9% Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina  9% Akcija je neophodna i treba je sprovesti odmah i dugoročno  82% Radnja nije neophodna (već se sprovodi) Radnja nije neophodna (nije značajna)	Short term and long term	
ID 90		<b>OTHER</b>	<b>Adaptation to climate change</b>	Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  82% Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina  18% Akcija je neophodna i treba je sprovesti odmah i dugoročno Radnja nije neophodna (već se sprovodi) Radnja nije neophodna (nije značajna)	Long term
ID 93			<b>River corridor maintenance - Floating debris and waste</b>	Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  27% Akcija je hitna (DUGOROČNA) - i trebalo bi da se sprovede u narednih 20 godina  55% Akcija je neophodna i treba je sprovesti odmah i dugoročno Radnja nije neophodna (već se sprovodi)  18% Radnja nije neophodna (nije značajna)	Long term

Bearing in mind the fact that Bosnia and Herzegovina is a decentralized state that consists of the entities Republika Srpska and the Federation of Bosnia and Herzegovina, and the Brčko District of Bosnia and Herzegovina, there is a need to achieve relations of cooperation and coordination in the implementation of work in the field of water and water management. Such relations exist in a slightly different form with regard to the countries that are in the immediate vicinity and with which hydrological basins are shared, as well as with other international entities in terms of water management.

Bosnia and Herzegovina as a complex state that is made up of two entities (Republika Srpska, Federation of Bosnia and Herzegovina and Brčko District), where the level of Bosnia and Herzegovina has a certain international coordinating role in international cooperation, but operational competences are located in the constituent parts of BiH, and these are the entities of the Brčko District of BiH)

Cooperation with the Federation of Bosnia and Herzegovina, international institutions and the implementation of the process of accession to the European Union stem from the Constitutional competence according to which the Republika Srpska is a unique and indivisible constitutional entity, which independently performs its constitutional, legislative and executive functions. The Republic of Srpska also protects and encourages the rational use of natural resources in order to protect and

improve the quality of life and protect and restore the environment in the general interest, and also regulates and ensures the protection of the environment and water.

The Federation of Bosnia and Herzegovina also protects and encourages the rational use of natural resources in order to protect and improve the quality of life and protect and restore the environment in the general interest, and regulates and ensures the protection of the environment and water. Unlike the Republika Srpska entity, in the Federation of BiH there are certain shared responsibilities and obligations with the cantons in the Federation of BiH (10 cantons in the Federation of BiH), as constituent parts of the Federation. In this regard, the situation is the same with the Brčko District of Bosnia and Herzegovina, when it comes to the rational use of natural resources for the purpose of protection and quality improvement. The WACOM partners have during the development process of the situational assessment identified following outstanding measures which are lagging behind the optimal and will be included in the overall WACOM strategy:

### **1. Education in Bosnia and Herzegovina**

Following the basic principles and goals of the Sendai Framework for Disaster Risk Reduction 2015-2030, whose signatory is Bosnia and Herzegovina expected outcome and goal, investing in the economic, social, health, cultural and educational resilience of persons, communities and countries and the environment, as well as through technology and research to build a culture of safety and resilience at all levels. To promote the incorporation of disaster risk knowledge, including disaster prevention, mitigation, preparedness, response, recovery and rehabilitation, in formal and non-formal education, as well as in civic education at all levels, as well as in professional education and training and increasing public education and awareness of disaster risk.

Education is implemented in accordance with plans that regulate training and exercise issues, with target groups ranging from citizens, local level of government institutions. The education of young people in preschool, primary and secondary education is implemented within the curriculum, but not through the introduction of a special subject. The rest of the public is educated through publications, public announcements and warnings, publishing various contents on the websites of competent institutions, radio and television shows, the press and other forms of spreading awareness.

The civil protection units of the Republic Civil Protection Administration Republike Srpske have been established or are in the final stage in terms of personnel and training and equipment. In the past period, the Republican Administration of Civil Protection has organized or participated in numerous exercises, both TTX and field, in which the topic of the scenario included, among other things, floods and incident pollution. The key points of departure are the following:

- All economic parameters must be considered exclusively from the point of view of covering the actual cost of work on the exploitation, maintenance and development of integrated water management systems that are necessary to realize all goals in the field of water use, arrangement and protection;
- Water management systems must harmoniously follow all other components of economic, social and other development, based on sustainability;

An important component of sustainability is also environmental protection in terms of development, whereby only that development that meets the needs of the present moment, while respecting the demands of future generations to meet their needs, is considered sustainable.

- The problems of water infrastructure development and environmental protection are most closely related, because the environment can be successfully protected only in a society in which through development they successfully meet the needs of people and the economy for water, energy and other resources, because the environment is most threatened precisely in conditions of poverty.
- Under the conditions of the implementation of integrated water management systems, all development requirements and environmental preservation requirements, especially water ecosystems, can be very successfully met.

Civil protection units of the Federal Administration of Civil Protection have been organized or are in the final phase of staffing, training and equipping. In the past period, the Federal Administration of Civil Protection has organized or participated in numerous exercises, both TTX and field, in which the topic of the scenarios were, among other things, floods and incident pollution. When it comes to the Federal Administration of Civil Protection, the situation is significantly more complex, because there is a shared jurisdiction between the level of the Federal Administration of Civil Protection and the level of 10 cantons

In the Federation of Bosnia and Herzegovina, training and education in the field of civil protection are organized and conducted according to the Law on the Protection and Rescue of People and Material Assets from Natural and Other Disasters in the Federation of Bosnia and Herzegovina, but through numerous agreements.

Competent bodies for organizing and conducting training and education in the field of civil protection in the Federation of Bosnia and Herzegovina are, in addition to the federal level, cantonal and municipal bodies of civil protection, in accordance with the competences established by the Law.

Common topics for training and education in civil protection include preparation and response to natural disasters such as floods, pollution, but also the additional consequences of landslides, and the like, and preparation for response to various types of accidents that can affect the lives and property of citizens. Also, trainings may include crisis management, first aid, evacuation and other related topics.

Organizers of training and education in civil protection in the Federation of Bosnia and Herzegovina implement these programs in different locations, including schools, fire stations, health institutions, and various other public and private institutions. Also, various organizations, including the Red Cross, volunteers and other civil society organizations, often participate in organizing and conducting trainings and educations.

The Brčko District of Bosnia and Herzegovina has its own law on protection and rescue from natural and other disasters, which prescribes the organization and implementation of training and education for the protection and rescue of people and material goods in the event of natural and other disasters.

The main bodies responsible for the organization and implementation of civil protection training and education in Brčko District are the Department of Public Safety.

Trainings and educations are conducted for different groups of people, from citizens to professional services such as firefighters, police, medical personnel and others. Common topics for training and education include:

Preparation and response to natural disasters, such as floods, landslides and the like

- First aid
- Evacuation and rescue of people in case of accidents
- Crisis management

Trainings are conducted in different locations, depending on the topic of the training and the target group. Locations include fire stations, schools, healthcare facilities and other public and private institutions. There are also special training centers that are equipped for simulating accidents and crisis situations.

## **2. Finance in Bosnia and Herzegovina**



Securing public financial resources on emergency procedures (floods, accidental pollution) is the responsibility of the line Ministries in two entities within Bosnia and Herzegovina. For example, the existing model of financing in the Republic of Srpska is based on the realization of the so-called instruments special water fees. Republika Srpska is the only one in the region that does not have the so-called instrument general water charges, which expresses the principle of everyone's solidarity in preventing water pollution, i.e. damage caused by water. The Civil protection administration of Republika Srpska uses financial resources allocated to it by the budget, donor funds and funds that are available through the implementation of projects in which we participate. There are also special financial resources provided by the Government of Republika Srpska in emergency situations.

Special water charges are paid by legal and natural persons who<sup>11</sup>:

- capture surface and underground water in order to use it,
- that produce electricity using hydropower,
- legal or natural persons, as well as other entities that pollute water in any way, which is why it is necessary to implement their protection,
- legal and natural persons who extract material from watercourses,
- Entities that lease public water assets.

The basis for paying the fee is the amount of water taken in (1m<sup>3</sup>), the amount of electricity produced in kilowatt hours, the equivalent number of inhabitants (EBS/ES) and others.

Water fee payers pay funds to special public revenue accounts, the budget of the Republika Srpska, to define numerical codes of the type of public revenue for each type of special water fee. All payments, including water charges, that belong to the Republika Srpska on any basis, are paid to the public account of the treasury in accordance with the procedures prescribed by the treasury regulations. Thus, the competent Ministry of Finance, the department of budget and treasury operations is responsible for the payments that, in return, in accordance with the adopted budget for the current year, are made according to budget users.

The projected framework of special water fees for the Republic of Srpska is around twenty million convertible marks annually. However, in the sum of external and internal factors, that amount is around seventeen million convertible marks annually.

The system of distribution of water charges defines that about 60% of the income is directed to the special purpose account for water, and about 40% of the local self-government units and the environment and energy efficiency fund.

With this mechanism, the Republic of Srpska has decided that the local self-government units and the fund have potential funds for applying to foreign, especially European, funds that support environmental and water protection. This mechanism works internally, but outside the Republic of Srpska, it is little applied in practice and implemented in relation to the available EU funds. This refers first of all to the lack of human resources and quality projects that can be applied for by European Union funds (e.g. Pre-accession funds - IPA) that are available to developing countries, such as Bosnia and Herzegovina.

The mechanism that is in the hands of the Government of R. Srpska is basically intended for the approval and control of the intended use of those funds. The existing model should certainly be upgraded through the creation of economic analysis of water, exact projection of trends for the next period and exact projection of the level of cost recovery. It is only the first step in the application of the postulate of the so-called "Framework Directives on Water", which was introduced into the legal system of the Republic of Serbia through the Law on Water. Currently, the biggest drawback of this model is the absence of a general water fee in the system, which until the beginning of this century was the backbone of the financing of the water management system.<sup>12</sup>

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<sup>11</sup> Work programs and financial plans of "Vode Srpske" PU for 2016, 2017, 2018, 2019 and 2020

<sup>12</sup> Water Law (Official Gazette of the Republic of Srpska No. 50/06 and 92/09)

Kada je u pitanju Federacija Bosne i Hercegovine prema Zakonu o vodama postoji instrumenat općih vodnih naknada i posebnih vodnih naknada. čime se izražava načelo solidarnosti svih u sprječavanju zagađenja voda, odnosno šteta od voda.

Federalna uprava civilne zaštite koristi finansijska sredstva koja su joj dodijeljena proračunom, donatorska sredstva i sredstva koja su nam na raspolaganju kroz realizaciju projekata u kojima sudjeluje.

Postoje i posebna finansijska sredstva koja osigurava Vlada Federacije Bosne i Hercegovine u izvanrednim situacijama, a obaveze u pogledu plaćanja naknada su propisane Zakonom o vodama FBiH.

In the Brčko District of Bosnia and Herzegovina, the water fee or utility fee is a fee paid by users of water services for the use of water and water resources located within the borders of the Brčko District. This fee is intended to finance public water supply and drainage services.

The water fee is charged to all users of water services, including households, companies, institutions and other organizations that use water and water resources within Brčko District.

### 3. Governance in Bosnia and Herzegovina

The legal framework in Bosnia and Herzegovina's water sector is harmonized with the constitutional organization of BiH, and consists of: Annex IV of the General Framework Agreement for Peace in BA - Constitution of BA, Constitution of FBA, Constitution of RS, Statute of BD, laws and bylaws passed at the level of BA, entities of FBA and RS, BD, cantons and municipalities. In FBA, the Law on Water ("Official Gazette of FBiH", No. 70/06) was adopted, as well as a series of bylaws required for the implementation of the Law. The FBA Water Law regulates the issue of adopting water management plans for the water area of the Sava River and the water area of the Adriatic Sea, as well as the implementation of measures and activities aimed at reducing or preventing the endangerment of people and material goods from the harmful effects of water and eliminating the consequences of their effects. Key steps and activities from the Directive were taken over by the Regulation on types and content of protection plans against harmful effects of water ("Official Gazette of FBiH", No. 26/09).

The Law on Water ("Official Gazette of the RS", no. 50/06, 92/09 and 121/12) was adopted in the RS, as well as a series of bylaws necessary for the implementation of the law. The flood defence plan in the RS ("Official Gazette of the RS", No. 6/14) was adopted by the Government of the RS and it represents the basic document for the coordination and implementation of activities of importance for flood protection and rescue and is updated annually.

In BD, the Law on Water ("Official Gazette of the RS", No. 10/98) is in force, as well as a number of bylaws required for the implementation of the law. Entity Ministers of Agriculture, Water Management and Forestry adopt the Federal Operational Plan (FOP) for flood defence in the FBiH, i.e. the Main operational plan (GOP) in the RS, while the GOP in BD is adopted by the Government of BD. With the implementation of the EU directive, adjustments will be made to the mentioned Operational Plans.<sup>13</sup>

The legal obligation to draw up water management plans is the result of the transposition of the EU Water Framework Directive (WFD), (Directive 2000/60/EC of the European Parliament and Council

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<sup>13</sup> Directive 2000/60/EC, which establishes the framework for Community action in water policy;

of October 23, 2000 establishing a framework for community action in the field of water policy). The responsibilities of various institutions and levels of government are defined in the laws governing the field of protection and rescue, environmental protection and water management. As part of the development and improvement of the integrated water management system, on September 23, 2007, the European Parliament and the Council of the European Union adopted the Directive on the assessment and management of flood risks 2007/60/EC (hereinafter: the Directive). The purpose is to establish a framework for the assessment and management of flood risks with the aim of reducing the harmful effects of floods on human health, the environment, cultural heritage and economic activity. Measures and activities have been defined that completely abandon the flood "control" approach and switch to the flood risk management approach. The directive also strengthens public participation by strengthening the right of access to information and participation in the planning and decision-making process. Considering the requirements of the Framework Directive on Water, whose main goal is the establishment of "good ecological status of waters", all activities for the implementation of the Directive on the assessment and management of flood risks should be harmonized with the Framework Directive on Water, especially through flood risk management plans and plans of water management. River basins do not know political borders and therefore states must coordinate their flood risk management practices in common basins, including third countries outside the EU. Flood risk management involves three key steps:

1. preparation of a preliminary flood risk assessment within river basins and associated coastal waters, with the aim of identifying "hot spots" with a potentially significant flood risk,
2. preparation of hazard maps and risk maps for these "hot spots",
3. preparation of a flood risk management plan that includes measures reduction of risks and potential consequences based on prevention, protection and preparedness.

#### **4. Human resources in Bosnia and Herzegovina**

One of the primary goals of Bosnia and Herzegovina is focusing on human resources as a key factor in the sustainability of the quality of water services, the sustainability of the operations of public utility companies - PUC, and the sustainability of capital investments in the field of water and environmental protection. The capacities of local self-government units (municipalities and cities) in Southeast Europe, especially in Bosnia and Herzegovina (BiH), face many challenges in their development, which is necessary for the quality implementation of basic competencies and the delivery of water services. The field of water supply and waste water drainage, as one of the priorities for citizens, service users, especially, requires significant progress in building and strengthening human capacities for better service provision. In addition, large investments by international financial institutions (IFIs) or donors that are directed to the field of water services require trained personnel of local self-government units (LGUs) as well as their public utility companies (PKU).

The level of institutional, organizational and personnel competence of LGUs is of key importance in the delivery of water services. Therefore, a successful LGU can be considered a cornerstone for effective delivery of water services.<sup>14</sup>The general conclusion is that there is a real need to improve the institutional and personnel competence of water supply/utility companies and local self-government units in Bosnia and Herzegovina, which would enable the provision of sustainable services in the field of water supply and drainage and wastewater treatment. The necessary knowledge, skills and capacities of senior management staff of LGUs and other employees can be achieved through targeted training programs, which are necessary above all, for the establishment of an efficient and effective organization of water services at the local level, and for the serious

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<sup>14</sup> Developed human resources, guarantee of sustainability of water services, public water companies and capital infrastructure projects, (Sandi Zulić, Emilija Mazar, Aida Moranjkić),

preparation and implementation of capital infrastructure investment projects, i.e. for effective management of these projects.

## **5. Information and communication technologies in Bosnia and Herzegovina**

In Bosnia and Herzegovina, Information and Communication measures in the field of managing natural disasters such as floods and accidental pollution are listed in:

- Framework law on the protection and rescue of people and material goods from natural and other disasters of Bosnia and Herzegovina
- The Law on Protection and Rescue in Emergency Situations of the Republic of Srpska,
- The Law on the Protection and Rescue of People and Material Assets from Natural and Other Disasters of the Federation of Bosnia and Herzegovina,
- The Law on the Protection and Rescue of People and Material Assets from Natural and Other Disasters in the Brčko District of Bosnia and Herzegovina.

Through the Decision on the Adoption of the BiH Interoperability Framework (Official Gazette of BiH, No. 53/18), a compact information system for the provision of unified and user-oriented services under the jurisdiction of the institutions of Bosnia and Herzegovina is ensured and forms an integral part of it.

The purpose of the decision is to:

- a) exchange of electronic documents and electronic services between administrative bodies of the same level (own interoperability),
- b) electronic data exchange between administrative bodies of different levels (joint interoperability),
- c) exchange of electronic documents and data with institutions of the European Union and governments of other countries.

By adopting the Interoperability Framework through legal, process-organizational, semantic and technical interoperability, prerequisites are created for the development and provision of electronic services of administrative bodies for citizens and business entities, local self-government and other groups of users of services of administrative bodies in Bosnia and Herzegovina.

Online sensors for the early identification of accidental pollution on key locations, other sensors and alerting software and hardware is implemented, for example, in the Republic of Srpska as part of the RUCZ and civil protection alert system at the level of local self-governments, it also has early warning systems and RHMZ, as well as the competent institution for water management in the Republic of Srpska, the public institution Voda Srpska.

Online sensors for the early identification of accidental pollution at key locations, other sensors and software and hardware for alerting have been implemented in the Federation of Bosnia and Herzegovina as part of the Federal Administration of Civil Protection and cantonal administrations of civil protection and the system for alerting civil protection at the level of local self-governments, it owns and early warning systems and FHMZ, as well as the competent institution for water management of the Federation of Bosnia and Herzegovina, the public institution Agency for the Sava River Basin.

Online sensors for the early identification of accidental pollution at key locations, other sensors and software and hardware for alerting have been implemented in the Brčko District of BiH as part of the Department of Public Safety of the BD BiH and the system for alerting civil protection at the level of local self-governments, it also has early warning systems and FHMZ and RHMZ.

The development of the "Flood Prediction and Early Warning System for the Sava River Basin - Sava FFWS" was officially launched at a meeting held in Zagreb on June 21, 2016.

The aim of the project is to improve the quality and efficiency of joint management of floods and droughts in the Sava river basin, as well as to strengthen flood and drought forecasting capacities, and to encourage cooperation among the project beneficiary countries: Slovenia, Croatia, Bosnia and Herzegovina, Serbia and Montenegro and the International Commission for Sava River Basin (ISRBC). In order to build a stable and functional system, server platforms were established at project users in the following countries: Slovenia (ARSO - Environmental Protection Agency) - primary server platform; Serbia (Hydrometeorological Institute) – backup server platform; Bosnia and Herzegovina (AVP Sava) – backup server platform; Croatia (DHMZ) – backup server platform. Forecast users access the system through a client application, while the entire system is located on the server platform.

For the purposes of establishing server platforms, as well as client use of the system, IT equipment (servers and laptops) was donated by the US government and delivered to institutions in each of the user countries.

Institutions from Bosnia and Herzegovina, beneficiaries of this project, which received IT equipment are:

- Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
- Federal Ministry of Agriculture, Water Management and Forestry
- Ministry of Agriculture, Forestry and Water Management of the Republic of Srpska
- Department for Public Safety of the Brčko District Government
- Federal Hydrometeorological Institute
- Republic Hydrometeorological Institute of RS
- PI"Vode Srpska"
- Agency for the water area of the Sava River - in which one of the three backup systems - server platforms - is installed.

Development and upgrading of the new casting and forecasting systems (i.e. Sava GIS, Sava HIS and Sava FFWS) and support of linkages with early warning systems was promoted in the public administration of Voda Srpska in the Republic Hydrometeorological Institute, as well as maintenance and upgrade of the discharge/level monitoring network.

## **6. Supervision in Bosnia and Herzegovina**

In Bosnia and Herzegovina, the area of information and supervision is under the jurisdiction of the entities. In the Republika Srpska, timely and efficient response to the occurrence of natural disasters and other accidents through the 112 system in accordance with EU standards and the establishment of a radio communication system in the protection and rescue system. So far, certain activities have been carried out, and the plan is to: Established System 121 - provided donor funds for the realization of the project of system 112. Completed project of system 112 for the Republic of Srpska.

The percentage of establishment of the civil protection radio communication system - the radio communication system in the Republic of Srpska (VHF and KT) - done project of the civil protection, communication system, radio communication and KT network, project documentation completed, repeaters placed throughout the territory of the Republic of Srpska, system separated by regional departments civil protection;

- A functional model number 112 was built and submitted to the Government of the Republic of Srpska for consideration;
- Technical support for the reorganization of the existing system 121 and the implementation of the system 112;

- Development of standard operating procedures for the work of the Center and the exchange of data between the Center 121 and subjects of importance for protection and rescue;
- Procurement of equipment and software;
- Participation in the development of the Training Plan and program and implementation of training for personnel included in the 121 system;
- Implementation of part of the VHF radio connection project on the territory of the Republic of Srpska, divided into two phases: setting up repeaters by region and raising links;
- A completed project of the civil protection, communication system, radio communication and KT network, completed project documentation.
- Repeaters were installed throughout the territory of Republika Srpska, a system separated by regional departments of civil protection, 65% of LGUs connected to KT and VHF network 20% of institutions of the Republika Srpska and other subjects of importance for the protection and rescue connected to KT and VHF network;
- Control of the establishment of KT network with local self-government units and user training.

In the Federation of Bosnia and Herzegovina, timely and effective response to the occurrence of natural disasters and other accidents through the 121 & 123 system, as a primary solution for the establishment of the 112 system in accordance with EU standards and the establishment of a radio communication system in the protection and rescue system, as well as through river monitoring.

In the Brčko District of Bosnia and Herzegovina, timely and effective response to the occurrence of natural disasters and other accidents through the 121 system, as a primary solution for the establishment of the 112 system in accordance with EU standards and the establishment of a radio communication system in the protection and rescue system, as well as through river monitoring. Linking OOiU centres to the call recording system.

## **7. Information in Bosnia and Herzegovina**

Systems for information and cooperation at the inter-entity levels in Bosnia and Herzegovina function through the exchange of information through mail correspondence, phone calls and through applications and software that have been implemented for that purpose, and are subject to information laws in both entities.

There was a starting point for the development and establishment of a unique, complete spatial (GIS) information system of the water sector at the level of Bosnia and Herzegovina (hereinafter referred to as the GIS Project), which was viewed through the current state and future development needs of the water sector in Bosnia and Herzegovina. The implementation of the GIS Project in BiH was supported by the European Union through the "EU CARDS Program for River Basin Management in Bosnia and Herzegovina", as well as by the World Bank through its Project BA-PMT-QCBS/01/CS/08-WIS - component A. Development Obligations ISVs are also prescribed by the new entity laws on water in Bosnia and Herzegovina, and they derive from a number of EU directives and regulations, especially the "European Framework Directive on Water".

The key area of information in Bosnia and Herzegovina in the field of water management and natural and other disasters falls under the jurisdiction of the entity, so for example there is a registry of water uses (abstractions) and discharge/level monitoring in the AVP covering areas in the Federation of Bosnia and Herzegovina, and in the Republic of Srpska the registers are kept in the public institution "Vode Srpska".

The river basin management plan includes a summary of public information and consultation measures taken, their results and the changes in the plan that followed as a result. Water condition monitoring is based on the Water Condition-Status Monitoring Program adopted by the relevant Ministry.

Improved data/information integration with the public service providers/companies. Promotion of an integrated system of protection and rescue in the Republic of Srpska during 2022. Affirmation of the Republic Platform for Disaster Risk Reduction.

Information on the movement/transport of pollutants in the territory of specific country jurisdiction is carried out according to the instructions and the law within The Environmental Approximation Strategy of the Republic of Srpska, the Law on the Transportation of Hazardous Materials of the FBiH, the Law on the Transportation of Hazardous Materials of the Republic of Srpska. The Water Information System of Republica Srpska is an integral part of the information system of the Republika Srpska, and is established and organized in accordance with the Water Law and special laws that define the basis and structure of the establishment of such a system.

Some of the main objectives of the Information System are:

- the use of modern communication and decision-making methods,
- rationalization, integration and optimization of decision-making in the water sector, through the process of using information and communication technology,
- exchange and synthesis of information internally
- within the water sector and externally - with external and international institutions.

In Federation of BiH, the modern Water Information Center was put into operation in the "Agency for the Sava River Water Area" Sarajevo.

The center was launched by the Federal Minister of Agriculture, Water Management and Forestry, which ended several months of work on establishing a technically and technologically modern center whose goal is to collect, process and visually present data, both from the field of Water Management (ISV system) and from system of hydrological monitoring of surface and underground waters with over 100 modern automatic stations installed on almost all watercourses in the Sava river basin in the Federation of BiH, which are under the jurisdiction of this Agency.

The center serves not only the processing of data from hydrological monitoring and the establishment of an early warning system for floods in real time, but also the collection, systematization and processing of other relevant water management information and data, essential for integral and sustainable water management in the Sava river basin in the Federation. Bosnia and Herzegovina.

In the case of the Brcko District: The competent organization of the river basin has the duty to create and maintain an information system for water quality in its territory.

The information system for the water quality of the river basin is based on:

1. constant monitoring of water quality and quantity,
2. information collected through procedures for issuing permits, consents and concessions,
3. data from monitoring carried out by water users themselves,
4. land registers and cadastres,
5. public monitoring.

The monitoring system managed by the competent organization of the river basin contains at least the following elements:

- for surface water,
  1. the amount and space of the flow, which affects the ecological and chemical state and ecological potential of the water;
  2. ecological and chemical state and ecological potential of water;

- for underground water: chemical and quantitative state;
- for protected areas,

The database on water protection is managed through a computerized Geographical Information System (GIS) and the Internet.

## **8. Infrastructure in Bosnia and Herzegovina**

The measures implemented in the field of infrastructure in Bosnia and Herzegovina and concerning extraordinary events due to natural disasters such as floods or hazards such as accidental pollution are under the jurisdiction of the two entities and Brčko District of BiH.

In addition to such ordered competences at the level of Bosnia and Herzegovina, there is an Assessment of Threats to Natural and Other Disasters, adopted on the basis of the Framework Law on the Protection of People and Material Assets from Natural and Other Disasters.

In the Republika Srpska, these measures are regulated both in the short and long terms within the Law on Waters, the Regulation on the Protection and Use of Water, the Regulation on the Protection and Harmful Effects of Water and through other legal regulations of this entity.

Measures such as like:

- Development of safe access locations along the key rivers, enabling access to the water rescue operations,
- Development of safe access locations along the key rivers, enabling access to the accidental pollution mitigation measures, including anchorage of booms and staging area for the emergencies,
- Maintenance of waterways,
- Establishment of a sufficiently dense network of reception facilities on the waterway for waste collection, were introduced laws and are in the constant plan of refinement and development.

Also in adopting documents such as: Strategy and action plan for protection of biological diversity in BiH (2015-2020), Assessment of BiH's vulnerability to natural or other disasters, Risk assessment of the RS, these measures, regulate on a large scale.

In the Federation of BiH, these measures are regulated in the short and long term by the Law on Waters of the Federation of BiH and other legal regulations of this entity. The measures are foreseen through the Law on Waters of the Federation of Bosnia and Herzegovina, which foresees the Program of Measures which contains the basic measures necessary to achieve the goals related to water protection, water regulation and protection against harmful effects of water and water use.

The measures provided for in this Law can be general or supplementary measures

In the Brčko District of BiH, these measures are regulated in the short and long term by the Law on Water Protection of the Brčko District of BiH, and other legal regulations of this entity. The measures are provided as general and special measures, by the Water Protection Law.

## **9. Knowledge in Bosnia and Herzegovina**

According to research conducted within both entities within Bosnia and Herzegovina and Brčko District of BiH, the database of polluters/potential polluters on waters does not exist, at least not as a registered catalogue of entities. In addition to accepted international conventions and protocols that oblige Bosnia and Herzegovina to take care of the protection of water systems, there is relatively



high-quality national legislation. In addition to the initiative of AVP Sava for protected areas, there is a registry with landfills for solid waste in Bijeljina, Banja Luka, Bihać, Sarajevo, Zenica, Tuzla.

Natura 2000 is an ecological network consisting of areas important for the conservation of endangered species and habitats of the European Union. It is based on two directives that support the nature protection policy of the European Union. These are the Habitats Directive and the Birds Directive. These directives protect 1,200 animal and plant species and 230 habitat types in over 20% of the territory of the European Union.

The Natura 2000 network consists of special protected areas - SAC (areas designated by the Habitats Directive) and special bird protection areas - SPA (areas separated under the Birds Directive) and currently includes around 30,000 areas. The goal of Natura 2000 is to ensure the long-term survival and favourable conditions of the most valuable and endangered habitats and species. These goals, among other things, are achieved by harmonizing the interests and well-being of the population living and performing activities in certain Natura 2000 areas. Network areas are determined according to scientific criteria that are the same for all countries.

EMAS (Eco-Management and Audit Scheme - EMAS) is a voluntary program for environmental management, which enables organizations to register their environmental management system in accordance with the relevant Regulation of the European Parliament and the Council. EMAS contains all the requirements of the ISO 14001 standard, as well as additional requirements. To date, not a single company in Bosnia and Herzegovina is EMAS registered, but there are several companies that prepared for EMAS registration. Full implementation will be possible when Bosnia and Herzegovina becomes a full member of the EU.

The Vulnerability Assessment of Republika Srpska contains data on pollutants, including Directive 2012/18/EC on control of the risk of major accidents involving dangerous substances (Seveso III Directive).

## **10. Logistics in Bosnia and Herzegovina**

Logistical measures in Bosnia and Herzegovina, in case of accidental pollution or flooding, are included in the Framework Law on the Protection and Rescue of People and Material Assets from Natural and Other Disasters of Bosnia and Herzegovina (Official Gazette of Bosnia and Herzegovina 50/08), the Law on Protection and Rescue in emergency situations of the Republic of Srpska and the Protection and Rescue of People and Material Property from Natural and Other Disasters Law of the Federation of Bosnia and Herzegovina, as well as the law Protection and Rescue of People and Material Property from Natural and Other Disasters Law of the Brčko District of BiH . In addition to the legal regulation that corresponds to this measure, procedures such as:

- Availability of the equipment necessary for the response in the case of accidental pollution emergencies,
- Availability of the equipment necessary for the response in the case of floods,
- Necessary tools and resources for the rescue and relief operations (trucks, booms, skimmers, pumps, reservoirs),
- Identification of service providers (contracting framework with the service providers) - specialized companies for the emergency response in the case of accidental pollution and floods,
- Costing process - cost monitoring, escalation...
- Identification and contracts with the service providers for the final treatment of polluted materials (earth, skimmers, floating debris...), are included in the Assessment of the vulnerability of BiH to natural or other disasters, the Assessment of the vulnerability of the Republic of Srpska, the Rulebook on actions and measures in cases of accidents on waters and

coastal water land (Official Gazette of the FBiH", No. 71 November 11, 2009) and other relevant plans on level of both entities of BiH.

Each of the aforementioned activities within the logistics measure in BiH requires constant action in terms of application, maintenance, investment, monitoring of costs, securing equipment and people. In the short term, it is necessary to carry out checks of equipment, vehicles, tools and techniques, while in the long term, it is necessary to carry out supplementation, upgrading, overhaul, investment by state institutions and active control.

## **11. Organization in Bosnia and Herzegovina**

Bosnia and Herzegovina does not have a centralized system of civil protection, but jurisdiction is divided so that the level of Bosnia and Herzegovina has a coordinating role, while the entities Republika Srpska, Federation of Bosnia and Herzegovina and Brčko District are the bearers of the system and operational activities in the field of protection and rescue. In the Republika Srpska, the highest level of government responsible for organizing the civil protection system is the Government of the Republika Srpska. In the Federation of Bosnia and Herzegovina, the highest level of government responsible for organizing the civil protection system is the Government of the Federation of Bosnia and Herzegovina and the cantonal governments at the cantonal level. In the Brčko District of BiH, the highest level of government responsible for organizing the civil protection system is the Government of the Brčko District of BiH. Civil protection system of entities and districts. are independent in management affairs. Civil protection management is organized at the strategic, operational and tactical levels.

Since 2022, Bosnia and Herzegovina has been a member of the Union Mechanism for Civil Protection, which means that the civil protection units of the Republika Srpska, the Federation of Bosnia and Herzegovina and Brčko District participate equally in the actions of the EU Civil Protection Mechanism. UN protocols - Barcelona Convention, UNECE. The second EPR also includes nine issues of importance for Bosnia and Herzegovina, related to policy making, planning and implementation, financing of environmental policies and projects and integration of environmental issues into economic sectors, especially sustainable management and protection of water resources, waste management, climate changes and forestry, biological diversity and protected areas.<sup>15</sup>

Ensuring functioning of PIAC centres in all countries/entities 24/7, functioning of AEWS information platform. The four countries that share the Sava River Basin, Contracting Parties to the Framework Agreement on the Sava River Basin (FASRB) and members of the International Commission for the Sava River Basin (Sava Commission) are: Bosnia and Herzegovina; Republic of Croatia; Republic of Slovenia and Republic of Serbia. In accordance with the provisions of the FASRB regarding the obligation to establish a coordinated or joint warning and alarm system in the Sava river basin for extraordinary impacts on the water regime in case of incident pollution, the FASRB Party states use the Warning System in case of incident pollution (AEWS, Accident Emergency Warning System) for the Danube, developed and maintained by ICPDR. Principal International Alert Centers (PIACs) have been established in each country as a central point of communication. They are responsible for communication, involving experts and making decisions about actions to be taken in case of emergency situations. Their operability is tested at least twice a year. The main goal of such exercises is to test the functionality of the system, the operability of the PIAC, as well as to test the basic use of the system. Future activities in the area of incident prevention and control will be focused on signing and ratifying the Protocol, developing on-site and off-site response plans, and improving PIAC capacity to ensure 24/7 operation.

Clear introduction of MACS (Headquarters) and single institution HQ concept. The framework law on the protection and rescue of people and material assets from natural and other disasters in Bosnia

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<sup>15</sup> Source: [http://aarhus.ba/sarajevo/images/docs/EPR\\_2\\_001\\_01-bh.pdf](http://aarhus.ba/sarajevo/images/docs/EPR_2_001_01-bh.pdf)

and Herzegovina, which was passed in the House of Peoples of the BiH Parliament in 2008, provides for the establishment of the Operational Communication Center of Bosnia and Herzegovina (OKCBiH) and the introduction of a system of unified the European emergency number - 112. The aforementioned law established the Coordination Body of Bosnia and Herzegovina for Protection and Rescue as an expert-operational body of the Council of Ministers of Bosnia and Herzegovina.

Until now, the Coordinating Body did not conduct significant activity.

At the entity level, the headquarters are clearly defined and all the procedures for how they function have been adopted. Basic headquarters were formed at the level of local units.

In Bosna and Herzegovina, cooperation at the institutional level in response to emergency situations has improved, following the spirit of European integration. The operational centres have a regular function and regularly communicate with each other. It is necessary to regularly invest in equipment, technical support and updating.

The framework for disaster risk reduction Sendai 2015-2030 is applied in Bosnia and Herzegovina in accordance with the set goals and available resources (human and material). The development and maintenance of international bilateral and multilateral agreements (based on water management, based on civil protection) and mutual assistance are in constant progress in Bosnia and Herzegovina. Some of these agreements are:

Agreement between the Government of the Republic of Croatia and the Government of Bosnia and Herzegovina on the regulation of water management relations ("Official Gazette of BiH" number: 6/96

Agreement on special parallel connections between the Republic of Srpska and the Republic of Serbia. The agreement was signed on September 26, 2006 in Banja Luka. Within this document, it is foreseen that, by respecting the Dayton Agreement, but also respecting the sovereignty, territorial integrity and independence of Bosnia and Herzegovina, intensive cooperation between the Republic of Serbia and the Republic of Srpska in the fields of economy, planning, legislation, privatization and denationalization, science and technology, education and sports, as well as in the field of health and social policy, tourism, environmental protection, information and protection of human rights.<sup>16</sup>

Development and maintenance of river basin management plans/flood management plans - state/entity level; transnational RBMPs are regularly prepared at the entity level in Bosnia and Herzegovina in accordance with the applicable laws of the entity. The proposal "Plan for the implementation of the directive for the assessment and management of flood risks in BiH" was prepared (Directive 2007/60/EC of the European Parliament and the Council), at the state level.<sup>17</sup> There is no reliable data on whether the plan proposal has been adopted, for now.

On January 11, 2012, the Water and Health Protocol along with the UN Convention on the Protection and Use of Transboundary Watercourses and International Lakes entered into force in Bosnia and Herzegovina. Each country signatory to the Protocol is obliged to establish and publish goals regarding: access to drinking water for everyone, and ensure sanitary measures, within the framework of integral water management systems, aimed at the sustainable use of water resources that do not endanger human health, in accordance with Article 6, paragraph (2) of the Protocol.

The goal of preparing the Basic Analysis of the situation in BiH for the implementation of the Water and Health Protocol under the UN Convention on the Protection and Use of Transboundary

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<sup>16</sup> Source: [https://www.b92.net/info/dokumenti/index.php?nav\\_id=567737](https://www.b92.net/info/dokumenti/index.php?nav_id=567737)

<sup>17</sup> Source:

<https://www.ekonsultacije.gov.ba/legislationactivities/downloaddocument?documentId=1013493>

Watercourses and International Lakes is to review the state and availability of data in the areas that are subject to the Protocol and that refer to a certain, defined period.<sup>18</sup>

In accordance with the provisions of the Water Law of the Federation of Bosnia and Herzegovina and the Regulation on the types and content of protection plans against the harmful effects of water, the Agency for the Sava River Water Area has prepared a Draft Flood Risk Management Plan for the Sava River Water Area in the Federation of BiH (2024-2029 ) for conducting public consultations.

The Republika Srpska has defined the integral water management of the Republika Srpska with the Law on Waters and transposed EU Directive 2000/60/EC1 into its legal system.

The Law on Water defines integral water management in the Republic of Srpska at the level of the Regional River Basin (district), and also defines the territorial basis of water management and establishes the basic unit for water management, which is the Regional River Basin (district). Republika Srpska has two regional river basins, namely the Regional river basin (district) of the Sava River and the Regional River Basin (district) of the Trebišnjica river. <sup>19</sup>

Within the framework of integral water management in the RS, flood defense plans are regularly updated at the level of civil protection in cooperation with other relevant ministries. During the national workshop, some measures that are important in the field of accidental pollution and flooding were highlighted. They were determined through surveys, described in the formulation that the implications of the same are needed in the short term. For some, we have determined that it is necessary to constantly upgrade and maintain them in the long term.

For example:

- Development of the protocols enabling improved involvement of insurance companies at all levels, engaging the knowledge and procedures of the insurance companies,
- Strategic development of the crisis communication (learning, programs in plans, analysis...), preparation of the crisis communication protocols, TTX for the crisis communication,
- Improved integration of different sectors of the government - civil protection - water management – navigation,
- Improved control over the legislation implementation and enforcement (inspectorate),
- Development and upgrading of the water management information systems,
- Improved documentation (national and transnational) process of the incidents, enabling long term storage of quality information on past incidents,
- Improved communication with the (contractual) companies being involved in the response framework,
- Improved communication with the navigation community,
- Improved communication and role of the police enabling their support to the incident (property protection, traffic...) and prosecution of the criminal activities and wrong doings (carefully),
- Implementation of the EU whistle blower directive in the domain of civil protection, water management,
- Certification process for risk management (ISO 33000 family...), Certification process for asset management (ISO 55000 family), Certification process for continuous operation management (ISO 22300 family), especially ISO 22301,
- Use of the available information resources set at disposal at EU Civil Protection Mechanisms,
- Disaster forensics, aiming at development of learning experiences after the accident (and liabilities, responsibilities). Regular reports on significant flood events, preparation of a study/guide for data and information collection during flood events,
- Focused flood management for the people with disabilities,
- Focused flood management in relation to cultural heritage,

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<sup>18</sup> Source: <https://ekonsultacije.gov.ba/legislationactivities/downloaddocument?documentId=12558>

<sup>19</sup> Source: <http://www.voders.org/upravljanje-vodama/planski-dokumenti/?lang=lat>

- In the event of discharge or the threat of discharge, the boatmaster must notify the nearest competent authority without delay, indicating the position, quantity and the substances spilled. Any vessel that has caused pollution or has detected pollution must immediately report to the competent response authority and notify the vessels in the vicinity of the spill area.
- The boatmaster shall keep and regularly update the Used Oil Log and shall present it to the competent authorities upon request,
- Sealing of the closing valve on the pipeline for direct discharge of the bilge water in the closed position. Bilge water must be delivered to the reception facilities.
- It shall be prohibited to burn household refuse, sludge, slops and special waste on board.
- The boatmaster of a vessel transporting hazardous substances shall notify the competent authorities of the Party involved. The Party in question may organize an escort for the vessel on the territory under its jurisdiction.
- Development and implementation of best available techniques and other measures for control of spills (accidental pollution) in order to identify the technical facilities required for the response.
- After a spill, the competent authority shall immediately forbid further navigation or allow limited navigation for vessels presenting danger to the environment in order to minimize adverse effects.
- Promotion and organization of national and regional multi-stakeholder round tables (and other forms of mutual activities) for planning the civil protection actions in emergencies with the aim of clarifying procedures, responsibilities and means at disposal of all relevant bodies (public and private).
- Exchange of information between parties (measures, contingency plans, experience with accidents, development of BAT, emergency preparedness, ...). Creation of an online application for information exchange between stakeholders involved in emergency flood defence as well as for informing the public.
- Facilitation of exchange of technology between the parties for the prevention of, preparedness for and response to accidents. Cooperation between parties for research and development, including research into less hazardous processes aimed at limiting accidents and consequences.
- Water management in the Federation of Bosnia and Herzegovina (FBiH) refers to the process of planning, development, use, maintenance and protection of water resources in this country. Water management in FBiH aims to ensure sustainable use and protection of water resources for current and future generations.
- Water management in the FBiH is regulated by various laws and regulations, including the Water Law of the Federation of BiH, and other relevant regulations. These regulations establish a framework for water management, and determine the competencies and responsibilities of the various institutions and organizations involved in this process.

Water management in FBiH encompasses various areas, including:

Planning and development of water resources, including the creation of strategies and plans for the use and protection of water, and the development of infrastructure for water supply, irrigation, energy production and other uses.

Maintenance of water facilities and systems, including dams, reservoirs, canals, rivers and other facilities essential to water management.

Protection of water from pollution, including monitoring of water quality, monitoring of industrial and municipal wastewater, and monitoring of the use of pesticides and other pollutants.

Flood and drought management, including preparation of response plans for water-related natural disasters.

Water management in FBiH is important for economic development, social progress and environmental protection. Water management requires cooperation and coordination of various institutions and organizations, as well as the participation of citizens and civil society in the decision-making process.

Water management in the Brčko District of Bosnia and Herzegovina (BiH) refers to the process of planning, using, maintaining and protecting water resources in this district. The Brčko District of BiH is an administrative unit located in the north of the country, and includes part of the Sava river basin.

Water management in Brčko District is regulated by various laws and regulations, including the Water Law of Brčko District BiH, ENVIRONMENTAL PROTECTION STRATEGY OF BRČKO DISTRICT BIH FOR THE PERIOD 2016 - 2026 and other relevant regulations. These regulations establish a framework for water management, and determine the competencies and responsibilities of the various institutions and organizations involved in this process.

Water management in the Brčko District of BiH encompasses various areas, including:

Planning and development of water resources, including the creation of strategies and plans for the use and protection of water, and the development of infrastructure for water supply, irrigation, energy production and other purposes.

Maintenance of water facilities and systems, including dams, reservoirs, canals, rivers and other facilities essential to water management.

Protection of water from pollution, including monitoring of water quality, monitoring of industrial and municipal wastewater, and monitoring of the use of pesticides and other pollutants.

Flood and drought management, including the preparation of response plans for water-related natural disasters.

Water management for recreational and tourism purposes, including infrastructure development for activities such as fishing, boating and other water activities.

## **12. Planning in Bosnia and Herzegovina**

The area of planning in Bosnia and Herzegovina for the prevention of the risk of accidental pollution and flooding is determined within the framework of laws at the entity levels. In the Republika Srpska, planning and development of capital projects, equipment and procurement of equipment for the needs of civil protection are defined by civil protection development plans. The way of planning and its reality are part of the conceptual model of civil protection in the Republic of Srpska, Federation of Bosnia and Herzegovina and Brčko District BiH.

The department for organizing, planning and training perform tasks related to the development and improvement of the CZ system; organizing, preparing and using CZ forces; participates in the drafting of legal regulations from the scope of administration and bylaws and planning documents from civil protection area; preparation of instructions in the field of CZ; organization, planning and execution of training and exercises of civil protection structures; informing the population about natural and other disasters; participates in protection and rescue activities from natural and other disasters; cooperates with local communities and subjects of importance for protection and rescue from natural and other disasters; writing reports and information to the Government; achieving cooperation with competent institutions from the area of CZ BiH and other countries; provision of complete

information by means of public information; performs other tasks within the scope of his work.<sup>20</sup>The measures and activities of the Civil protection in the protection and rescue system are determined by the protection and rescue plans adopted by companies and other legal entities, the municipality, that is, the city and the Government. Business companies and other legal entities are obliged to coordinate the Protection and Rescue Plan with the Protection and Rescue Plan of the municipality, that is, the city. The protection and rescue plan of the municipality, that is, the city, is coordinated with the Plan of protection and rescue from natural disasters and other disasters in the Republic of Srpska, Federation of Bosnia and Herzegovina and Brčko District BiH. Protection and rescue plans can be unique, collective or individual for certain types of natural disasters and other accidents.

The planning documents of the civil protection system of the Republika Srpska are:

- Strategic plans - RS level;
- Tactical plans - regional level;
- Tactical plans - level of cities and municipalities;
- Operational plans - level of cities and municipalities;
- Executive plans - level of cities and municipalities;
- Executive plans-units of SCZ RS;
- Executive plans - local community level (local communities, communities of apartment owners); Planning and development of capital projects, equipping and procurement of equipment for the needs of civil protection is defined by civil protection development plans. The way of planning and its reality are part of the conceptual model of civil protection in the Republic of Srpska.

The planning documents of the civil protection system of the Federation of Bosnia and Herzegovina are:

- Strategic plans - level of the Federation of Bosnia and Herzegovina;
- Tactical plans - Canton level in the Federation of Bosnia and Herzegovina (10 cantons);
- Tactical plans - city and municipality level;
- Operational plans - city and municipality level;
- Implementation plans-units of the Civil Protection Service in the Federation of Bosnia and Herzegovina;
- Implementation plans - local community level (local communities, communities of apartment owners);

The planning documents of the civil protection system of the Brčko District of Bosnia and Herzegovina are:

- Strategic plans - Brčko District BiH level;
- Tactical plans - level of cities and municipalities of Brčko District;
- Operational plans - city and municipality level;
- Implementation plans-units of the Civil Protection Service in the Brčko District of BiH;
- Implementation plans - local community level (local communities, communities of apartment owners);

### **13. Navigation in Bosnia and Hercegovina**

Navigation and monitoring in Bosnia and Herzegovina on the river roads are under the authority of the entity from parts of rivers and the coastal zone of the river bed, depending on the territory through which they flow. Bosnia and Herzegovina is a signatory to several international conventions and agreements in the water field. The Ministry of Communications and Transport of Bosnia and

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<sup>20</sup> Zorić Ž., „Konceptualni model civilne zaštite u Republici Srpskoj“ – doktorska disertacija, page 69

Herzegovina had prepared the text of the Law on Inland and Maritime Navigation of Bosnia and Herzegovina, but it remained in the drafting phase. In the Federation, the Law on Inland and Maritime Navigation ("Official Gazette of the Federation of BiH", number: 73/05) and a series of bylaws ("Official Gazette of the Federation of BiH", no. 13/07 and 48/07) are in force; In the Republika Srpska, the Law on Inland Navigation ("Official Gazette of the RS" No. 58/01, 33/06 and 01/08) is in force, as well as a series of bylaws;

The Law on Inland Navigation of the Brčko District ("Official Gazette of the Brčko District of BiH", no. 28/08 and 19/10) regulates navigation on the waters of the Brčko District.

Regular controls and monitoring tasks are performed by the services in whose entity jurisdiction they relate. In the Republic of Srpska, these services are within the framework of the public institution "Voda Srpska", the republic's inspectorates and the relevant ministry.

The institutional framework of water transport consists of

- 1) Ministry of Communications and Transport of Bosnia and Herzegovina with the Department for Transport and the Department of Water and Air Transport;
- 2) Federal Ministry of Transport and Communications, and within the same the Sector for Railway Water and Combined Transport with the Captaincy of Ostrožac Inland Navigation and the Captaincy of Maritime Navigation-Traffic Neum. Within the 10 cantons of the Federation, there are cantonal ministries that are in charge of traffic and communication issues, since the traffic infrastructure in the Federation of Bosnia and Herzegovina is under shared jurisdiction according to the constitution of the Federation and the cantons;
- 3) The Ministry of Transport and Communications of the RS, and within it the Sector for Railway, Water and Air Transport with the Brčko Inland Navigation Captaincy. 4) The Government of Brčko District formed the Captaincy of Brčko District.

One of the many activities planned as part of the Risk Assessment Strategy is the introduction of a permanent service on the watch wave (16 VKT channel) as well as the establishment of a service to help vessels in case of accidents (grounding, collisions, vessel breakdowns, etc)

#### **14. Other measures in Bosnia and Herzegovina**

In Bosnia and Herzegovina, there are still a lot of important measures that are strongly dependent on the topic of accidental pollution and flooding, only some of which we have not mentioned so far are:

- Measures related to the adaptation to climate change (generally)
- Mine problem - mine clearance demeaning of the Sava (and Drina) river
- Objective status of river corridors (vegetation, sediments, erosion) following the requirements of WFD for the good ecological status.

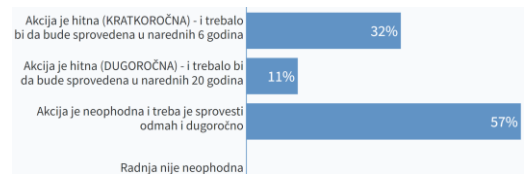
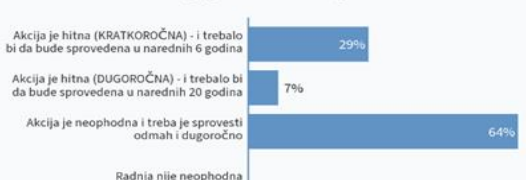
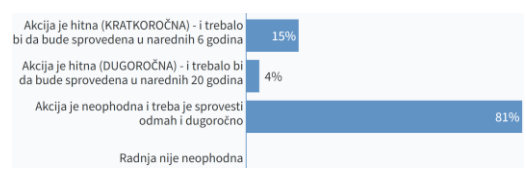

The first national report of BiH in accordance with the UN Framework Convention on Climate Change is a document that explains the direct impact of climate and climate change on nature and natural phenomena. The law on demeaning of Bosnia and Herzegovina includes the area of the demeaning of riverbeds in Bosnia and Herzegovina, procedures, rules and plans. The Management Plan for the regional river basin (district) of the Sava River of the Republic of Srpska (2017-2021) and the Draft Water Management Plan for the water area of the Sava River in the Federation of Bosnia and Herzegovina cover the maintenance of the river corridor.


















All measures implemented at the level of both entities and at the state level are variable, upgradeable and feasible in different deadlines. Through a short analysis of correlation of key measures with the theme of the WACOM project, we tried to point out certain shortcomings, point out the plans on which it is a priority to work urgently in the short term, but also those that need to be refreshed and upgraded in the long term. The key intervental areas are listed randomly, based upon their



development during the WACOM project. Thus, their position in this list does not represent their dominant or subordinate position.

### 3.4 Implementation priority of measures implemented in Republic of Serbia

Key intervention area	Proposed measure	Assessment of priority	Implementation needed in the short/long term	
ID 4	<b>EDUCATION</b>	ICS 100 - incident command system standardized framework protocols	Long term	
		Education of special ICS functions (IC, Safety officer, PR, Operations, Planning, Logistics, Administration/finance)	Long term	
ID 9	<b>FINANCIAL</b>	<b>Enforcing the polluter pays principle (compensation for the floods)</b>	 <p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina: 32%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina: 11%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno: 57%</p> <p>Radnja nije neophodna</p>	Short term and long term
ID 10		<b>Securing public financial resources</b>	 <p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina: 29%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina: 7%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno: 64%</p> <p>Radnja nije neophodna</p>	Short term and long term
ID 12		<b>Individual understanding of financial responsibilities in the case of floods and accidental pollution (education)</b>	Short term and long term	
ID 13		<b>Education of water users (abstractions) on emergency procedures (floods, accidental pollution)</b>	 <p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina: 15%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina: 4%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno: 81%</p> <p>Radnja nije neophodna</p>	Short term and long term
ID 18		<b>ICT</b>	<b>GIS based situational awareness</b>	 <p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina: 36%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina: 11%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno: 54%</p> <p>Radnja nije neophodna</p>

Key intervention area		Proposed measure	Assessment of priority	Implementation needed in the short/long term
ID 25	INFORMATION	Improved supervision and control over the production, use and storage of pollutants	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  21%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina  7%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno  71%</p> <p>Radnja nije neophodna</p>	Short term and long term
ID 31	INFRASTRUCTURE	Safe river access locations (booms)	<p><b>Sigurne lokacije za pristup rekama (bumovi)</b></p> <p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  19%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina  7%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno  74%</p> <p>Radnja nije neophodna</p>	Short term and long term
ID 33	INFRASTRUCTURE	Other emergency management related structural measures	Short term and long term	
ID 55	ORGANIZATION	Protocols enabling involvement of insurance companies	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  52%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina  4%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno  37%</p> <p>Radnja nije neophodna  7%</p>	Short term and long term
ID 65	ORG	EU whistle blower directive	Short term and long term	
ID 70	ORG	Disaster forensics after the accident	<p><b>Primena forenzičke analize posle akcidenta</b></p> <p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  15%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina  15%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno  69%</p> <p>Radnja nije neophodna</p>	Short term and long term
ID 71	ODR	Focused flood management for the people with disabilities	Short term and long term	
ID 77		Transport of hazardous substances	Short term and long term	
ID 89	OTHER	Adaptation to climate change	<p>Akcija je hitna (KRATKOROČNA) - i trebalo bi da bude sprovedena u narednih 6 godina  21%</p> <p>Akcija je hitna (DUGOROČNA) - i trebalo bi da bude sprovedena u narednih 20 godina  14%</p> <p>Akcija je neophodna i treba je sprovesti odmah i dugoročno  54%</p> <p>Radnja nije neophodna  11%</p>	Short term and long term

The WACOM partners have during the development process of the situational assessment identified following outstanding measures which are lagging behind the optimal and will be included in the overall WACOM strategy:

## **1. Education in the Republic of Serbia**

As a strategic measure, the education on prevention, protection and mitigation of floods and accidental pollution should be improved at all levels, from preschool to high education, research and on-the-job training, as well as seminars and continuous education for the public. To improve water management related to flood response procedures and accidental pollution management, training on procedures in cases of emergencies should be regularly performed for professionals and water users following the Incident Command System (ICS) procedures and practical training (staff exercises for flooding and accidental pollution).

Currently, the education on environmental/disaster risk reduction and management is analytically realised only at university levels, scientific research, and international support programmes. The Environmental Risk Management one-year Master's programme of academic studies is offered by the Faculty of Security Studies at the University of Belgrade. Topics concerning floods and accidental pollution are being studied at the University of Belgrade – Faculty of Civil Engineering, Department of hydraulic and environmental engineering; Faculty of Forestry, Department of ecological engineering for soil and water resources protection and Faculty of Mining and Geology, Department of environmental and safety engineering. In addition, some aspects of these topics have been tackled within the study programmes of departments for environmental engineering or environmental protection at the Universities of Nis and Novi Sad. If compared, far more attention is given to the reduction and management of flood risks than accidental pollution risks.

At other levels of education, there are no or only sporadic activities concerning education on these topics. Furthermore, there are no continuous education programmes and targeted courses with micro-credentials<sup>21</sup>.

In Serbia, the Department for Emergency Situations of the Ministry of Internal Affairs performs, among other things, educational activities for the organization, planning, implementation, and control of measures to protect the environment in conditions of natural disasters and technical and technological accidents. This process includes professional training of members of organizational units, education of citizens in the field of risk reduction and emergency management, training and improvement of staff managers for emergencies, and training of members of volunteer fire brigades. In 2013, the Government established the National Emergency Training Centre to provide training for members of professional and voluntary firemen and rescue services, as well as citizens who take part in civilian protection.

## **2. Finance in the Republic of Serbia**

Following the harmonization process of National legislation with European Union regulations and directives, several new legislations have been adopted, including those related to financial and management issues in the water sector, communal water supply and sanitation, as well as cross-cutting issues with other sectors (energy, agriculture, industry, etc.). The essence of this transition is in a decentralized approach, i.e., transfer of competencies related to financial

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<sup>21</sup> EU COMMISSION (2021) Proposal for a Council Recommendation on a European approach to micro-credentials for lifelong learning and employability (<https://data.consilium.europa.eu/doc/document/ST-9237-2022-INIT/en/pdf>)

instruments in the water sector and organization of drinking water and sanitation services from the state level to the levels of local governments.

According to the Law on Waters<sup>22</sup>, the existing framework for financing water management in the Republic of Serbia, consists of the budget of the Republic of Serbia, the budget of the autonomous province and public revenue as fees for water and concession fees, as well as other sources including EU funds, donations and other funds (international financial institutions, loans from banks, etc.) and investors' funds. The interrelationship between potential financial mechanisms depends on the significance, size and purpose of the water management facilities and objects. It is important to underline that the Law on Waters provides the basis for ensuring real income by introducing the user pays and polluter pays principles. The existing level of water pricing covers only operational costs, consequently, it will become a relevant source of financing only after reaching its economic level. The long-term financing stability has yet to be ensured.

The scope of funding considering both, flood management and accidental pollution prevention cover activities of general interest, including those on:

1. watercourses development and protection against the adverse effects of water
  - 1.1. the preparation of flood risk management plans, flood and ice defence plans, and erosion and torrential stream protection plans
  - 1.2. the erection, reconstruction, and repair/rehabilitation of publicly-owned control and protective water constructions and the maintenance of watercourses
  - 1.3. the implementation of flood and ice defence
  - 1.4. the erection of constructions and the undertaking of works and measures on protection from erosion and torrential streams
2. water development and water use
3. water protection from pollution
  - 3.1. the classification of surface water and groundwater bodies
  - 3.2. the preparation of water quality monitoring programs
  - 3.3. the preparation of water pollution protection plans and accidental pollution action plans, and the organization and oversight of the implementation thereof
  - 3.4. the undertaking of long-term and short-term measures aimed at preventing, mitigating, and controlling water pollution
  - 3.5. development of the water regime of protected areas
  - 3.6. the erection and reconstruction of publicly-owned water constructions for wastewater collection, evacuation, and treatment, and for water pollution protection
4. the construction, maintenance, and management of reclamation systems
  - 4.1. maintenance of publicly-owned water constructions for drainage and irrigation
  - 4.2. the management of publicly-owned drainage and irrigation systems
  - 4.3. the erection of water constructions of the primary drainage canal network
5. the construction, maintenance, and management of regional and multipurpose water systems
6. other activities of general interest.
  - 6.1. the preparation of planning documents and normative enactments
  - 6.2. the preparation and issuance of water enactments, and oversight of the implementation thereof

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<sup>22</sup> The Law on Waters (with amendments) 10/2012, 12/2018 ("Official Gazette RS", no. 30/2010, 93/2012, 101/2016, 95/2018 i 95/2018, and other laws)

- 6.3. the preparation and review/revision of capital project documents on watercourse development, protection against the adverse effects of water, water development, water use, and water protection from pollution
- 6.4. activities in international cooperation
- 6.5. the establishment and management of water documentation and the water information system

*The Proposal for a Flood Risk Management Plan for the Territory of the Republic of Serbia for the period from 2021 to 2027*<sup>23</sup> unifies measures as investment and non-investment and applies them to all APSFR. The status of the implementation of each of the individual measures and works from the catalogue depends on the funds provided for their implementation. Risks in the implementation of measures from the plan are insufficiently secured funds in the budget of the Republic of Serbia for this purpose, as well as unresolved property legal relations.

Local self-government has the authority to plan and implement the flood defences measures for the second-order waters<sup>24</sup>; to declare erosion zone and determine conditions for their use and protection, then for issuing water acts for facilities of local importance, primarily for performing and developing communal services (drinking water treatment and distribution, collection and disposal of sanitary, waste and atmospheric water and wastewater treatment).

If torrential streams and/or strong erosion processes threaten settlements, industrial facilities, highways, regional roads, and/or reclamation systems, or if they extend into the territories of two or more local self-governing units, the funding for the erection of constructions and/or the undertaking of works and/or measures aimed at protection against the adverse effects of erosion and torrential streams shall be provided by the local self-governing units and the Republic of Serbia, or the local-self governing units and the autonomous province within the territory of the autonomous province.

Relative to the existing sources of financing which cover several flood management tasks, some challenges remain:

- Penetration of insurance against flood damage practically does not exist.
- There are limited cases where financial liability for the floods is identified and paid to the persons who were flooded.

The financing framework for accidental pollution prevention and improved response in the case of accidental pollution is not defined on the same level as flood management.

### **3. Governance in the Republic of Serbia**

In Serbia water management policy instruments are closely related to the implementation of EU water policy, recognizing Water Framework Directive (WFD 2000/60) as an umbrella directive, taking into account all related EU directives including the Floods Directive (FD 2007/60) and CIS documents.

Specific policy instruments in Serbia are:

- *The Water Management Strategy of the territory of the Republic of Serbia by 2034*(the Strategy)<sup>25</sup> is the master planning document that serves as a blueprint for the implementation of reforms in the water sector, aimed at achieving the set of goals and prescribed standards at

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<sup>23</sup> <https://www.rdvode.gov.rs/arhiva-2022-istorija-aktivnosti-u-2022.php>

<sup>24</sup> The Law on Waters, Article 6, the Decision on determining the list of the first order waters ("Official Gazette RS", no. 83/2010)

<sup>25</sup> "Official Gazette RS" no 3/2017

the national, regional and local levels. The Strategy also proposes the structural and non-structural measures required to achieve established objectives, outlining required financial resources, as well as the implementation timetable and responsibilities.

- *The Proposal for a Water Management Plan for the territory of the Republic of Serbia for the period 2021 – 2027*<sup>26</sup> (the public hearing was finalized in December 2021), is currently considered the valid RBMP for the Sava River Basin in Serbia. Relative to accidental pollution the RBMP defines investigative monitoring (pg. 130) and the basic preventive measures (pg. 204) while the alerting and alarming procedures, as well as the monitoring, its organisation and implementation control is the responsibility of the PWMCs "Srbijavode" and Vode Vojvodine. These mechanisms are performed using the exchange of information and alerting procedures with "the ministry responsible for health affairs, the ministry responsible for environmental protection affairs, the ministry responsible for internal affairs, the public water management company and the local self-government unit on whose territory the pollution occurred"<sup>27</sup>.

In the event of accidental water pollution PWMCs "Srbijavode" and "Vode Vojvodine" are organizing and coordinating intervention measures, whereas Serbian Environmental Protection Agency (SEPA) is conducting investigative monitoring. In some cases, protection and remediation measures against accidental water pollution are carried out by the contractor of the state public service, determined according to the regulations on water. In the event of a major environmental disaster, all necessary measures are implemented following the protection and rescue plans determined by the regulations on protection against natural and other disasters.

Data exchange at the international level is carried out based on international agreements and takes place via established protocols and networks.

Local self-government has the authority to plan and implement flood defences measures for the second-order waters<sup>28</sup>; to declare erosion zone and determine conditions for their use and protection.

*The Proposal for a Flood Risk Management Plan for the Territory of the Republic of Serbia for the period from 2021 to 2027*<sup>29</sup> unifies measures as investment and non-investment and applies them to all APSFR. The MAFWM/RDW is the responsible institution for the preparation and adoption of the Flood Risk Management Plan on the territory of the Republic of Serbia by water area, as well as the General and Operational Plan for flood defence. The PWMCs "Vode Vojvodina" and "Srbijavode" manage water facilities for protection from floods on the first order waters (including dams with accumulations and retention), water facilities for protection against erosion and floods on reservoir basins and water drainage facilities that are in public ownership, and take care of their intended use, maintenance and preservation, and have a dominant role in the implementation of numerous measures listed in the Proposal for the FRMP in the RS.

As part of active flood protection measures, 52 reservoirs and retention ponds are used to mitigate flood waves of large waters according to the Operational Plan for Flood Defence for 2022<sup>30</sup>.

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<sup>26</sup> <https://www.rdvode.gov.rs/zavrsene-javne-rasprave.php>

<sup>27</sup> The Law on Waters, article 106

<sup>28</sup> The Law on Waters, Article 6, the Decision on determining the list of the first order waters ("Official Gazette RS", no. 83/2010)

<sup>29</sup> <https://www.rdvode.gov.rs/arhiva-2022-istorija-aktivnosti-u-2022.php>

<sup>30</sup> „Official Gazette of the RS" No. 123/21

The General Plan for flood defence defines the measures that must be taken preventively and in the period of high water (external and internal) and ice accumulation on the watercourse, the way of institutional organization of flood defence, duties, responsibilities and powers of defence managers, institutions and other persons responsible for flood defence, method of observation and recording of hydrological and other data, forecast of occurrences, notifications and other data defined by the Regulation

The Operational Plan for flood defence on the territory of the Republic of Serbia for the following year contains: (1) names of legal entities responsible for organizing and implementing flood defence and names of flood defence managers and other responsible persons; (2) Operational flood defence plan from external and inland waters and ice; (3) review of hydrological and meteorological stations and ice observation points

National legislation guarantees the right of citizens of the Republic of Serbia to access information of public importance, including information in the field of flood management and accidental pollution prevention. The policy in the water sector respects, among others, the transparency principle in integrated water management. The Law on Waters stipulates the obligation to public participation in the preparation of water management plans, as well as methods for submitting "Comments and objections to documents that are made publicly available shall be submitted to the Ministry or the Public Water Management Company within six months from the day the documents were made public"<sup>31</sup>.

It can be concluded that advanced instruments for public participation in flood and pollution risk management decision-making processes have been provided. However, practice shows that still there is a space for further improvement in this segment. Currently, there are no official limits for citizens to freely express their own opinion but, in some cases, this is where the story ends. Water management experts try to find their place in an arena of various interests, organising public audits for citizens to exercise their opinions. A need for extensive public participation is indubitable though, steps towards its implementation do not fully follow current development in the water sector. How to further strengthen public participation in water management and ensure citizens' rights to express their opinions and to be considered is a question and task for both sides.

Experts and citizens should understand and respect each other. Pragmatic knowledge of citizens and qualified knowledge of experts should be exchanged, their interaction should be through direct contact, building a feeling of ownership, trust, and efficient form of cooperation between the two sides.

Also, permanent education is necessary for building public awareness of the water resources' importance, limitations and a need for rational use and protection, as well as the importance and function of water facilities considering protection from floods and pollution along with citizens and goods protection from waters.

Specific targets regarding the improvement of overall governance processes related to flood management and accidental pollution management are not only improved participatory processes but greater involvement of elected representatives of key institutions (state, regions, local communities, e.g., mayors) as well. It is needed for the long-term post-accident challenges and the implementation should start without delay.

#### **4. Human resources in the Republic of Serbia**

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<sup>31</sup> The Law on Waters, Article 39

Human resources in the field of water management are currently very limited probably due to the limited awareness of the general public on most engineering professions that are necessary to provide the related services.

Budget constraints and a lack of investment in human capacity are limiting the effective implementation of the Serbian emergency response system. Adequately trained and equipped protection and rescue personnel are essential to effective emergency response. Although the number of professional firefighters and rescue workers is still below internationally recognized minimum standards with the lack of technical capacities, some progress has been made in recent years. In 2013, the Government increased its roster of professional firefighters and rescue workers and established the National Emergency Training Centre to provide training for members of professional and voluntary firemen and rescue services, as well as citizens who take part in civilian protection. More investment, however, is needed to increase the number of personnel and to finance training and education.

The overall lack of educated and skilled professionals and available human resources presents a significant bottleneck in the implementation of the services necessary for the implementation of the overall strategy. The study „Human Resource Management in Environmental Protection in Serbia”<sup>32</sup> conducted in 2020 showed that the units of national authorities and local self-government are not sufficiently oriented towards innovations related to human resources and the environment. The most important factor for the possible improvement of the environment is the size of the municipality. The other parameters, such as human resources policy and human resources service did not have significant effects on the ability to improve the environment. In more than half of local self-governments, there was no clearly defined human resources strategy in the field of environmental protection, an environmental protection service, an Environmental Action Plan, as well as an employment plan for waste management in local governments, etc. The research has shown that top managers of local governments agree that the management of human resources in environmental protection represents a significant opportunity to improve the quality of the environment.

Work in the field of human resources is assessed as critical, there is no long-term planning for the development of human resources in this area, career development, job satisfaction etc. Specific activities related to career development, motivation, and continuity of services, are currently not existing in the field of water management. Mechanisms to monitor employee satisfaction are necessary to improve organizational climate, the Employee satisfaction mechanisms should be implemented in the long term.

## **5. Information and communication technologies in the Republic of Serbia**

In general, the necessary measures in the field of information and communication technology are assessed as satisfactory. The availability of the GIS-based situational awareness and communication equipment for securing transmission during emergencies are implemented and functional, as well as the new casting and forecasting systems and flood management centres. Having in mind a very quick progress concerning the ICT, it is important to underline the necessity for continuous development and upgrading of these measures for advancing functionality of the existing and future warning system and its thematic modalities (floods, flash-floods, landslides, accidental pollution, ice, etc.), with the vision to cover territories of all water districts. Further improvement is needed considering supervision and control over the

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<sup>32</sup> Neda Nikolić, University of Kragujevac, Faculty of Technical Science, Čačak, Serbia, Vladimir Cvetković, University of Belgrade, Faculty of Security Studies, Serbia, Miodrag Zečević, European University, Faculty of International Engineering Management, Belgrade, Serbia



transport of pollutants and should be a long-term implementation process, while the early identification of accidental pollution and alerting should be implemented in a short term.

## 6. Information in the Republic of Serbia

In general, the necessary measures in the field of information are assessed as satisfactory. The public awareness system on flood and accidental pollution conditions is implemented and functional, as well as inter-institutional notification about hazards and disasters. Further improvement is needed considering supervision and control over the transport of pollutants and should be a long-term implementation process

To contribute to greater resilience and responsiveness in flood risk management, national and international projects have been conducted in Serbia in recent years. Focus was mainly on renewing and establishing a public alert system in areas with significant flood impacts and contributing to proper behaviour and actions before, during and after of emergency for the safety of people, national goods and cultural heritage.

The project "Establishment of an early warning system for floods on second-order waters in Belgrade" is targeted to strengthen the resilience and readiness of the city of Belgrade to respond to natural disasters and crises. It is also coupled with the introduction of a system for early warning of floods on torrential watercourses in the area of Belgrade.

## 7. Infrastructure in the Republic of Serbia

The necessity of permanent maintenance of the existing infrastructure relevant for flood protection, accidental pollution and navigation. In the Republic of Serbia, measures in the infrastructural KIA (key intervention area) are partly or fully implemented. The *lowest level of implementation* is for safe river access locations booms (development of safe access locations along the key rivers enabling access for the accidental pollution mitigation measures, including anchorage of booms and staging area for emergencies) and other emergencies management-related structural measures. There is an anchor at the border with Croatia and on the Sava River's left bank in Novi Beograd. Although there is an improvement in their implementation, data and information are not easily accessible and accurate.

Financial instruments for their implementation and maintenance are provided by PWMC "Srbijavode" and PWMC "Vode Vojvodine". Measures for safe river access locations (rescue) along the key rivers enabling access for the water rescue operation are *partially implemented*. Their development and maintenance are the responsibility of the Ministry of the Interior and Ministry of Construction, Transport and Infrastructure / Directorate for Inland Waterways. *Fully implemented* are *waterways* maintenance and *reception facilities* i.e., the establishment of a sufficiently dense network of reception facilities on the waterway for waste collection, measures. Financial instruments and their maintenance are the jurisdictions of the Directorate for Inland Waterways. Concerning implementation, medium priority for both short and long-term measures has been recognized for the majority of infrastructural measures.

## 8. Knowledge in the Republic of Serbia

National and international (EN) standards, i.e., development of national and implementation of international (EN) standards and guidelines development and implementation is governed by the Law on Standardization<sup>33</sup> which includes the principles and objectives of standardization in the Republic of Serbia, organization and activities of the national standardization body (Institute for Standardization of Serbia) and adoption, publications and applications of

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<sup>33</sup> Law on Standardization ("Official Gazette of RS", no. 36/2009 and 46/2015)

standards in the Republic of Serbia. This measure implementation is an ongoing process and is evaluated as implemented.

The knowledge base of the polluters<sup>34</sup> (different sources: SEVESO, industrial facilities, traffic, accident risk spots (ARS of the ICPDR)) is partially implemented. Ministry for Environmental protection and Serbian Environmental Protection Agency (SEPA) are responsible for this measure implementation.

Due to a lack of data and information concerning the knowledge base of the pollutants and procedures (knowledge base of the pollutants, their characteristics and procedures in the case of emergencies) evaluation of the measure is not feasible. Evaluation of this KIA in the Republic of Serbia indicates the necessity to establish a knowledge base of the pollutants and procedures and improvement of the polluters' knowledge base in Serbia.

## 9. Logistics in the Republic of Serbia

For the majority of these measures, implementation is ongoing in the Republic of Serbia. Policy instruments for the logistic measures implementation are those regarding emergency management and water management, e.g., the Law on Disaster Risk Reduction and Emergency Management<sup>35</sup>, the Operational Plan for flood defence on the territory of the Republic of Serbia<sup>36</sup>, etc. Financial instruments for the majority of measures implementation are national funds (state budget<sup>37</sup>, regional budget<sup>38</sup> and local budget<sup>39</sup>).

Logistic KIA is overall assessed as satisfactory, with the assessment that further expansion is expected. Almost fully implemented measures are those concerning emergency equipment availability in case of floods, rescue tools and resources availability, and identification of service providers (contracting framework with the service providers - specialized companies for the emergency response in the case of accidental pollution and floods). Implementation of emergency equipment available in the case of accidental pollution costing units, and service providers for the final treatment of polluted materials (earth, skimmers, floating debris, etc) is ongoing and progress in implementation is necessary.

## 10. Organization in the Republic of Serbia

This KIA includes the largest number of individual measures. In general, the organizational framework is considered acceptable. Policy instruments for the implementation of these measures are the majority of those regarding water and emergency management. In addition to Water Law and Law on Disaster Risk Reduction and Emergency Management, some other policy instruments are International agreements (ISRBC and ICPDR) and MEA<sup>40</sup>, Bilateral agreements (technical commissions)<sup>41</sup>, Water inspection<sup>42</sup>, Environmental inspection<sup>43</sup>, National Emergency Management Headquarters - National Platform (Sector for emergency situations and representatives of all ministries, scientific institutions, civil sector, other)<sup>44</sup>.

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<sup>34</sup> Register of releases and transfer of pollutants - PRTR Register

<sup>35</sup> "Official Gazette of RS", No. 87/18

<sup>36</sup> <https://www.rdvode.gov.rs/dokumenta.php>

<sup>37</sup> Ministry of Interior/Emergency management sector, Ministry of Agriculture, Forestry and Water Management//Water directorate

<sup>38</sup> PWMC "Srbijavode", PWMC "Vode Vojvodine"

<sup>39</sup> Local Self-Government Units

<sup>40</sup> <https://www.rdvode.gov.rs/lat/medjunarodna-saradnja.php>

<sup>41</sup> <https://www.rdvode.gov.rs/lat/medjunarodna-saradnja-bilateralna.php>

<sup>42</sup> <https://www.rdvode.gov.rs/lat/struktura-vodne-inspekcije.php>

<sup>43</sup> <https://www.ekologija.gov.rs/inspekcija>

<sup>44</sup> <http://prezentacije.mup.gov.rs/svs/HTML/organizacija.html>

Financial instruments are mainly from national funds. Due to a lack of data and information, the implementation and priority of the following measures have not been evaluated:

- Certification process for risk management (ISO 33000 family);
- Certification process for asset management (ISO 55000 family);
- Certification process for continuous operation management (ISO 22300 family).

Based on data available at the Institute for Standardization of Serbia ISO 55000 and ISO 22300, SRPS ISO 55000:2018<sup>45</sup> and SRPS EN ISO 22300:<sup>46</sup> 22300 are available in the Serbian language. Protocols enabling the involvement of insurance companies have the lowest level of, followed by:

- Transport of hazardous substances;
- Focused flood management for people with disabilities;
- Disaster forensics after the accident;
- EU whistle-blower directive<sup>47</sup>

Concerning the implementation priority, these measures are evaluated as immediate for both the short (next 6 years) and long-term (20 years).

## 11. Planning in the Republic of Serbia

Planning is addressed by current legislation and practices. Although it is generally satisfactory, the necessity for further improvement is recognized. Planning instruments are legal frameworks relevant for water management, environmental protection, disaster risk reduction and emergency management, e.g., Decree on establishing a general plan for flood protection<sup>48</sup>, river training<sup>49</sup>, prevention of major accidents involving dangerous substances from Seveso plants (installations)<sup>50</sup>, emergencies (methodology, regulations)<sup>51</sup>, etc. All measures in planning KIA in Serbia are funded by national funds (Ministry of Agriculture, Forestry and Water Management/Water directorate, Ministry of Interior/Emergency management sector, Ministry of Environmental Protection, Republic Hydrometeorological Service of Serbia). The hazard identification, and risk assessment measure implementation level is estimated as moderate so improvement is necessary. The other two measures within this KIA (maintenance of contingency management plans on different levels and planning, execution and improvement of exercises) are close to being fully implemented.

## 12. Monitoring (Supervision) in the Republic of Serbia

Monitoring and assessing the state of water quality in the Republic of Serbia is, following the Act on environmental protection, the responsibility of the Environment Protection Agency of the Republic of Serbia. Monitoring programs are prepared following the regulations that summarize the content of the provisions of the European directives and following the assessment of the situation and analysis of loads on individual water bodies. They include river quality monitoring and lakes, groundwater and areas of special regimes.

However, supervision in Serbia is assessed as lacking, because the water act does not stipulate a strong, independent supervisory body. Also monitoring wastewater discharges and establishing an inventory of water uses/withdrawals at risk of accidental pollution is needed.

<sup>45</sup> <https://iss.rs/sr/Latn/project/show/iss:proj:65082>

<sup>46</sup> <https://iss.rs/en/project/show/iss:proj:69779>

<sup>47</sup> Whistle-blower Protection Law ("Official Gazette of RS", 128/2014)

<sup>48</sup> "Official Gazette of RS", No. 18/19

<sup>49</sup> <https://www.rdvode.gov.rs/uredjenje-vodotoka.php>

<sup>50</sup> <https://www.ekologija.gov.rs/dozvole-obrasci/kontrolne-liste/zastita-od-hemijskog-udes-a-kod-seveso-postrojenja>

<sup>51</sup> <http://prezentacije.mup.gov.rs/svs/HTML/zakonska%20regulativa.html>

We also found a need for the establishment of an integrated inspection service (specialised inspection body).

### 13. Navigation in the Republic of Serbia

In general, navigation KIA is satisfactory and for the majority of measures implementation is progressing. Regulation of the Government of the Republic of Serbia on the determination of international and interstate waterways<sup>52</sup> defines the Sava River as an international waterway on the entire length of the flow through the Republic of Serbia, from km 0 to km 210+800. Policy instruments for the logistic measures implementation are mainly those regarding Navigation and Ports on Inland Waters, e.g., Law on Navigation and Ports on Inland Waters<sup>53</sup>, Law on Transportation of Dangerous Goods<sup>54</sup> and Disaster risk reduction and emergency management. Financial instruments for the majority of measures implementation are national funds (state budget<sup>55</sup>) and vessel owners.

For the majority of measures implementation is ongoing, i.e., improved integration of governmental sectors, notification of authorities, used oil log and prohibition of further navigation after a spill. Insufficient implementation is identified for the transport of hazardous substances measure, while protocols with the key water uses/abstractions potentially under threat of accidental pollution and floods are almost fully implemented.

### 14. Other measures in the Republic of Serbia

Policy instruments (The Law on Waters<sup>56</sup>, Law on Waste Management<sup>57</sup>, Law on Climate Change<sup>58</sup>, and Operational plans<sup>59</sup>) and financial instruments (Budget of the Republic of Serbia, Budget of PWMCs. Directorate for Inland Waterways, Local Self-Government Units) are included in sectoral legal frameworks. In general, measures related to the maintenance of water infrastructure and facilities, as well as river corridors are valued as appropriate. However, further enhancement is required. Their priority for short and long-term full implementation is evaluated as high.

Adaptation to climate change has the lowest implementation level and has to be intensified and tackled more systematically. The priority of measure implementation is evaluated as urgent short-term (next 6 years) and immediate long-term. More details on implemented or ongoing activities and projects, documents, etc, for Climate Change Adaptation, are available at: <https://www.klimatskepromene.rs/projekti/strategija-u-oblasti-klimatskih-promena/>.

For all measures in KIA 14, policy instruments are already defined in sectoral laws, plans and by-laws in the Republic of Serbia. Financial instruments for the majority of measures implementation are national (funds (state budget, regional budget and local budget). For some measures combined sources of financing are identified. Although the latter is beneficial due to the required efficient and improved cooperation among different stakeholders and sectors, it could generate issues if the co-financing is not clearly defined by specific guidance documents.

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<sup>52</sup> "Official Gazette of RS", No. 109/16

<sup>53</sup> "Official Gazette of RS", No. 73/10, 121/12, 18/15

<sup>54</sup> "Official Gazette of RS", No. 88/10

<sup>55</sup> Ministry of Construction, Transport and Infrastructure / Directorate for Inland Waterways, Ministry of Interior/Emergency management sector

<sup>56</sup> <https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/reg/viewAct/54547db1-244d-4570-a6a5-3a9a56470dfd>

<sup>57</sup> <http://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2009/36/14/reg>

<sup>58</sup> <https://www.pravno-informacioni-sistem.rs/SlGlasnikPortal/eli/rep/sgrs/skupstina/zakon/2021/26/1/reg>

<sup>59</sup> Public water management companies, Waterway Directorates, local self-government units

The key intervention areas are listed randomly, based upon their development during the WACOM project. Thus, their position in this list does not represent their dominant or subordinate position.

## 4 Tool for the implementation of the Sava STEER

As final outcome of the WACOM project partners will develop two strategies enabling strategic drafting of the further steps of involved countries in the Sava River Basin towards the set objectives – improved transnational management of extreme events – transnational accidental pollution and transnational flood events. On one hand these strategies will directly support the objectives of the International Sava River Basin Commission (ISRBC), while on the other hand the strategies will also support the implementation of national agencies covering these topics: water management agencies, civil protection agencies and agencies responsible for inland navigation in all involved countries.

Follow-up of the implementation of any strategic guidelines or any strategy in general, which exists on the level of recommendation is a challenging task, because the implementation itself is not legally binding, and as many international agreements it is also subject to different limitations and bottlenecks. Countries are encouraged to identify their own action plan for the implementation of the WACOM defined strategies. This is often related to the removal of bottlenecks hindering successful implementation of the strategies. A tool enabling methodical and systematic follow up of the Sava STEER implementation will be prepared within the next steps of the WACOM project.

## 5 Conclusions

After mapping the status of key measures for the reduction of flood risks and accidental pollution risk reduction measures in all countries of the Sava River Basin, a catalogue of measures was developed. A harmonized catalogue was evaluated in order to identify common experiences with these measures and to identify differences between countries with respect to the same measure. The WACOM catalogue of measures was developed through a multi-stage, process involving multiple stakeholders. A comprehensive list of measures was developed, for all countries involved: Slovenia, Croatia, Bosnia and Hercegovina and Serbia.

In order to develop a tool that allows a methodical and systematic follow up of the Sava STEER (Strategies for emergency response in the Sava River Basin), a well-structured list of necessary steps need to be taken prior to the implementation stage. With this regard to the Strategies for emergency response in the Sava River Basin, the first step was to identify the deficiencies in the area of Contingency management. The involvement of target groups in this process was crucial, and through the project workshops, stakeholders contributed to the thorough analysis of the implemented measures and strategies. Target groups were carefully collected according to their specific knowledge in the field, mostly practical knowledge from their daily work in all countries (SI, HR, BA and RS),

The proposed key measures for the efficient and effective response in the case of accidental pollution and floods, observed in the framework of disaster management cycle (preparedness, response, and recovery), we aggregated the listed measures to key selected areas of measures, which are grouped in order to address key groups of measures.

Key intervention areas are: Education, Finance, Governance, Human resources, Information and communication technologies, Supervision, Information, Infrastructure, Knowledge, Logistics, Organizational, Planning, Navigation and Other (i.e. Climate Changes,). In these 14 key intervention

areas of measures, we have included 94 individual measures. The WACOM partners have identified all key intervention areas as equally important and all will be included in the final WACOM strategies.

Both strategies (for flood response cooperation and interoperability and for the accidental pollution response cooperation and interoperability) define in elaborative way all necessary arguments relative to the implementation of proposed toolbox and especially procedures related to coordination, modelling and situational awareness.