



# **Terms of Reference**

for the development of the

**Study on Sediment, Water and Biota in the Sava River Basin**

**July 2024**

<b>PROJECT:</b>	SAVA AND DRINA RIVER CORRIDORS INTEGRATED DEVELOPMENT PROGRAM (SDIP)-Phase 1, Part 4 – Regional Cooperation
<b>IMPLEMENTING AGENCY:</b>	International Sava River Basin Commission
<b>ACTIVITY:</b>	Study on Sediment, Water and Biota in the Sava River Basin
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## ABBREVIATIONS AND ACRONYMS

BQE	Biological Quality Element
EEA	European Environment Agency
EO	Earth Observations
EQS	Environmental Quality Standards
EU	European Union
FASRB	Framework Agreement on the Sava River Basin
FAIR	Findable, Accessible, Interoperable, and Reusable
HEC-HMS	Hydrologic Engineering Center's Hydrologic Modeling System
HIS	Hydrologic Information System
IFI	International Financial Institution
ISRBC	International Sava River Basin Commission
QA/QC	Quality Assurance and Quality Control
msPAF	Multisubstance potentially affected fraction
RBMP	River Basin Management Plan
WFD	Water Framework Directive
WISE	Water Information System for Europe

# 1. Introduction

## 1.1 Basic information about the Sava River basin

The Sava River basin is a major river basin of South-Eastern Europe that covers an area of approximately 97,200 km<sup>2</sup>. Encompassing substantial portions of Bosnia and Herzegovina, Croatia, Montenegro, Serbia, and Slovenia, the Sava River basin constitutes 12% of the Danube River basin area, making it the second-largest sub-basin of the Danube (Figure 1).



Figure 1. The Sava River basin overview

The Sava River is the largest tributary by discharge to the Danube River, with an average discharge of about 1,700 m<sup>3</sup>/s, which accounts for almost 30% of the Danube's total discharge at their confluence in Belgrade. The Sava River is formed by two mountainous streams: the Sava Dolinka and the Sava Bohinjka. From the confluence of these headwaters in Radovljica (Slovenia), the Sava River is 945 km long. It flows in a northwest-southeast direction through Slovenia, Croatia, Bosnia and Herzegovina, and Serbia. A schematic longitudinal profile of the Sava River and some of its main tributaries is shown in the following figure.

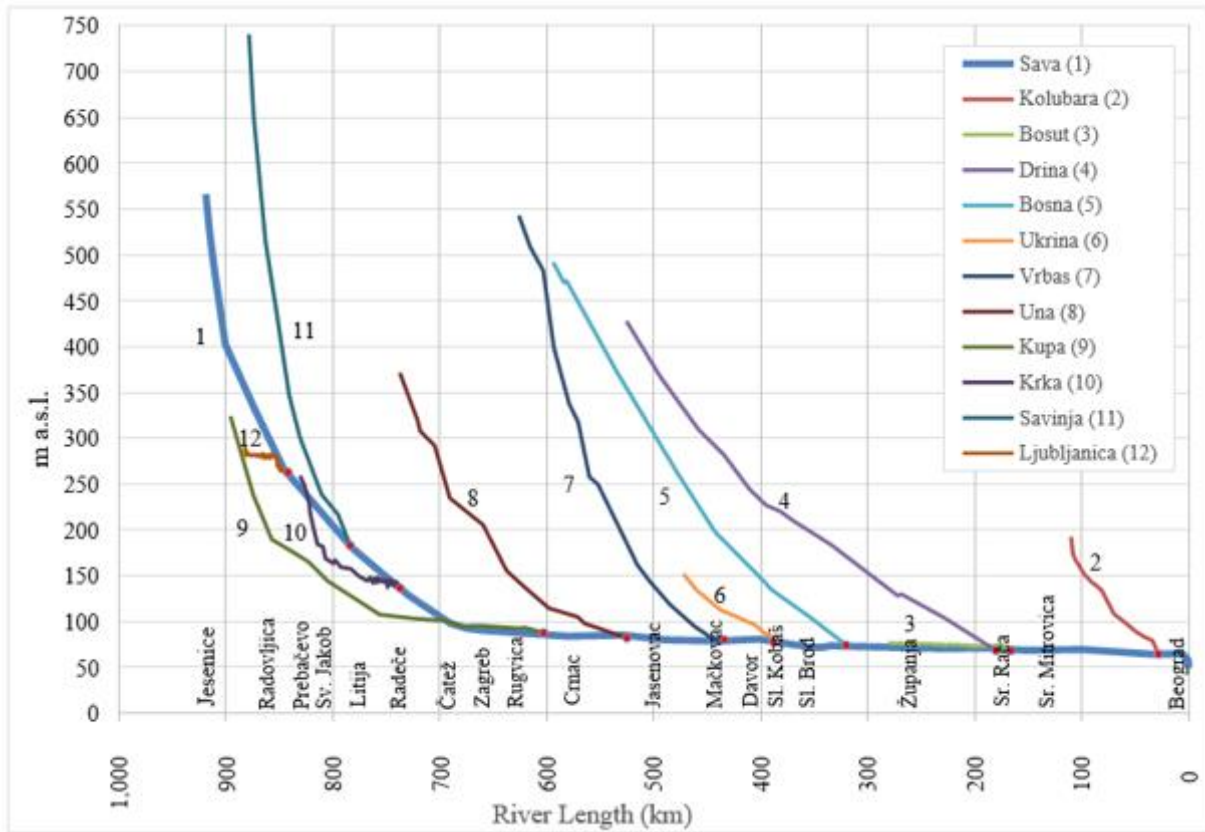


Figure 2. Schematic longitudinal profiles of the Sava River and its main tributaries

The Sava River is a vital source of water for people, ecosystems, and economies, and, as such, a prerequisite for sustainable socio-economic development of the whole region. A detailed elaboration of the main characteristics of the Sava River basin is provided in the [2<sup>nd</sup> Sava River basin analysis report](#) prepared in 2016.

## 1.2 Transboundary cooperation in the Sava River basin

In 2001, the four riparian countries of the Sava River basin (Slovenia, Croatia, Bosnia and Herzegovina, and the former Federal Republic of Yugoslavia at the time) aiming at cooperation for sustainable basin-wide water resources management, entered a process known as the *Sava River Basin Initiative*. The core concept of the Sava Initiative was to establish an effective institutional framework for transboundary cooperation, aiming at sustainable use, protection, and management of water resources in the basin and ultimately improving the standard of living in the region. In 2002, the process was successfully finalized by signing the Framework Agreement on the Sava River Basin ([FASRB](#)). The FASRB calls for cooperation among the Parties<sup>1</sup>, toward, among others, three main goals: (a) establishment of an international regime of navigation on the Sava River and its navigable tributaries; (b) establishment of sustainable water management; and (c) undertaking of measures to prevent or limit hazards and reduce and eliminate adverse consequences, including those from floods, ice hazards, droughts, and incidents involving substances hazardous to water. In 2005, the International Sava River Basin Commission (ISRBC; Sava Commission) was established to facilitate the implementation of the FASRB. Since then, ISRBC has coordinated the preparation and implementation of basin-wide plans (for example, the Sava River Basin Management and Flood Risk Management Plans), the development of studies for navigation

<sup>1</sup> Slovenia, Croatia, Bosnia and Herzegovina and Serbia

rehabilitation and expansion, and the delivery of practical tools such as a Geographic Information System (GIS), and a Flood Forecasting and Early Warning System for the Sava River Basin.

### **1.3 Transboundary activities related to sediment management in the Sava River basin**

Sediment management is an important aspect of integrated water resources management as it can affect the ecology of aquatic ecosystems, water quality, inland navigation safety, and the sustainability of water use for human consumption and other purposes, and therefore sediment issues have been addressed to a greater or lesser extent since the inception of the Sava Commission.

In that regard, a long-term project Towards Practical Guidance for Sustainable Sediment Management using the Sava River basin as a Showcase has been launched upon the initiative of the UNESCO Venice Office, together with the UNESCO International Sediment Initiative (ISI), European Sediment Network (SedNet) and the ISRBC. The main objective of this initiative was to develop and validate practical guidance on how to achieve a Sustainable Sediment Management Plan on the river-basin scale, using the Sava River Basin as a showcase.

The most important results of the collaboration through this initiative include:

- [Towards Practical Guidance for Sustainable Sediment Management using the Sava River Basin as a Showcase- Estimation of Sediment Balance for the Sava River \(2013\)](#), and
- [Towards Practical Guidance for Sustainable Sediment Management using the Sava River Basin as a Showcase - Establishment of the Sediment Monitoring System in the Sava River Basin \(2015\)](#).

The cooperation among the Parties to the FASRB was particularly strengthened by the entry into force of the [Protocol on Sediment Management to the FASRB](#) in 2017. Protocols, as supplements to the FASRB, are binding international legal instruments through which the state Parties seek to more closely regulate their mutual rights and obligations in specific aspects of cooperation at the transboundary level. By this Protocol, the Parties aim to promote sustainable sediment management practices that support the overall objectives of the FASRB. The most significant outcome of the cooperation prescribed by the Protocol is the development of a joint Sediment Management Plan in the Sava River Basin. According to its provisions, the Plan should be developed in the six years cycles covering sediment balance throughout the river system, evaluation of sediment quality and quantity, monitoring, as well as determining measures, such as those aimed to prevent pollution resulting from dredging, control erosion and reservoir sedimentation, maintain conditions for safe navigation, protect wetlands areas and retention spaces, etc.

The Protocol also stipulates the Parties to continuously exchange data on planned dredging and provide information on executed dredging, sediment disposal and treatment for the Sava River and its main tributaries. This information has been exchanged regularly since 2019.

Following the Protocol's entry into force, it is important to highlight the preparation of:

- [Program for the development of the Sediment Management Plan in the Sava River Basin](#) (2020), and
- [Outline of the Sediment Management Plan for the Sava River Basin](#) (2021).

The Outline, prepared with the support of the UNESCO Office in Venice, compiled sediment management data and practices in the Sava countries, provisionally identified gaps that need to be addressed and provided recommendations for further steps towards developing a Sediment Management Plan.

In December 2022, the [2<sup>nd</sup> Sava River Basin Management Plan \(Sava RBMP\)](#) was adopted by the Parties to the FASRB, as one of the milestones in regional cooperation which are leading towards the fulfilment of one of the main objectives of the FASRB, i.e., the establishment of sustainable water management.

The 2<sup>nd</sup> Sava RBMP elaboration was based on the commonly agreed Significant Water Management Issues (SWMIs) for the whole basin. The following issues were addressed in the Sava RBMP as SWMIs:

organic pollution, nutrient pollution, hazardous substances pollution, hydromorphological alterations and pressures on groundwater quality and quantity. Sediment quality and quantity have also been addressed, as hydro-morphological conditions and most biological quality elements (BQEs) depend, to a greater or lesser extent, on both the proper quantity and quality of sediment. In terms of quality, a variety of substances, including chemical substances, metals, and nutrients, accumulate in sediment over time. These substances may be released into the water column or taken up and accumulated by aquatic species, potentially impacting the chemical and/or ecological status of water bodies. Additionally, in the Sava River basin, like in many European river basins, numerous anthropogenic activities impose pressures on water resources and cause deterioration of water quality, affect water-dependent ecosystems, and provoke changes in the natural dynamics of the sediment balance. Such pressures include besides pollution, different human interventions such as dredging, and sand and gravel mining that have led to widespread hydromorphological and contamination impacts, and therefore impede the achievement of the environmental objectives of the Water Framework Directive (WFD)<sup>2</sup> (i.e., the achievement of good status of all waterbodies), and affect current and future water uses.

However, although the cooperating countries were aware of the importance of sediment-related issues, they could not designate them as SWMIs simply due to a lack of sufficient and reliable information. Generally, sufficient and reliable data on sediment transport, sedimentation in reservoirs, sediment quantity and quality, as well as their interlinkages with water and biota, were lacking. Additionally, there is a poor density of monitoring stations and a lack of appropriate storage and manipulation of datasets. Therefore, sediment quality and quantity have been addressed in the Sava RBMP just as “candidate” SWMI. The final confirmation of the status is expected to come with new findings in the upcoming RBM planning cycles, taking into account that water, sediment, and biota represent intrinsic components of the riverine systems and the path towards sustainable water management comprises transboundary solutions that address these issues, also considering their numerous interlinkages.

## **2. Objectives of the Assignment**

The key objective of the on Sediment, Water and Biota in the Sava River Basin (Study) is to make a crucial contribution to the further understanding of sediment-related issues in the Sava River basin by building the knowledge base, filling the recognized gaps, and providing state-of-the-art knowledge to support the implementation of the FASRB and its related Protocol on Sediment Management. Furthermore, the Study will provide significant support for achieving the WFD objectives and help fulfil requirements of other environmental EU legislation, including the Floods Directive<sup>3</sup>, the Habitats Directive<sup>4</sup>, the Directive on Soil Monitoring and Resilience (Soil Monitoring Law)<sup>5</sup> as well as sectoral policies, such as those for agriculture, energy, and transport.

The specific objectives of the Study are to:

- Upgrade the methodological approach to facilitate basin-wide compliance of monitoring practices and fill the data gaps related to sediment, water, and biota in the Sava riparian countries, compliant with the Water Framework Directive (WFD) requirements and other relevant EU policies.
- Identify and assess interlinkages of the water, biota, and sediment regime (in terms of quality, quantity, and transport), taking into consideration various anthropogenic pressures

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<sup>2</sup> Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 (Water Framework Directive)

<sup>3</sup> DIRECTIVE 2007/60/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 23 October 2007 on the assessment and management of flood risks

<sup>4</sup> COUNCIL DIRECTIVE 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

<sup>5</sup> DIRECTIVE OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Soil Monitoring and Resilience (Soil Monitoring Law)



and water and sediment uses, and anticipate climate change impact on the water, biota and sediment system.

- Enable data, knowledge and information exchange about sediment quality and quantity affecting water and biota in the Sava River Basin, including the development of a simulation model that could contribute to this objective.
- Pave the way towards the development of an Integrated Sediment Management Plan for the Sava River Basin, as required by the Protocol on Sediment Management to the FASRB, and compliant with the WFD and other relevant EU policies.
- Build the capacity of national experts and different stakeholders.

### 3. Scope of Services, Tasks and Expected Deliverables

#### 3.1 Main activities

The five main activities (A-E) that the Consultant should perform are<sup>6</sup>:

A. **Assessment of the current status** and trends of:

- **sediment quantity** i.e., to provide information on how much and what types of sediment, there currently are and how the sediment is distributed in, and moves through the Sava River Basin, by collecting data at locations of existing hydrological/sediment monitoring network and other relevant sources on sediment discharges, loads and depositions, granulometric curves, the granulometric composition of suspended and bed load deposit, characteristic grain diameters, and other relevant data. Assess sediment transport in the Sava River and its major tributaries and prepare an inventory of interventions that affect it.
- **sediment quality** i.e., to provide information on the current physicochemical composition of the sediment as well as inventory of pressures that affect it.
- **water and biota** which are dependent or affect sediment quality and quantity.
- **existing data on sediment/water/biota collection/exchange practices** on the country levels as well as on the Sava River Basin level, and state-of-art sediment/water/biota modelling practices suitable to the Sava River Basin **along with the review of the existing models for sediment related modelling purposes.**

The expected **outcomes** of this activity are (i) an up-to-date insight in sediment, water and biota system, including standard statistical processing of collected observed data on quantity, and analysis of data on quality and sediment transport for the Sava River and its major tributaries; (ii) identified hotspots in terms of sediment quantity and quality; (iii) preliminary assessment of sediment impact on water uses (social-economic activities and environment); (iv) inventory of data collection/exchange practices on sediment, water and biota including the review of the identified existing models; (v) performed delineation of the sediment management units in accordance with geographical features, hydrological conditions, sediment characteristics, anthropogenic activities, and land use, as main units for future measures implementation; (vi) identified data and knowledge gaps and suggestions on how to fill them.

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<sup>6</sup> The list of tasks and instructions presented hereunder should not be considered exhaustive. The tasks (not provided in chronological order, are to be performed where possible in parallel) will be confirmed based on the Inception Report and may be subject to further amendments based on insights into progress. Therefore, it is the responsibility of the Consultant to proactively reassess the requested services, to fulfil the stated objectives of the assignment.

- B. **Monitoring, data collation and data management:** Collation and review of the state-of-art and good practices regarding *in situ* sampling methods (WFD compliant), passive sampling, QA/QC<sup>7</sup>assured sample analyses/analytical methods (WFD compliant), possibilities of earth observation (EO: especially optical water types, water color), FAIR data management approaches and (big) data storage and sharing (compatible with existing national data collection and data sharing practice, Sava GIS/HIS, EEA, WISE), data QA/QC.

The expected **outcomes** of this activity are: (i) recommendation for (standardized, where relevant WFD compliant) sediment, water and biota monitoring (including sampling protocols and possibilities of EO) and suggestions for indicative monitoring practice (use of sediment and/or biota as indicators to describe the general contaminant status, compare contaminant concentrations in different areas, identify possible sources of contaminants, and biota as indicators for assessment of sediment quality and quantity); (ii) proposal for upgrade of existing Sava GIS/HIS structure and content related to sediment/water/biota, a proposal for relevant database modules for collection, storage, exchange and sharing of relevant data sets.

- C. **Development of a sediment model** for a better understanding of the Sava River Basin water/sediment system functioning. Establishment of the model to perform sediment simulation should include the following tasks: (i) review of necessary and available modelling data, taken into consideration the outcomes from A and all other available data (ii) select the surface erosion and sediment transport methods; (iii) re-evaluate the parameters developed for the existing models using existing data, newly acquired data, and modification of techniques used, and update the existing model with data on erosion and sediment discharge that were not originally incorporated into the modeling; (iv) develop historical event-based calibration and verification of the basin and rivers across a range of events (using observed data at 8 locations where historical daily sediment discharge measurements exist) to ensure that the model is capable of simulating across a range of hydrological events; (v) finalize the model and deliver it with the modeling results including recommendations for its use for further evaluation of sediment/water/biota interlinkages and provide the concept of a such comprehensive model; (vi) develop technical documentation of the model used and modeling activities performed within the assignment. This task will include the assessment of climate change impacts on the water/sediment system. The model developed will need to be able to simulate management and investment planning scenarios to assess the impact/benefits of the implementation of policy, infrastructure or management decisions on sedimentation in the basin.

The expected **outcomes** of this activity are: (i) model which should include the transformation of precipitation and other meteorological inputs into runoff and simulation of the surface soil erosion and sediment transport, able to route flows down the tributaries and the Sava River and produce appropriate flow hydrographs and to simulate erosion intensity and sediment production and transport with the corresponding technical documentation; (ii) trained experts through on-the-job-trainings in accordance with the training program; (knowledge transfer program should be confirmed during the Inception Phase); (iii) evaluation of the model performance and results, with clearly defined model's strengths, weaknesses, and limitations and recommendations for further model developments and its potential use for assessment sediment, water and biota interlinkages.

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<sup>7</sup> QA/QC: Quality assurance & quality control in sampling

**Note:** The existing Sava HEC-HMS<sup>8</sup> hydrological model will be made available to the Consultant. It currently does not include sediment simulation. The ISRBC encourages the use of this model for this Assignment.

- D. **Organizing a sediment, water and biota sampling campaign** to demonstrate the monitoring of water, sediment and biota in accordance with the most appropriate protocols and methods defined for the Sava River basin under the review under activity B, exchange knowledge between experts, and promote visibility of the study. Agreed with the ISRBC, one site will be selected in each of the Sava countries for this sampling campaign. The samples will have to be analyzed by QA/QC assured laboratories (if not available in the Sava countries, then to be analyzed in another EU country). The results should be jointly evaluated with the relevant stakeholders.

The expected **outcome** of this activity is a performed sampling campaign in cooperation with experts from the Sava River basin. The objectives of this task are to contribute to harmonization and upgrade of monitoring techniques in the Sava basin countries, in addition to foster knowledge exchange and collaboration, to inform the study activities and to increase the visibility of the study.

- E. **Towards an integrated sediment management plan:** (i) analyze the results obtained in activities A-D; (ii) perform an economic impact assessment of sedimentation in the Sava River basin by developing a first order model (this may include the use of Invest to assess the economic impact on water supply services, RESCON2 to assess the economic impact of sedimentation in dams, among others. The consultant shall propose the scope and approach, based on the most important features of the sediment-water-biota system in the Sava basin) (ii) Review how sediment management is addressed in other transboundary basins (such as in the Elbe RBMP). Based on the analysis and review performed, the guidance provided in the WFD CIS sediment document, and based on a critical review of policies that are already in place for the Sava (such as the Protocol on Sediment Management to the FASRB) suggest how to develop an integrated sediment management plan for the Sava River Basin compliant with legal obligations (FASRB, WFD and other, relevant EU policies), and World Bank Environmental and Social Framework (ESF).

The expected **outcome** of this activity is the updated and upgraded Outline of the Sediment Management Plan for the Sava River Basin, including recommended steps for developing an integrated Sediment Management Plan for the Sava River Basin that complies with legal obligations.

All activities should be performed fully aligned with the provisions of the ESF of the World Bank, and all the underlying Environmental and Social Standards (ESS) under the ESF, in particular, ESS1 on Environmental and Social Impact, ESS6 on Biodiversity, and ESS10 on Stakeholder Engagement. The results of the Study should be compared to the ESF, and if gaps are identified, recommendations that include ways to bridge the identified gaps should be provided.

Over the course of the Assignment, the Consultant shall organize the following events with the participation of key stakeholders<sup>9</sup>:

- Kick-off meeting during the Inception Phase.

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<sup>8</sup> <https://www.savacommission.org/activities/cross-cutting-issues/hydrologic-and-hydraulic-models/282>

<sup>9</sup> Key stakeholders to be identified in the Inception Phase of the Assignment

- the 1<sup>st</sup> stakeholder forum after finalization of the 1<sup>st</sup> Interim report.
- the 2<sup>nd</sup> stakeholder forum during preparation of the 2<sup>nd</sup> Interim Report.
- the final conference to present the final report and all main project outcomes.

The events will be in general held in person, with the possibility of participation online. The Consultant should provide an adequate meeting room, equipped with modern technical equipment, which includes excellent sound systems, quality lighting, projector, screen, and high-speed internet. The costs of refreshments and meals for participants will be borne by the Consultant. For each event, the Consultant should prepare (i) an agenda with background information, (ii) draft documents and presentations with critical issues to be discussed. The Consultant shall moderate and compile the minutes of the events.

The estimated number of participants, to attend events in person, is as follows:

- 25 at the kick-off meeting
- 30 at the forums
- 40 at the final conference.

The list of participants in each event will be defined in cooperation with the ISRBC.

During the implementation of part C of the assignment, the Consultant should organize knowledge transfer sessions to provide participants with information on model development and the necessary skills to effectively use the model. The Consultant shall prepare a detailed proposal of the training program, aligned with the project's implementation phases. The program will be refined based on the analysis of the key stakeholders, further detailed, and approved during the Inception Phase.

During the implementation of part D of the assignment, the Consultant should organize sampling campaigns in each of the Sava countries on selected sites (four sites, one per country) in cooperation with the experts from the Sava countries.

In principle, workshop/training will be conducted in person with an estimated attendance of ten (10) participants per event. The Consultant will cover the costs of travel, meals, and accommodation for training participants. Per diems may not be paid to participants when meals and accommodation are to be provided. The Consultant is also responsible for providing a suitable meeting room equipped with modern technical amenities, including excellent sound systems, quality lighting, a projector, screen, and high-speed internet. For national experts who will not be able to attend the training sessions in person, access should be provided through a web application, such as MS Teams, Webex, etc. Workshop/Training materials such as agendas, descriptions of specific topics, presentations, modeling examples, etc., will be distributed to participants at least one week before each course.

During the implementation of the assignment, the Consultant will, on an ad hoc basis, prepare appropriate materials for public release, which may include short videos, press releases, and news for the web and social media, in English and one of the official languages of the Parties to the FASRB.

In addition, the Consultant shall present interim and subsequent project results at the meetings of the ISRBC respective expert groups (Permanent Expert Groups for River Basin Management, Flood Protection, Navigation, and Hydrometeorological Issues) which will review and provide comments and recommendations for draft deliverables. The participation of the Consultant at the meetings

may be in person or online. It is estimated that eight meetings of the expert groups will be organized by the ISRBC during the Assignment.

## 4. Deliverables

The Consultant should provide the following deliverables:

1. Report on the assessment of the sediment, water and biota system in the Sava River Basin.
2. Report on the database module structure and content with recommendations for future development.
3. Sediment simulation model tested by appropriately trained experts in the Sava countries with corresponding technical documentation.
4. Report on the recommendation for (standardized, where relevant WFD compliant) sediment, water and biota monitoring and sampling campaign.
5. Report on analysis of the activities performed within the assignment with recommendation for steps needed for preparation of an integrated sediment management plan.

## 5. Reporting Requirements and Time Schedule for Delivery

### 5.1 Time schedule and Reports' content

Month*	Report	Content of Report
1	Draft Inception report	
2	The Inception Report	<ol style="list-style-type: none"> <li>a. Detail description of the activities (A-E) that will be performed during the assignment.</li> <li>b. Detailed timetable (including a Gantt chart with deliverables and milestones).</li> <li>c. Identification and explanation of modifications to the initial methodology as set out in the Technical Proposal.</li> <li>d. Detailed knowledge transfer program.</li> <li>e. Identification of key stakeholders, and activities planned for stakeholder engagement.</li> </ol>
5	Draft 1 <sup>st</sup> Interim report	
6	The 1 <sup>st</sup> Interim Report	<ol style="list-style-type: none"> <li>1. Report on the assessment of the current status of sediment, water and biota system in the Sava River Basin that should contain:               <ul style="list-style-type: none"> <li>- Information on sediment quality, quantity and transport in the Sava River and major tributaries including identification of the hotspots in terms of both quality and quantity.</li> <li>- Preliminary assessment of sediment impact on important water uses.</li> <li>- Identified data and knowledge gaps in relation to the sediment, water and biota system and their interlinkages and suggestions on how to fill them.</li> </ul> </li> </ol>

Month*	Report	Content of Report
		<ol style="list-style-type: none"> <li>2. Report on the database module structure and content, future cooperation and development that should contain:                             <ul style="list-style-type: none"> <li>- inventory of data collection/exchange practices on sediment, water, and biota in the Sava River basin and comparison with best industry practices.</li> <li>- a proposal for upgrade of existing Sava GIS/HIS structure and content related to sediment/water/biota.</li> <li>- first version of delineated sediment management units (in a database, Activity B), with elaboration of the procedures used for delineation.</li> </ul> </li> <li>3. Inventory of best modelling practices and practices in the Sava River basin and beyond, selection of the modelling approach including the first version of the sediment simulation model.</li> </ol>
10	Draft 2 <sup>nd</sup> Interim Report	
11	The 2 <sup>nd</sup> Interim Report	<ol style="list-style-type: none"> <li>1. Report with recommendation for (standardized, where relevant WFD compliant) sediment, water and biota monitoring (including sampling protocols and possibilities of EO) and suggestions for indicative monitoring practice.</li> <li>2. Report on sampling campaign including sampling and analytical methods and evaluated sample results (containing but not limited to data and information on locations, protocols used, data acquired and their evaluation and critical assessment). Results of the sampling campaign within the database (Activity B).</li> <li>3. Report comprising modelling activities performed within the assignment, and final modelling results.</li> <li>4. Report on the knowledge transfer program.</li> </ol>
13	Draft Final Report	
14	Final Report	<ol style="list-style-type: none"> <li>1. Final delineated sediment management units.</li> <li>2. Final version of the Sediment simulation model tested by appropriately trained experts in the Sava countries with corresponding technical documentation, and evaluation of the model performance and results.</li> <li>3. Analysis of the activities performed within the assignment, and updated and upgraded Outline of the Sediment Management Plan, with recommended steps needed for the preparation of the full-fledged plan.</li> </ol>

\*From the commencement of the Assignment

The Consultant shall also prepare short monthly progress reports (5 pages maximum) containing:

- Progress on tasks and deliverables, including any challenges and risks.
- Review and feedback on the work completed.
- Verification that the project remains on track and aligned with the objectives and, if necessary, proposed corrective measures.

## 5.2 Format of the reports and deliverables

All draft reports, including main deliverables, shall be submitted only electronically in an editable format to the Project Coordinator, who will be responsible for approval of the reports and deliverables. The Consultant shall present the final version within 21 days from the dates it receives the comments.

The approved reports shall be delivered in digital format and in two hard copies.

All reports must be accompanied by necessary maps/graphs/figures. All maps/graphs/figures and data used for their development should be delivered in appropriate digital editable format. Each version of database and sediment simulation model should be prepared and submitted on digital media.

All reports shall be submitted in English.

Monthly progress reports should be prepared in English, only in digital version.

*Submitted and approved reports (Inception, Interim reports, and Final report) containing related deliverables shall constitute the basis against which the payments to the Consultant will be made.*

## 6. Team Composition & Qualification Requirements for the Consultant

### 6.1 Consultant Qualification

1. The Consultant must be a legal entity whose core business should comprise the development and execution of all activities as described in section 3.1.
2. The Consultant should demonstrate extensive experience regarding the execution of similar tasks with similar scope, complexity, and value such as:
  - Experience with the development and execution of water, sediment, and biota related projects, plans and programs.
  - Experience with the implementation of sediment management related EU policies, in particular the WFD, Floods Directive, Habitats Directive, etc. as well as sectoral policies such as agriculture, energy, and transport.
  - Expertise in hydrogeomorphology, ecotoxicology and ecology, modelling, and data management.
3. The Consultant must have completed in the past ten (10) years as a Lead Consultant at least four (4) similar assignments. This should be demonstrated by attaching Copies of References (containing the start and completion date, a brief description of the assignment, country of assignment, client name, address, reference's contact, and contract value) for the listed works. If the Consultant associates with other firms in the form of a joint venture or a sub-consultancy to enhance their qualifications, copies of their references must also be attached.
4. The Consultant should demonstrate the solid technical and managerial capability of the firm. Please provide only the structure of the organization, general qualifications, and availability of appropriately skilled key experts. It is not needed to provide the CVs of key experts<sup>10</sup>.

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<sup>10</sup> No need to provide CVs while at the shortlisting stage. The key experts will be evaluated at next stages of procurement procedure.

The criteria for the selection of the Consultant are:

- |   |           |
|---|-----------|
| a) Overall experience relevant to the assignment –        | 35 points |
| b) Similar contracts to demonstrate specific experience – | 50 points |
| d) Firm Organization and availability of key experts–     | 15 points |

## **6.2 Details on required personal capabilities requirements**

It is expected that this project will require a team of experts covering the skill sets listed below. Required experience should be demonstrated by the attached list of references (containing start and completion date, country of assignment, client name, address, reference's contact, and a brief description of the assignment, with clearly defined role performed) for all the listed contracts.

It is expected that this project will require a team of consultants covering the following range of skill sets:

### **Key Expert 1: Team leader (Water Resources)**

1. Advanced university degree (master's or equivalent) the field of water management /engineering, or environmental science; an advanced university degree in another discipline may be accepted in lieu if it is pertinent to the requirements of the assignment and in combination with relevant professional experience.
2. At least ten (10) years of proven professional experience in the water resources field and in the implementation of similar assignments in terms of scope, value, and complexity.
3. Documented experience in leading international and multidisciplinary technical project teams (at least five (5) contracts), including activities of planning, budgeting, and scheduling. Strong project management skills and leadership abilities to ensure the successful implementation of the assignment within specified timelines and budgets.
4. Excellent knowledge of relevant EU policies, regulations, standards, and guidelines related to water and sediment management.
5. Excellent command of written and spoken English.
6. Previous experience in the Sava basin region will be taken as an advantage.

### **Key expert 2 (sediment/hydrogeomorphology)**

1. Advanced university degree (master's or equivalent) in the field of geology, geomorphology, hydrology, environmental science, or civil engineering; an advanced university degree in another discipline may be accepted in lieu if it is pertinent to the requirements of the assignment and in combination with relevant professional experience.
2. At least ten (10) years of proven qualifying experience related to hydrogeomorphology, sediment transport, and engineered river systems.
3. Experience in the implementation of at least three (3) contracts for services that are similar to the assignment, showing excellent knowledge about the inherent complicity of the sediment, water, and biota interlinkages.
4. Extended knowledge of sediment management-related EU policies and the WFD, in particular.
5. Excellent command of written and spoken English.

### **Key expert 3 (ecotoxicology):**

1. Advanced university degree (master's or equivalent) in environmental science, biology, ecology, chemistry, toxicology, or environmental engineering. An advanced university degree in another discipline may be accepted in lieu if it is pertinent to the requirements of the assignment and in combination with relevant professional experience.
2. At least seven (7) years of qualifying professional experience related to bioavailability, food chain transfer, sediment-water-biota partitioning, msPAF, multi stressor, emerging substances and substance of great concern, WFD EQS and setting of such EQS, source-pathway-receptor



paradigm, hazard > risk > impact, risk-based management, Triad approach (chemistry, bioassays, field inventory), effect-directed analysis, mesocosms, QA/QC chemical analysis and bioassays, multivariate statistical analyses, standardization, intercalibration, round-robin testing, WFD CIS guidance, WFD chemical and ecological status assessment.

3. Experience in the implementation of at least three (3) contracts for services that are similar to the assignment.
4. Excellent command of written and spoken English.

**Key expert 4 (ecology):**

1. Advanced university degree (master's or equivalent) in ecology, biology, or environmental science. An advanced university degree in another discipline may be accepted in lieu if it is pertinent to the requirements of the assignment and in combination with relevant professional experience.
2. At least seven (7) years of qualifying professional experience related to BQE, habitat types, invasive species, ecological patterns and processes, food web analyses, multivariate statistical analyses, biological indices, species traits and traits-based analyses, biological knowledge rules in ecological modelling, ecological models, bio-geomorphology, (WFD compliant) biota sampling, indicative monitoring, WFD CIS guidance, WFD ecological status assessment.
3. Experience in the implementation of at least three (3) contracts for services that are similar to the assignment.
4. Excellent command of written and spoken English.

**Key expert 5 (modeling):**

1. Advanced university degree (master's or equivalent) in the field of hydrology, engineering, or environmental science. An advanced university degree in another discipline may be accepted in lieu if it is pertinent to the requirements of the assignment and in combination with relevant professional experience.
2. At least seven (7) years of qualifying professional experience related to hydrological and hydraulic modelling, erosion modelling, modelling sediment from the land surface, and sediment discharge transport modelling.
3. Experience in the implementation of at least three (3) contracts for services that are similar to the assignment.
4. Excellent command of written and spoken English.

The pool of experts should contain as well non-key experts who should possess at least the following expertise:

- Stakeholder engagement/public participation
- Data management
- Biology
- Ecology
- Economy/Environmental Economy
- Sediment
- Water/sediment quality monitoring
- Hydrology/sediment quantity monitoring
- Modelling
- GIS Specialist
- Data Analyst

The list of the non-key experts shall be approved with the approval of the Inception Report, i.e., when the final scope of services for the assignment will be (re)defined and approved.

**Estimated input per expert:**

<b>Experts</b>	<b>Estimated number of days</b>
Key expert 1 Team Leader	70
Key expert 2 (sediment/hydrogeomorphology)	70
Key expert 3 (ecotoxicology)	45
Key expert 4 (ecology):	40
Key expert 5 (modelling):	45
Non key experts	385
<b>TOTAL</b>	<b>655</b>

## 7. Client's Input

The ISRBC shall:

- make available to the Consultant all produced publications of interest in electronic form.
- make available the existing Sava HEC-HMS hydrological model and related GIS data in native format.
- facilitate contacts with the stakeholders and assist in the collection and valorization of comments where necessary.
- provide support in the organization of forums and other events/meetings.

## 8. Working language

The working language is English.

## 9. Duration of the Assignment

The expected duration of the assignment is 14 months from the commencement date. The intended commencement date is January 2025, but the actual date will be defined with the Contract signature. The Consultant will perform the services in line with a detailed schedule submitted as part of the proposal, subject to changes during negotiations to accommodate the Client's comments and requirements and during the inception phase period

## 10. Selection process

The Consultant will be selected under the provisions of the World Bank Procurement Regulations for IPF Borrowers (Procurement Regulations), in investment project financing Goods, Works, Non-Consulting and Consulting Services November 2020, based on the method of Quality and Cost Based Selection (QCBS) Lump Sum Contract.