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Preparing FAIRway 2 works in the Rhine-Danube corridor

MINUTES (final)

Stakeholders' Forum Meeting 15 (SHFM15)

Date	07.05.2025
Time	10:00 – 12:00
Place	Online meeting (*Google Meet*): https://meet.google.com/cwa-xidu-hms
Participants	See List of Participants (LoP)
For the minutes	Katarina Marinković, Predrag Živadinović

The presentations are available for download on the Stakeholders' Forum website.

Welcome note

Mr. Ljubiša Mihajlović welcomed all to the 15th Stakeholder Forum meeting for the Project "Preparing FAIRway 2 Works in the Rhine-Danube Corridor," where the focus will be on critical aspects of hydraulic modelling and Multi-Criteria Analysis (MCA). He introduced himself as a representative of the Directorate for Inland Waterways. The Serbian Ministry (MGSI) is a project partner responsible for organising and coordinating the Stakeholder Forum in the project emphasizing its role in supporting joint sector activities on the Danube between Serbia and Croatia, within the FAIRway 2 project under the CEF framework.

Ms. Marina Ilić, the chairperson of the forum meeting, provided an overview of the agenda and the presentations scheduled for the meeting.

Modelling & Multi-Criteria Analysis of the common Danube section

Hydraulic and morphological modelling of the SRB-CRO common stretch of the Danube River - 2D Modelling Progress *(Romeo Soare, Hidrozavod DTD, 2025-05-07_PPT_PFW2_SHFM15_01_Project_Activities_Overview_R.Soare.pdf)*

Mr. Soare presented an overview of the completed and ongoing project activities, with a particular focus on data collection, hydrodynamic and morphological modelling, as well as the application of multi-criteria analysis (MCA) for the Croatian-Serbian common Danube section.

Activities 1 through 3 have been completed. These included the update of the Low Navigable Water Level (LNWL), identification and prioritization of navigation bottlenecks, preparation of the bottleneck catalogue, and the development of the 1D model including setup, calibration, and integration of the LNWL data. The methodological approach for the MCA was also finalized within these activities.

Activity 4, which focuses on 2D hydrodynamic and morphological modelling, is in its final phase. Mr. Romeo highlighted that all relevant input data had been updated and complemented with additional measurements provided by Plovput in 2023. These included hydrological and sediment data necessary for both the calibration and validation of the 2D model.

The 2D model was developed using the BASEMENT software. The digital terrain model (DTM) was created based on the available bathymetric data, and the computational mesh was generated accordingly for each selected sector. Calibration was performed using multiple data sources, such as measured flow velocities, sediment transport characteristics, and bathymetric surveys carried out in September 2023. Verification was done through comparison with observed flow patterns and sediment behaviour.

As part of the scenario development process, several structural and revitalization measures were tested through simulations. For each critical sector, different variants were analysed with regard to their hydraulic and morphological performance. For example, in one scenario two chevrons were introduced, and their impact was demonstrated using velocity field visualizations and sediment transport simulations.

A draft report summarizing the 2D modelling results and preliminary MCA application was submitted in April. Mr. Romeo emphasized that the final report is currently being revised and will include all feedback received from stakeholders.

Finally, Mr. Romeo informed the participants that an integrated study is under preparation, which will consolidate the findings from all four activities. This study will include modelling outcomes (1D and 2D models), MCA evaluations, environmental and climate considerations, and stakeholder inputs collected throughout the project. Remaining tasks under Activity 4 (Tasks 7–9) are expected to be completed in the upcoming period, in line with the project's Terms of Reference.

Questions & Answers:

Q (Mr. Tibor Mikuška, Croatian Society for Bird and Nature Protection): Pointed out that while the report on bottleneck variants was marked as finalized, the stakeholder group never had a proper opportunity to work through or analyze it thoroughly. The first draft was received in March, followed by comments during SHFM #14. A second draft came later, but it was not finalized. Other stakeholders confirmed this. He requested clarification on whether their comments would be addressed and if feedback would be provided.

A (Mr. Nikola Rosić, Hidrozavod DTD): Final comments were still being processed, including some received that morning, and that the consultant would provide answers.

Simulation Results of Morphological Alterations for Alternative Solutions *(Nikola Rosić, Hidrozavod DTD, 2025-05-07_PPT_PFW2_SHFM15_02_2D_Modelling_N.Rosic.pdf)*

Mr. Nikola Rosić presented the results of the 2D morphological modeling conducted within Activity 4 of the project. The focus of the presentation was on the hydraulic and morphological effects of various structural and revitalization measures simulated for selected sectors along the Croatian-Serbian common Danube stretch. The modeling included three scenarios: Scenario 1 representing the "do-nothing" baseline, Scenario 2 involving structural and regularization interventions, and Scenario 4 encompassing adjusted variants of the previous scenario.

Five sectors were analyzed in total, of which four were previously identified as critical for navigation. In the Apatin sector, two major navigation issues were addressed: the instability of a sandbar near the left bank and insufficient fairway depth on the right side. Different configurations involving one or two chevrons and bottom seals were simulated. The results indicated that chevrons influenced the flow field by promoting deposition behind the structures, while seals contributed to reducing erosion through flow redistribution. Increased flow velocity in critical zones and improved uniformity were observed. Morphological changes included expected erosion and deposition patterns, confirmed via longitudinal and cross-sectional profiles.

In the Čivutski Rukavac sector, although four problematic areas were identified, only one was addressed due to environmental constraints. A single groin structure was proposed, and four sub-variants were examined—rooted versus detached, with and without rings. Under dominant discharge conditions, differences between variants were minor. At lower discharges, however, groins with rings (T-groins) provided greater flow stability and were therefore selected as the preferred option. Detached T-groins were adopted for the final variant due to their favorable influence on navigation and minimized environmental impact.

In the Drava confluence sector, significant deposition near the fairway posed navigational challenges. Two types of interventions were tested: an upstream side channel designed to reduce sediment input and a set of bottom seals aimed at altering the flow field. The scenario involving the channel showed improved sediment distribution and enhanced riverbed deepening in the critical zone. Bottom seals in Scenario 4 demonstrated moderate improvement through redistribution of erosion and deposition areas, with a slightly reduced sediment accumulation in the confluence zone.

Although the Aljmaš sector was not previously classified as critical, it was included in the modeling due to its hydraulic connectivity with neighboring sectors. A side channel was proposed to address downstream issues in the Staklar sector by redistributing part of the flow. Modeling results showed reduced erosion and increased deposition in strategic areas. While the velocity magnitude differences were minor between the scenarios, morphological differences were more evident. Scenario 4 in particular showed increased water levels, possibly due to the effect of seals installed further downstream.

In the Staklar sector, structural measures were introduced to resolve depth limitations along the left margin of the fairway. A combination of upstream channels and bottom seals was modeled. Although four seals were initially analyzed, two were ultimately adopted. Simulations showed a more uniform velocity field and enhanced sediment deposition in the fairway area. Morphological simulations highlighted reduced erosion in critical zones and general sediment redistribution. Longitudinal riverbed profiles confirmed a gradual lowering of the riverbed across all scenarios. Scenario 2 generally led to decreased water levels, while Scenario 4 showed localized increases attributed to structural elements.

In closing, Mr. Rosić emphasized that differences in morphological behavior between scenarios were more pronounced than differences in flow velocities, and that final conclusions regarding the effectiveness of each measure must be derived from the ongoing Multi-Criteria Analysis (MCA). He also noted the sensitivity of modeling outcomes to sediment transport parameters, which were carefully calibrated and based on expert judgment.

Questions & Answers:

Q (Mr. Georg Rast, consultant): Raised concerns regarding the objectives and long-term functionality of sidearms, particularly in the Staklar–Aljmaš sector. It was questioned whether the stated purpose, sediment retention, would eventually result in silting and loss of function. Regarding the presented graph on long-term water level decrease, it was observed that the differences between scenarios were minimal, about 3 cm variation against a 20 cm overall decrease. This led to questions about modelling boundary conditions and the assumptions behind the time frame of morphological changes.

A (Mr. Nikola Rosić, Hidrozavod DTD): Clarified that the sidearms were intended to retain sediments along the main channel, although the wording in the report may have been misleading and would be revised accordingly. It was also acknowledged that important information, such as cross-sections and flow distribution data for sidearms, was missing and would be added in the next version. It was confirmed that Scenario 4 did not include the sidearm and instead focused only on bottom sills. It was explained that the scenarios were designed to evaluate individual measures separately, which would allow their distinct effects to be analysed within the MCA framework. Simulation results were indicative and based on a set of parameters derived from a limited dataset.

Q (Ms. Kerstin Bock, WWF Austria): Expresssed a concern that not all scenarios had been modelled for each sector. In particular, Scenario 3 (fairway realignment) was missing. She also questioned why mixed scenarios (e.g., sidearms with bottom sills) were not analysed and suggested that Scenario 2 should be split to distinguish between structural and revitalisation measures.

A (Mr. Nikola Rosić, Hidrozavod DTD): Explained that scenario three is a fairway realignment scenario. It is a scenario also without structural measures. In terms of morphological alteration, it's scenario S1, so doing nothing scenario. Fairway realignment without intervention, is the scenario where it is going to be analysed the possibilities for realignment inside scenario one, scenario one with realignment. In terms of modelling, there are no differences.

Q (Ms. Arno Mohl, WWF Austria): Scenario 3 was not a pure non-intervention scenario, as it also included minor interventions such as dredging and operational measures like one-way navigation, which had not been modelled. He underlined that from the project partner's perspective, Scenario 3 should include such measures and be properly assessed.

A (Mr. Nikola Rosić, Hidrozavod DTD): Explained that dredging was considered a baseline measure common to all scenarios and would be reflected in the MCA as an indicator, not as an individual scenario. One-way navigation was not analysed in the model, as it was considered an operational decision rather than a morphological measure. However, the need for clearer terminology and more consistent assumptions across all reports was acknowledged.

Additional information (Mr. Romeo Soare, Hidrozavod DTD): clarified that, in line with the Danube Commission's recommendations, one-way navigation may be applied under difficult hydrological conditions, but it is not considered a recommended or permanent measure. In the Apatin sector, the area where chevrons are proposed already meets the minimum fairway width parameters, raising the question of why additional structures are being planned if the navigation conditions are already acceptable.

It was reiterated that fairway conditions are a result of hydrological circumstances and not a design parameter per se.

He explained that the chevrons are intended primarily to stabilise a historically mobile sandbar, which has caused navigation difficulties in the past due to its instability in both horizontal and vertical directions. The proposed intervention aims to ensure long-term morphological stability near the left riverbank.

Additional information (Dejan Trifunović, Danube Commission): Clarified that one-way navigation was accepted under exceptional circumstances but was not recommended as a standard measure. It was emphasized that the fairway width of 120–150 meters, as accepted by the Commission, did not imply one-way navigation. The Commission noted that any reduction below this threshold would require further consideration.

Q (Mr. Tibor Mikuška, Croatian Society for Bird and Nature Protection): raised concerns about the hydrodynamic model results for Scenario 1 in the Apatin sector, pointing out discrepancies between the simulated velocity distributions and observed conditions during low water levels. He emphasized that the model primarily represents dominant discharge (~2400 m^3/s), whereas actual navigation conditions frequently occur at lower discharges (~1400 m^3/s), when a sandbar and an island are clearly present and well above water level, and this is not reflected in the model output. Instead proposed chevrons that will have little or no effect to the existing navigation channel upstream Apatin, to eliminate the bottleneck downstream Apatin he recommended consideration of the removal of the eroding embankment downstream of Apatin to allow the river more space for natural meandering. This could widen the channel cross-section, reduce shear stress, and potentially improve navigation conditions without extensive structural works. He also noted that it is a very unfortunate situation that the members of the Stakeholder forum had not been able to discuss any of the alternatives to the proposed measures, because, during the 15th SF meeting, this is the first time that measures for the bottlenecks and their hydro-morphological consequences were properly and fully presented (but still without results of the MCA analysis) by the modelling team. He offered to the Stakeholder Forum to prepare a presentation with the alternative solutions to the current proposal and to present it during the next SF meeting.

A (Mr. Nikola Rosić, Hidrozavod DTD): Pointed out that the area downstream of Apatin is an industrial zone with existing infrastructure, making such removal difficult. Moreover, there is limited hydrological and morphological data to support this solution, and it was not included in the current modelling scenarios.

Next steps & AOB

- Stakeholder Forum meetings planning for 2025

  Following the discussions among participants at the Forum, it has been decided that the next meeting will take place on **18th of June 2025**.

Upcoming Meetings

Meeting	Date / time	Place
Stakeholder Forum Meeting #16	18 June	Online

Attachments

- List of participants (separate file)
- Presentations (Stakeholder Forum website: https://www.viadonau.org/en/company/project-database/preparing-fairway-2-works-in-the-rhine-danube-corridor-study/stakeholder-forum