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Preparing FAIRway 2 works in the Rhine-Danube corridor

MINUTES (final)

Stakeholders' Forum Meeting 17 (SHFM17)

Date	16.07.2025
Time	10:00 – 12:00
Place	Online meeting (*Google Meet*): https://meet.google.com/zid-kmse-vqs
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 17th Stakeholder Forum meeting for the Project "Preparing FAIRway 2 Works in the Rhine-Danube Corridor". 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. He emphasized that the aim of the session was to summarize results achieved so far and to discuss directions for the final phase of the project, including formulating strategic recommendations. It was noted that the majority of project outputs had already been completed, with the exception of Output 5.1 Integrated study on alternative solutions, which was still undergoing finalization. The intention remains to conclude all deliverables by 1 August 2025, the official project end date.

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

Wrap up on activities on the common Croatian-Serbian sector & Assessment of the application of integrated planning process & lessons learned *(Danijel Đuđar, MMPI and Predrag Živadinović, MGSI, 2025-07-16_PPT_PrepFW2_Assessment.pdf)*

The presentation provided an overview of the project background, emphasizing that inland waterway transport projects on the Danube face dual challenges: improving navigability while safeguarding environmental and biodiversity values. It was recalled that the Danube forms part of the core trans-European Rhine–Danube corridor and that the common stretch between Croatia and Serbia remains subject to an unresolved border dispute. Nevertheless, a bilateral agreement signed in 2010 laid the groundwork for joint maintenance, and in 2014 the two countries jointly identified 17 critical sectors. These sectors are reviewed every ten years, reflecting the dynamic nature of the river. This project enabled Croatia and Serbia to jointly implement monitoring and modelling activities, recalculate low navigable water levels (ENR), and reprioritize critical sectors accordingly.

Croatia was responsible for implementing Activity 2 - Monitoring - which included riverbed surveys, sediment sampling, inventory of existing river engineering structures, and biodiversity monitoring (covering fish, birds, benthic fauna, and floodplain habitats). Serbia implemented Activity 3 - Modelling - which involved 1D hydraulic modelling, prioritization of critical sections using hydrodynamic and morphological models, application of multi-criteria analysis (MCA), and definition of potential investment steps.

Detailed overview of the integrated planning methodology based on the Danube Practical Manual was provided, which defines a six-step process for developing environmentally sound waterway infrastructure

projects. The first four steps, which were implemented within this project, include: analysis of the current status (navigation, ecology, conservation), outlining targets and project scope, planning and assessing integrated measures and engaging stakeholders and institutions. The final two steps, monitoring and evaluation, were outside the scope of this phase.

In Step 1, the navigation status was analysed by Croatia using hydrographic and sediment data, infrastructure inventories, and river flow velocity measurements. Serbia used these data, along with morphological inputs, to update ENR and high navigable water levels, identifying 13 out of the original 17 critical sectors as still relevant. Ecological status was evaluated based on the most recent River Basin Management Plans (RBMPs) in both countries, aligned with the EU Water Framework Directive (WFD). The RBMP data showed significant shares of water bodies with unfavourable ecological status: 60% for biological elements, 49% for physical-chemical elements, and 58% for hydro morphological elements. Conservation status was assessed through field monitoring and standard data forms (SDFs). In Croatia, outdated Natura 2000 data were supplemented with new field data collected under the guidance of the Ministry of Environmental Protection and Green Transition. In Serbia, Emerald Network data for 2024 were consulted.

Step 2 involved defining the scope and targets of the project. The project aimed to resolve bottlenecks along the river stretch by identifying navigation improvements that also consider ecological constraints. Data collected during monitoring followed methodologies consistent with EU and national environmental standards, enabling their future use in ecological status assessments. Responsible water and environmental authorities in both countries were engaged throughout the project. Environmental and nature impact assessments, required for any navigation-related interventions, will be undertaken in future projects.

Step 3 dealt with planning and assessing integrated measures. Four development scenarios were defined. Scenario 1 (baseline) assumed no intervention. Scenario 2 involved structural and revitalization measures combining navigation and environmental objectives. Scenario 3 proposed minimal intervention focused on fairway realignment. Scenario 4 included full structural interventions, integrating traditional river engineering with nature-based solutions. Each scenario was assessed for its potential impacts on navigation (based on TEN-T guidelines), Natura 2000 sites, and overall ecological status. In Croatia, potential impacts on Natura 2000 sites will be addressed through appropriate assessment procedure in line with the Habitats Directive. In Serbia, impacts on protected areas and biodiversity will be addressed through Environmental Impact Assessment (EIA) procedures in later stages. Direct assessment of WFD ecological status impacts was not conducted during this phase.

Step 4 emphasized transparency and Stakeholder engagement. The Stakeholder Forum was established to enable regular dialogue and data exchange. External experts supported both the monitoring and modelling components. Final documentation includes a Monitoring Report with eight annexes and a Modelling Report with detailed annexes covering modelling results and MCA inputs.

The presentation continued with a summary of lessons learned. It was emphasized the importance of establishing regular biodiversity monitoring and centralized data repositories to support future waterway development projects. Improved data exchange and early involvement of environmental organizations were identified as key success factors. It was recommended that joint governance structures be established in future projects to balance navigational and ecological interests.

The presentation also included a set of detailed recommendations. These included expanding monitoring to cover macroinvertebrates and water quality parameters, continuing hydrology and morphology data collection, harmonizing conservation assessments across both countries, improving mapping of habitats and aligning national monitoring efforts with project-level assessments. For ornithofauna, it was suggested to share data with other sectors and integrate bird monitoring with existing initiatives, publishing data through public platforms.

Recommendations derived from the modelling activities were presented. It was emphasized the need for integrated, adaptive river basin management, and improved coordination among institutions responsible for navigation, water management, and environmental protection. It was also highlighted that the project produced updated ENR values requiring validation by both countries. The 2D model developed within the project was presented as a valuable tool for future planning and analysis. Output 5.1 will elaborate further on modelling results and recommended alternatives. All project results are available upon request from the national contact points - Ms. Hubalek (Croatia) and Mr. Mihajlović (Serbia).

Questions & Answers:

Summary of the Discussion

Ms. Kerstin Bock (WWF Austria) thanked the speakers for the comprehensive summary and asked whether project results and Stakeholder feedback tables would be made publicly available on the project website.

Mr. Predrag Živadinović (MGSI) responded that online publication of materials was under discussion and confirmed that a table summarizing Stakeholder comments had been prepared by the consultant and will be shown in following presentation. While Output 5.1 Integrated Study on Alternative Solutions was still being finalized, all other deliverables and general project related documents would be published and accessible on the Plovput website. The link will be shared with Stakeholders.

Modelling & Multi-Criteria Analysis of the common Danube section

Integrated Study *(Romeo Soare, Hidrozavod DTD, Hidrozavod_Integrated_Study_Final_Outputs_rev.pdf)*

Mr. Soare began by thanking all Stakeholder participants for their contribution throughout the implementation of hydraulic and morphological modelling on the Danube's cross-border section between Serbia and Croatia. He outlined the content of the presentation, which would include a brief overview of previous activities, key findings, technical characteristics of the proposed variants, recommendations, and next steps.

He explained that the project comprised seven activities, from Activity 0 to Activity 6, each of which would be briefly presented. For Activity 1 (1D hydraulic modelling), the key outcomes included the hydrological study, updated values of the low navigable water level (LNWL), and visual representation of bottlenecks. It was noted that 1D modelling is becoming obsolete, and that 2D simulations provide more detailed and powerful analysis of bottlenecks, offering enhanced visualization of navigational constraints.

A major challenge in this activity was the lack of consistent and comprehensive data. While some spatial and database resources existed, they did not fully cover the observed area, and data had to be merged from both Serbian and Croatian sources. Discrepancies in riverbed data highlighted the need for improved cross-border coordination. This issue was not unique to this section of the Danube and should be addressed in cooperation with the Danube Commission in the future.

Mr. Nikola Rosić intervened to emphasize that the development of a full 2D model was an added value from the consultant. This model simulates river flow for the entire common section in a relatively short computation time, making it a valuable tool for the administration.

Activity 2 focused on redefining and prioritizing navigation bottlenecks. The existing catalogue was updated by applying the new LNWL values, resulting in a reduction from 17 to 13 identified bottlenecks. These were prioritized using the level of service methodology. The update reflected changes in riverbed morphology and supported future planning and scenario development.

Activity 3, one of the most dynamic components, concerned the development of a multi-criteria analysis (MCA) framework for scenario evaluation. Four primary criteria were defined: navigation, environment, feasibility, and climate change. The MCA structure was tailored specifically for this project and included advanced indicators. Weighting coefficients were proposed and agreed upon with Stakeholders to ensure transparency and alignment with project objectives.

Activity 4 was described as a cornerstone of the project. It involved the development of a 2D model for priority bottlenecks and simulation of agreed scenarios. A "do-nothing" scenario served as a baseline. Other activities included refinement of the digital terrain model, improvement of the computational mesh, and calibration of hydraulic and sediment transport models. Rather than developing separate models for each critical sector, a single unified model was created, allowing integrated assessment across multiple sectors.

Structural measures showing the most favorable navigational impact were selected and evaluated using the MCA. The key outcomes of Activity 4 included the creation and verification of the 2D hydrodynamic and morphological model, the definition of bottleneck variants, and combined results of 2D modeling and MCA.

The model allowed for simultaneous simulation across four sectors, offering better insights into morphological evolution and sediment transport. Environmentally friendly structural measures such as chevrons and groins were proposed as viable alternatives to traditional river training structures. Following

MCA evaluation, Scenario 4 (structural measures only) received the highest score due to its positive impact on navigation.

However, the absence of a well-defined environmental methodology was identified as a major weakness. The lack of quantitative environmental indicators and weak correlation with engineering interventions limited the ability to fully assess ecological impact. It was noted that improved interdisciplinary cooperation, particularly at state and basin levels, would be essential for similar projects in the future.

Activity 5 focused on compiling all previous activities into an integrated study. Compared to earlier versions, the current report included a more consistent structure with clearer links between chapters. Major changes occurred in Chapter 6, corresponding to Output 4.2 Bottlenecks Variants Defined. The consultant also prepared compilations of Stakeholder comments and consultant responses related to Outputs 4.2 Bottlenecks Variants Defined, 4.3 Technical report on 2D modelling and application of MCA, and the draft of 5.1 Integrated Study on Alternative Solutions.

Then, key findings from the project were presented. These included the development of a 2D hydraulic model, which demonstrated good agreement between simulated and observed water surface levels. The findings identified strengths in the methodology, remaining data and coordination gaps, and the practical applicability of the modelling outputs.

All newly observed LNWLs for the period 1994–2023 are higher and all newly observed HNWLs for the period 1994–2023 are lower compared to those previously reported to the Danube Commission. These findings reflected a shift in the discharge regime over the 1994–2023 period.

The application of the level of service concept combined with morphological assessments led to the identification of four critical bottlenecks: Apatin, Čivutski Rukavac, the Drava confluence and Staklar.

The MCA framework enabled comprehensive evaluation of scenarios, assigning 40% weight to navigation, 40% to environment, 15% to feasibility, and 5% to climate resilience. Scenario 4 was deemed optimal due to its favourable balance between navigational improvements and ecological sensitivity. Measures included two chevrons, one groin, and six sills.

It was emphasized that environmental impacts were only considered indirectly, and further research would be needed to assess lateral water and sediment transport and broader ecological effects. Intersectoral and international cooperation was highlighted as essential for future navigation planning.

In discussing project limitations, technical constraints included incomplete floodplain data, limited calibration data for sediment transport, and gaps in infrastructure data. Organizational limitations included fragmented Stakeholder coordination, divergence from terms of reference due to differing priorities, and the absence of inland waterway experts from stakeholder discussions. Data-related issues included missing historical records, inconsistent metadata, and incomplete geospatial data.

Regarding scenarios, Scenario 1 was the "do nothing" benchmark. Scenario 2 introduced traditional structures in upstream sectors, complemented by chevrons and downstream sills. It also proposed channel excavations in the Drava and Aljmaš sectors as a balanced solution between navigation and ecological goals.

Scenario 3 involved fairway realignment in selected sectors, while Scenario 4 proposed the most comprehensive set of measures, combining traditional river training structures with nature-inclusive interventions.

The presentation continued with a detailed explanation of the structural components included in the proposed scenarios. The final design variants for river training structures along the Danube comprise five types of interventions: chevrons, sills, T-groins, sidearm channels, and fairway realignment, as previously outlined.

Regarding chevrons, the proposed structures are characterized by a design constructed using crested stone material ranging in size from 15 to 45 cm. These structures maintain standardized dimensions, including a crest width of three meters. A significant engineering advantage of chevrons lies in their construction methodology, which typically involves placement on existing sandbars, thereby minimizing the need for imported material compared to more conventional river training structures.

For the sill structures, the design consists of submerged stone sills with a maximum stone size of 45 cm. These sills serve to redistribute flow and control erosion within affected zones. The geometric specifications are consistent, with a crest width of three meters, and slope configurations of 1:1.5 on the upstream side

and 1:1.3 downstream. The final design foresees sill implementation in three critical sectors: Apatin, Drava Confluence, and Staklar.

The detached T-groins represent an environmentally friendly alternative to traditional groin systems. These structures adopt a T-shaped configuration, forming channels between the riverbank and the structure itself, thus enhancing longitudinal connectivity for aquatic organisms. The groins adhere to standardized dimensions, and their height is set at low navigable water level (LNWL) plus one meter to ensure optimal navigational safety. A dual-material approach is applied in construction, where the core structure is made of smaller stone, while the protective top layer uses stones up to 45 cm in diameter.

Regarding sidearm channels, these physical interventions aim to improve navigation by modifying the route while simultaneously supporting ecological revitalization. Scenario 4 includes a combination of traditional structures and nature-inclusive solutions—incorporating elements already proposed in Scenario 2, along with additional detached T-groins and sills implemented across multiple sectors.

The sidearm channels are integral part of the comprehensive revitalization measures. They address both navigational and environmental objectives. The final design specifies a channel width of 60 meters, determined through extensive 2D modelling. Incremental widths from 15 to 60 meters were evaluated. The channels feature a trapezoidal cross-section with 1:1 bank slopes and a longitudinal gradient of 0.002. Construction involves excavation of existing groins, requiring the full removal of selected groin structures. The stones from dismantled groins are reused for bank protection. Final implementation focuses on key sectors such as the Drava confluence and Aljmaš, where the channels are designed to follow the natural riverbed slope of the main channel.

Concerning fairway realignment, the Apatin sector includes modifications at problematic locations where geometric corrections are feasible.

In the Čivutski–Rukavac sector, five critical locations were identified, but no fairway realignment was feasible due to the narrowness of the riverbed. In the Drava Confluence sector, only limited modifications were possible and considered for implementation.

The presentation continued with details regarding the fairway realignment measures. In the Staklar sector, due to constraints related to fairway width and morphological conditions, no realignment has been proposed.

Regarding recommendations, it was emphasized that both Serbia and Croatia are signatories to relevant international agreements and actively participate in initiatives concerning inland waterways and navigation. Although a bilateral agreement on navigation and technical maintenance of inland waterways was signed in 2010, the two countries have yet to conclude an interstate agreement delimiting the border along the Danube River.

Mr. Soare then presented general recommendations aimed at promoting sustainable and efficient inland navigation along the Danube. These recommendations address key environmental, operational, and governance challenges, providing a framework aligned with European principles and regional cooperation priorities.

The holistic development of inland navigation infrastructure should be promoted with a focus on resilience and sustainability, integrating innovative solutions that protect and enhance the ecological integrity of the Danube River. Adaptive measures are advised, applying a context-specific mix of structural, natural, and non-structural interventions to optimize navigation outcomes while minimizing environmental impact.

River management should integrate the interplay of physical, ecological, and social processes to develop coordinated strategies that mitigate potential conflicts and support long-term sustainability. Alignment with EU standards is essential to ensure compliance with the “do no significant harm” principle and the EU taxonomy regulation, maintaining high environmental and sustainability performance across all infrastructure planning activities.

Cross-border administrative cooperation should be enhanced to improve coordination between Serbian and Croatian waterway authorities in jointly addressing and managing navigation bottlenecks along their shared section of the Danube.

Recommendations are organized according to implementation horizons, short, medium, and long term, with thematic focus areas and clearly assigned oversight to guide accountability and follow-up actions.

Short-term actions include forwarding newly calculated data on low and high navigable water levels to the Croatian River Administration and officially submitting these to the Danube Commission for record updates. Both Serbian and Croatian waterway administrations are to maintain and regularly update a joint bottleneck catalogue to ensure effective management and navigation improvements. Additionally, technical training on 1D and 2D hydrodynamic modelling will be provided to build internal capacity within both administrations for scenario analysis, model interpretation, and adaptive river management.

The administrations are encouraged to explore sustainable solutions to address navigation challenges in prioritized bottlenecks, adopting multi-criteria analysis (MCA) approaches for structured and effective decision-making. MCA and 2D modelling should be integrated into regular planning and operations to support technical capacity building. Furthermore, ecological assessments and zero-state analyses are recommended to support environmental impact assessments in cooperation with national environmental authorities.

Medium-term actions involve harmonizing hydrological data and services between Serbian and Croatian hydro meteorological services, standardizing measurement methods, data collection, and processing. A new reference level assessment is anticipated by 2030 when Croatian stations will reach 30 years of continuous data records.

An ecological monitoring program aligned with EU environmental directives should be designed and proposed for both waterway and national environmental authorities. This program is suggested to be a short-term priority given Croatia's EU membership and existing Natura 2000 obligations.

Long-term actions focus on implementing adaptive management solutions, developing maintenance and adaptation plans based on 2D model outcomes and MCA prioritization. Climate resilience criteria should be embedded into future infrastructure design, supported by transport ministries and waterway authorities. Additionally, the performance of nature-inclusive structures should be evaluated through key monitoring indicators and benchmarking.

The presentation concluded with next steps, including consolidating strategic input, reviewing available documentation and modelling analyses, confirming scenario selections with Stakeholders and government bodies, and clarifying regulatory contexts such as permitting frameworks and cross-border coordination. The technical scoping of design parameters should be defined, including performance objectives and integration with existing infrastructure, supported by accurate geospatial and topographic data and validated modeling outputs.

Institutional and procedural coordination requires clear oversight with identified technical leads, communication protocols, and engagement with regulatory authorities to ensure compliance with national standards, Danube Commission guidelines, and relevant EU directives such as the Water Framework Directive and Habitat Directive.

A draft structure for technical documentation, including design reports, drawings, bills of quantities, risk assessments, cost estimations, and environmental mitigation strategies, will be prepared with agreed quality control checkpoints throughout the process.

Finally, contributions and questions from Stakeholders were addressed, emphasizing transparency in sharing feedback documents and clarifying deadlines for submitting comments on reports. It was noted that while the formal project phase concludes on August 1st, future strategic and political coordination, including the convening of the interstate commission, will be essential for ongoing river management efforts.

Questions & Answers:

Mr. Georg Rast (consultant) proposed an additional recommendation to provide targeted training on the assessment of environmental criteria, in order to improve the application of MCA. He pointed out that recent discussions revealed differing interpretations of environmental impacts across scenarios, highlighting the need for a common understanding between both countries. He stressed that this should be considered a mid-term action.

Mr. Romeo Soare (Hidrozavod DTD) agreed that training should be the first step, followed by its practical application in future processes.

Ms. Kerstin Bock (WWF Austria) emphasized the importance of transparency in the consultation process, suggesting that the full feedback tables for each document, particularly Output 5.1 should be shared either publicly online or at least within the Stakeholder Forum group. She noted that Stakeholders currently only receive feedback on their own comments, while it would be beneficial for all to have access to the full range of feedback in order to gain a broader understanding.

She also raised the question of timing for submitting general feedback or final stakeholder statements. On behalf of several Austrian institutions, she asked whether such statements, beyond the comments on Output 5.1 could be submitted in October or November, considering current scheduling constraints, including vacations and internal meetings.

In response, Ms. Marina Ilić (chairperson) explained that the official deadline for comments on Output 5.1 was set for 21 July, due to the consultant's contract expiring on 1 August. While comments received after that date cannot be included in the final report, they can still be valuable for future projects. Such inputs could be reflected either as annexes or as lessons learned and recommendations for future activities, particularly since this Stakeholder Forum does not mark the end of the process, but rather the transition into the next stage.

Mr. Tibor Mikuška (Croatian Society for Bird and Nature Protection) proposed a revision to the classification of the recommended action concerning the environmental monitoring program. He suggested that the development of a monitoring program aligned with EU directives should be moved from the mid-term to the short-term action plan. He justified this by pointing out that Croatia, as an EU member state since 2013, was already obliged to establish such monitoring, particularly for Natura 2000 areas, but that this has not yet been harmonized. He emphasized that aligning the fragmented monitoring efforts across Croatian and Serbian institutions would not require excessive time or resources, and proposed initiating joint coordination in the short term.

He then directed a question to the Serbian beneficiary regarding a previously submitted document on alternative measures, asking whether it had been shared with the broader Stakeholder Forum.

Mr. Ljubiša Mihajlović (Plovput) responded that the document had only been received a few days earlier, and that it had not yet been discussed internally. He explained that due to time constraints related to the preparation of the current meeting, a decision had not yet been made on whether or how to distribute it, particularly considering the complexity and length of the presentation. He confirmed that the Serbian team would inform Mr. Mikuška once a decision is made.

Mr. Tibor Mikuška (Croatian Society for Bird and Nature Protection) also stated that his organization, the Croatian Society for Bird and Nature Protection, would not provide comments using track changes on Output 5.1, as they did not find that approach meaningful in this case. Instead, they would submit a final written statement addressing the overall process. He requested that this statement be included either as an annex to Output 5.1 or as a separate document on the project website. He also asked whether such inclusion would be feasible.

Ms. Lucia Karpatyova (viadonau) explained that it would be up to the Serbian partners to decide how late-stage contributions and general Stakeholder statements would be incorporated, possibly as annexes or in another form. She reiterated that all final reports would be published on the Plovput website, and that links to the Croatian documentation would be provided where relevant. She noted that technical limitations and internal coordination may require additional time.

Mr. Tibor Mikuška (Croatian Society for Bird and Nature Protection) asked what the next steps would be following this final Stakeholder Forum, and how communication would continue.

Mr. Ljubiša Mihajlović (Plovput) clarified that the consultant's contract would expire on 1 August, and that most project outputs would be finalized by then. He added that future steps would likely be more formal, strategic, or political, rather than technical. A reactivation of the interstate commission, last held in Zagreb prior to the COVID-19 pandemic is foreseen, with the next meeting expected to take place in Belgrade.

Ms. Marina Ilić thanked all participants for their active engagement and contributions throughout the Stakeholder Forum process. She reminded stakeholders to submit their comments by 21 July, so that the consultant team could finalize all outputs by 1 August. Ms. Ilić reiterated that all final reports would be made available on the Plovput website, and emphasized that, while this meeting marked the conclusion of the current phase, it does not represent the end of the project. She noted that stakeholders would be timely informed about the next steps.

Mr. Ljubiša Mihajlović (Plovput) also extended his thanks to all participants and expressed hope that the cooperation would continue in the future, in this or another format. He noted that the topics discussed during the Forum deserved serious attention and acknowledged that, while not all issues were resolved, important questions were raised. He concluded by stating that, following the meeting of the Interstate Commission and further decisions at the bilateral level, all stakeholders would be duly informed about the next steps.

Next steps & AOB

- Stakeholders are reminded to submit their comments by 21 July, to enable finalization of the outputs by 1 August
- All final outputs will be published on the Plovput website https://www.plovput.rs/pf2w-eng
- Stakeholders will be timely informed about future steps

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