

Protocol on flood protection to the FASRB

The [Protocol on Flood Protection](#) formalizes a firm commitment of the Parties to the FASRB to further cooperate in implementing joint activities aimed at improvement of flood protection in the Sava River Basin, via their joint platform – Sava Commission and to undertake all necessary actions related to the preparation of the joint flood risk management plan, the establishment of a flood forecasting and warning system, the exchange of information relevant for sustainable flood protection, as well as undertaking any other agreed activities that can contribute to the improvement of the flood protection in the basin. The Parties have agreed to prepare the Flood Risk Management Plan for the Sava River Basin (Sava FRMP), in accordance with the content defined by the Directive 2007/60/EC, and taking into account all relevant aspects of flood risk management. The Parties have also conform to establish a coordinated or joint Flood Forecasting, Warning and Alarm System in the Sava River Basin (Sava FFWS).



Sava Flood Risk Management Plan (Sava FRMP)

The joint [Sava FRMP](#), prepared by ISRBC in close cooperation with the relevant national institutions, was officially approved by the ISRBC Parties at their 8th Meeting *of the Parties to the FASRB* held in Sarajevo on October 24, 2019. Sava FRMP represents a milestone in the cooperation of the Parties leading towards fulfilment of one of the main objectives of the Framework Agreement on the Sava River Basin – to prevent or limit hazards and reduce and eliminate adverse consequences, including those from floods.

Based on national Areas with Potential Significant Flood Risk, Sava FRMP identified 21 Areas of Mutual Interest for flood protection at the Sava River Basin level (AMIs) as basic units for analysing the flood risks, with a total surface of 5,659 km², representing 5.8% of the Sava River Basin area and home to 1.4 million people. In AMIs, 38 structural measures were identified with a total value of over € 250 million. 42 non-structural measures were also identified, which mostly relate to the entire AMIs or the Sava River Basin. The implementation of the measures will strongly contribute to meeting the commonly agreed objectives – avoidance of new flood risks, reduction of existing flood risks during and after the floods, strengthening resilience, raising awareness about flood risks and implementing solidarity principle. Coordination mechanisms at the Sava River Basin level and cooperation in case of extraordinary flood defence were also analysed, with recommendations for improvements.

Flood Forecasting and Warning System for the Sava River Basin (Sava FFWS)

Sava FFWS is a common flood forecasting platform and valuable addition to existing national systems based on the Delft-FEWS platform. It is implemented as an open shell for managing the data handling and forecasting process, allowing a wide range of external data and models to be integrated. This concept is particularly important for the five cooperating Sava countries, where different models are in use. Sava FFWS integrates various numerical weather prediction models, available weather radar and satellite imagery, outputs of the existing national forecasting systems, different meteorological, hydrological, and hydraulic models which are easily 'plugged' into a common Sava FFWS platform.

This concept is particularly important for the cooperating countries since the Sava River basin is shared by five countries and each country has its own models, monitoring systems, forecasting systems, water authorities and interests.

Sava FFWS consists of five hosting locations, i.e. one Primary and three Backup server locations as well as Archive and Web server. Under normal circumstances, the Primary system is the only system that is used to carry out operational tasks such as the running of forecasts or the uploading of changes to the configuration while the Backup systems retrieve data from the Primary system through an automatic data synchronization process. Users of Sava FFWS are 9 national institutions from the Sava River basin responsible for the flood forecasting.

Sava FFWS integrates Sava Hydrological Information System ([SavaHIS](#)) as a data hub for the collection of real-time observed hydrological and meteorological data. Within Sava FFWS, 8 Numerical Weather Prediction (NWP) models are used as meteorological inputs coming from the global scale models: ALADIN, ECMWF, WRF, NMMB. Along with the NWPs, Sava FFWS is prepared to extrapolate radar or satellite imagery to provide a very accurate short-term hydrological forecast (nowcasting) for several hours in advance based on measured values. Nowcasting products are currently not available within the Sava River basin. Considering the importance of providing a nowcasting hydrological forecast and raising the awareness of experts to this meteorological input, FFWS existing radar data from Slovenia are implemented in Sava, along with the EUMETNET Opera radar composite images as well as the EUMETSAT H-SAF satellite images.

Sava FFWS currently contains 13 different hydrological models, like HEC-HMS, Mike NAM, HBV, W-Flow and 14 hydraulic simulation models, like HEC-RAS, Mike 11. Some of them are integrated/coupled models including both components. Some cover complete basin and rivers or a large area while others cover just small local river basins and parts of rivers. Models developed in coordination with ISRBC – hydrological model for the Sava River Basin and hydraulic model for the Sava River - are also incorporated and run operationally as a backbone of Sava FFWS.

