Interreg
Danube Region

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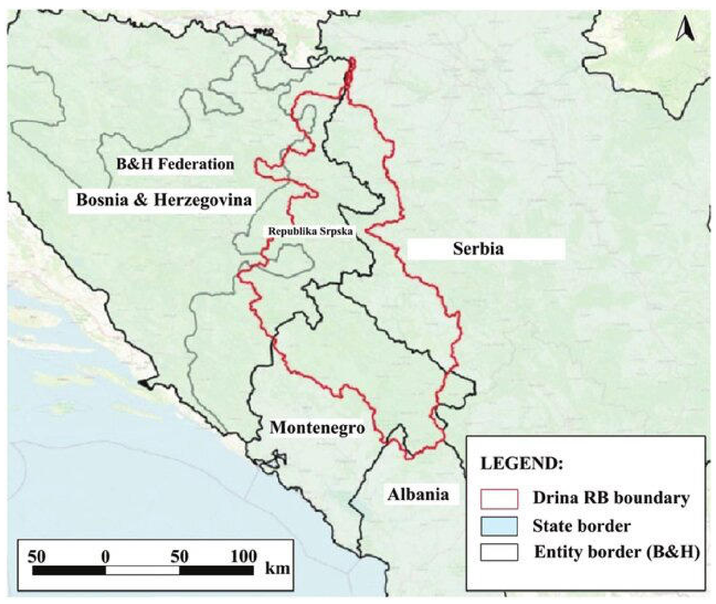
Danube Water Balance

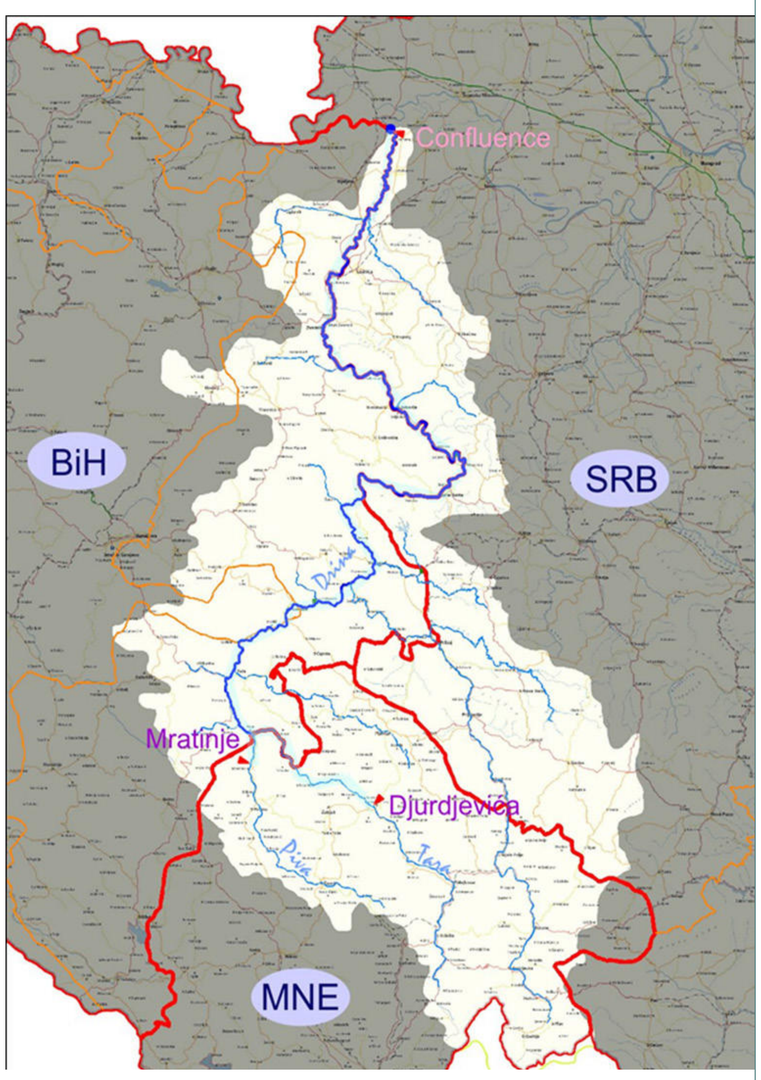
Drina river basin

General description of the subbasins e.g. whare, how much precipitation on average, how much discharge, countries, main sub-basins. Geological, geomorphological features etc. (1/2 page each pilot)

The Drina River Basin (DRB) spans an area of approximately 20,000 km², distributed almost evenly among three riparian countries: namely, Montenegro (31.5%), Bosnia and Herzegovina (37%), and Serbia (30.5%), while less than 1% of the basin area is located in Albania. The river's main course extends 335 km, beginning at the confluence of the Piva and Tara rivers on the border between Montenegro and Bosnia and Herzegovina in the south, to the confluence with the Sava River in the north. The hydrographic network is well-developed, with key tributaries including the Tara, Piva, Lim, Ćehotina, Prača, Rzav, Uvac, and Drinjača rivers. The basin elevation ranges between 75.4 m a.s.l. at the mouth to more than 2,500 m a.s.l. on the highest mountains (Prokletije Mountain 2,694 m a.s.l.), with the mean elevation of 961.6 m a.s.l.



Location of the Drina River Basin



The average annual precipitation in the basin is approximately 1,100 mm, and the discharge at the confluence with the Sava River is around 380-400 m³/s. High precipitation depths in the mountainous southern regions of about 3,000 mm per year result in significantly higher specific runoff (approximately 50 L/s per km²) compared to the central (10-15 L/s per km²) and northern areas (2-8 L/s per km²). Notably, around 60% of the total river flow originates in Montenegro.

Special features of the subbasins (e.g. reservoir, karstic, which some water transfer).

The Drina River Basin, with its abundant water resources, is primarily utilized for hydroelectric power generation. To facilitate hydropower production, numerous dams and reservoirs have been constructed, many with large storage capacities, such as Zvornik, Bajina Bašta, and Višegrad on the Drina River; Piva (Mratinje) on the Piva River; Potpeć on the Lim River; Uvac, Kokin Brod, and Radoinja on the Uvac River; and Otilovići on the Ćehotina River. These reservoirs, all constructed before 1990, play a crucial role in regulating the water regime.

Other water uses, including public water supply, industrial consumption, and agricultural irrigation in the lower parts of the basin, have minimal impact on the overall water balance. This is primarily because most of the water is returned to the river after use, and consumptive losses from irrigation are relatively small.

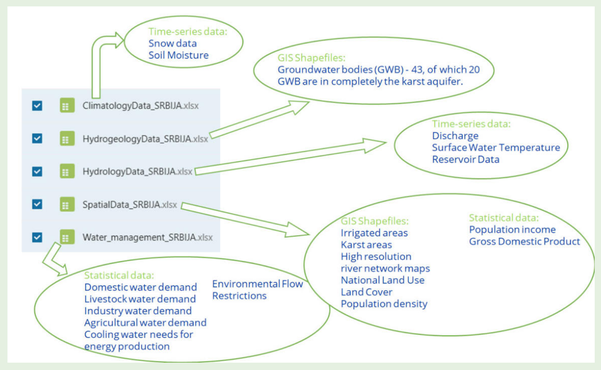
Another feature of the basin to be accounted for in the model calibration and evaluation are karst formations of considerable depth in the upper parts of the basin. In this part of the basin it is nearly impossible to delineate the boundary between the Black Sea and Adriatic Sea basins, or to accurately define the catchment areas that contribute water to rivers flowing into the Drina River, and subsequently towards the Sava River. In the Drina River Basin there are 43 groundwater bodies (GWB), of which 20 GWB are in completely the karst aquifer.

Danube Water Balance project activities

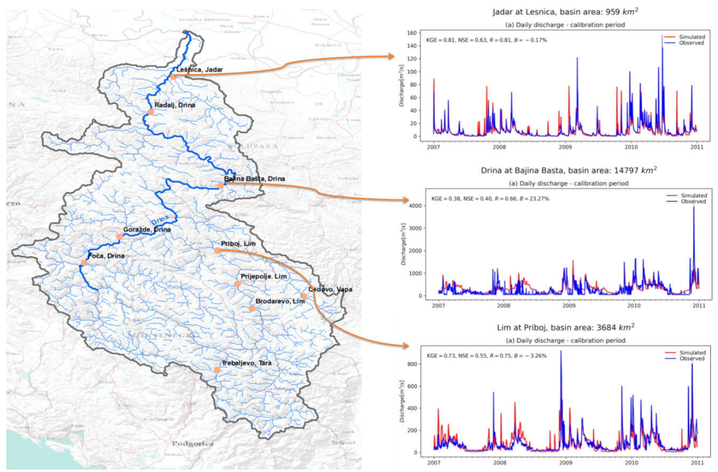
During Danube Water Balance project project representatives of PWMC Srbijavode (PP13, RS) organized several meetings with projects partners from Serbia (RS) and Bosnia (BA): Institute for Water Management, PP9, BA), University of Sarajevo (PP10, BA), University of Novi Sad Faculty of Agriculture (PP11, RS), PP12 Jaroslav Cerni Water Institute (PP12, RS) and with associated partners from Serbia, Bosnia and Montenegro: Sava River Watershed Agency (ASP6, BA), Ministry of Agriculture, Forestry and Water Management (ASP13, ME), Republic Hydrometeorological Service of Serbia (ASP10, RS), Public Water Management Company of Vojvodine (ASP11, RS).

Main goal of those meetings was to comment template for hydrology, climatology, hydrogeology, spatial data, as well as data related to water management data and to collecting needed data.

After that, the model was calibrated at 77 stations in the Sava river basin, 10 of which are in the Drina sub-basin:



Overview of the collected datasets



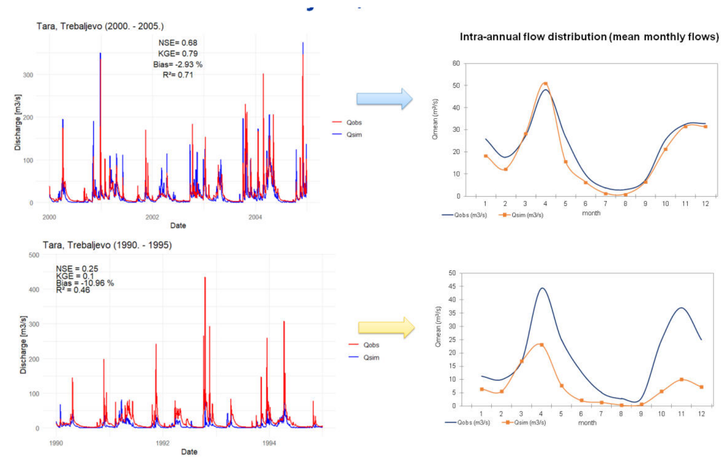
Results of model calibration

Simulation periods:
1990-1995 (dry period)
2000-2005 (wet period)

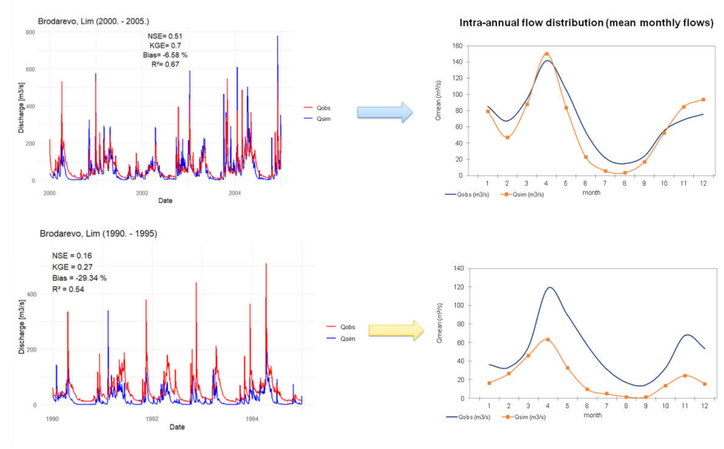
Simulation was performed for 5 selected locations: Radalj, Bajina Bašta and Goražde on the main course of Drina river, Brodarevo on one of major tributaries Lim river and Trebaljevo on river Tara, one of constituent rivers in the headwater part of the basin. Simulation results were compared with the observed flow values for selected stations. Model version does not include data collected

Results interpretation:
Visual inspection (volume, runoff dynamics, seasonality)
Numerical performance indicators: KGE (Kling-Gupta Efficiency), NSE (Nash-Sutcliff Efficiency), B (Bias), R2 (Coefficient of Determination)
Intra-annual flow distribution charts

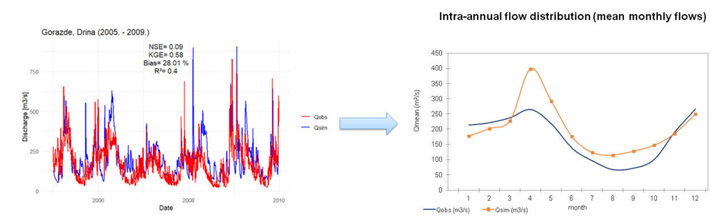
Results overview – Trebaljevo, Tara



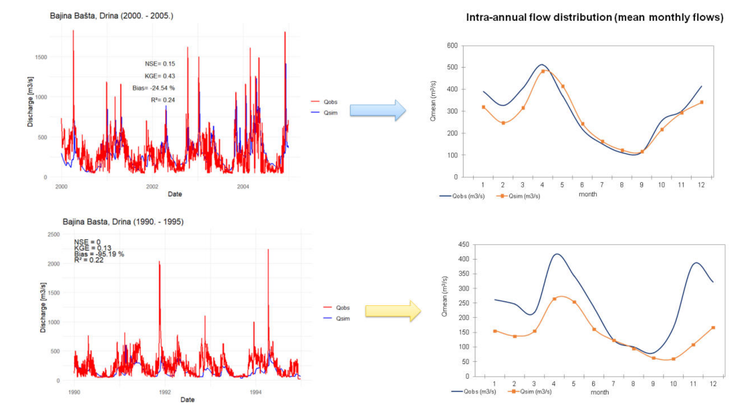
Results overview – Trebaljevo, Tara



Results overview – Goražde, Drina



Results overview – Trebaljevo, Tara



GENERAL DIRECTORATE OF WATER MANAGEMENT