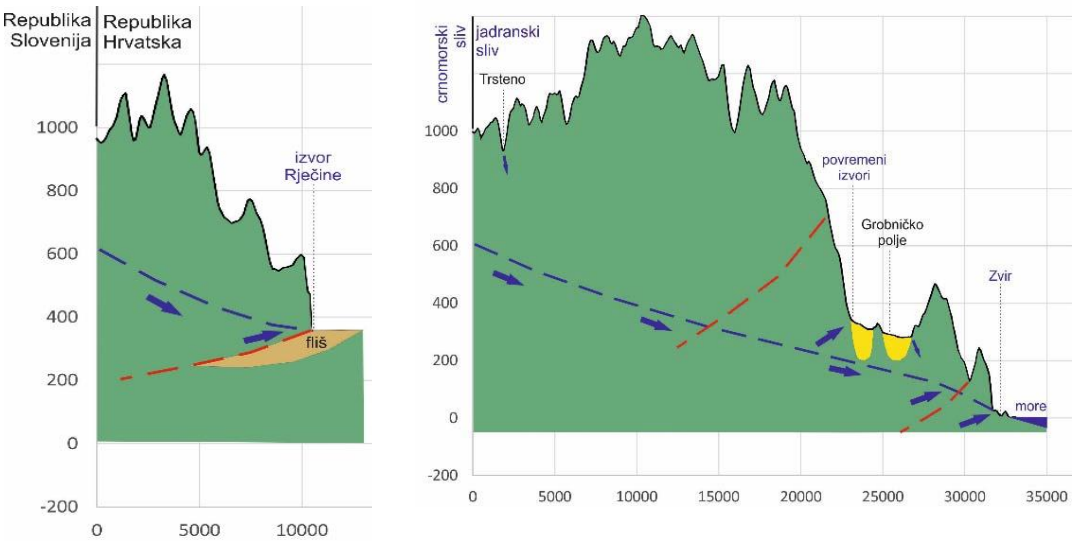
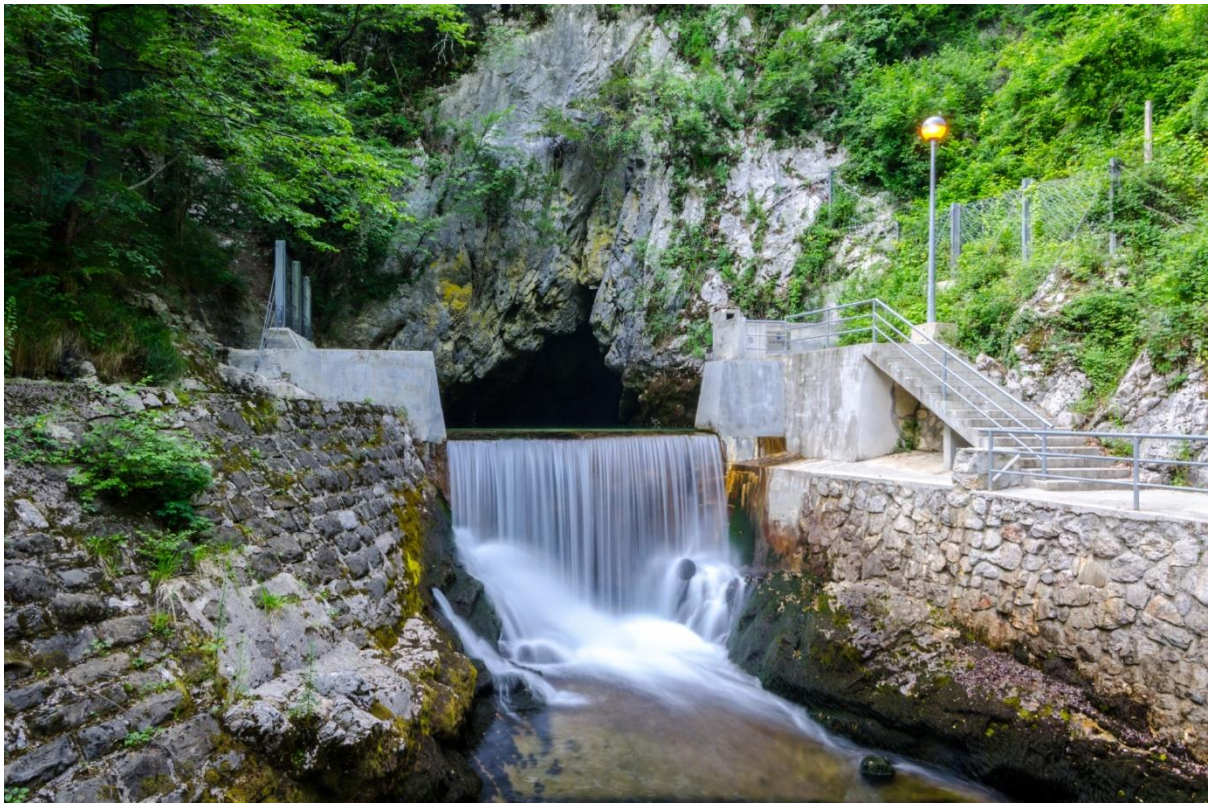

AUSTRIA
SLOVENIA
HUNGARY
SERBIA
CROATIA
Rjecina
Zvir
Gacka
BOSNIA
&
HERZEGOVINA
Jadro
ITALY
ADRIATIC SEA
MONTENEGRO
Ombla
Legend:
MIKAS
NIKAS
Karstifiable rocks
(potential karst aquifer)
Continuous carbonate rocks
Discontinuous carbonate rocks
WOKAM database;
©BGR, IAH, KIT and UNESCO 2017
N
W
E
S
0
115
230
Km

Country (NIKAS)	NIKAS springs	Coordinates / Nearby City	Spring discharge (Q in l/s,min/av/max) / tapped or not	Criteria* order / Main justification */ H-historic, A-aesthetic, S-scientific, E-Economic, Ec-ecologic	Data collected by
Croatia 	1. **Rječina and Zvir springs**	Rječina N 45° 25' 30" E 14° 25' 27" Z = 325 m asl Zvir N 45° 20' 05" E 14° 27' 11" Z=1.5-2.8 m asl Rijeka, Adriatic basin	Rječina 0/6850/62900 Zvir 600/ 4.620/ 20.000 Zvir spring has been used for water supply from ancient times. 2000 l/s according to the water permit for each spring. They provide potable water to the Rijeka (190,000 residents) and even 300,000 during tourist season	***E, H, Ec, S, A*** *The two springs represent the upper and lower outflow of the same aquifer, the upper, gravity one (Rječina spring) is temporary and active only during high groundwater levels, while the lower one- ascending Zvir is permanent. The most important springs for water supply of Rijeka city and the surrounding area (Opatija, Krk island and Crikvenica). Except for water supply the waters are used for hydropower plant Rijeka. The Rječina Spring has high ecological value as a key karst water source that supports unique groundwater biodiversity, maintains high-quality drinking water, regulates downstream freshwater ecosystems, and provides vital ecosystem services. Catchment area of the spring is transboundary (Slovenia-Croatia) but still unknown due to the lack of data and the complexity of the karst system. The aesthetic value of the Rječina spring and Zvir lies in their natural beauty and scenic surroundings.*	Maja Oštrić, Želimir Pekaš
	2. **Gacka group of springs**	N 44°47'17.2" E 15°22'01.3" Z = 570 m asl Otočac, Ličko senjska County	730/3600 / 13.900 For the period 1982-2016, for Tonković vrilo, which provides app 25% of total discharge of Gacka. Water supply Otočac, the coastal area – Senj- Karlobag and islands Rab and Pag (145 l/s water permit).	***Ec, A, E, S, H*** *Zone of permanent springs which feed the river Gacka: Majerovo vrilo, Tonkovića vrilo, Klanac and Pećina and smaller ones Pucirep, Knjapovac, Begovac, Jaz, Marusino vrelo and Graba. Springs drain large Dinaric karst aquifer (460 km^2, J_1-K_2 age). The Gacka springs have exceptional ecological value because their extremely clean, cold, stable water that supports sensitive trout populations, endemic invertebrates, and specialized aquatic plants. As key outlets of the regional karst aquifer, they maintain biodiversity, stabilize seasonal flows. It strengthens the regional economy through tourism, rural development, local product branding, scientific interest, and preservation of a unique cultural landscape. The Gacka River has outstanding aesthetic value due to its crystal-clear turquoise water, scenic karst springs, traditional wooden mills, and harmonious rural landscape. It has high economic value due to its world-renowned fly-fishing tourism.*	Maja Oštrić, Želimir Pekaš

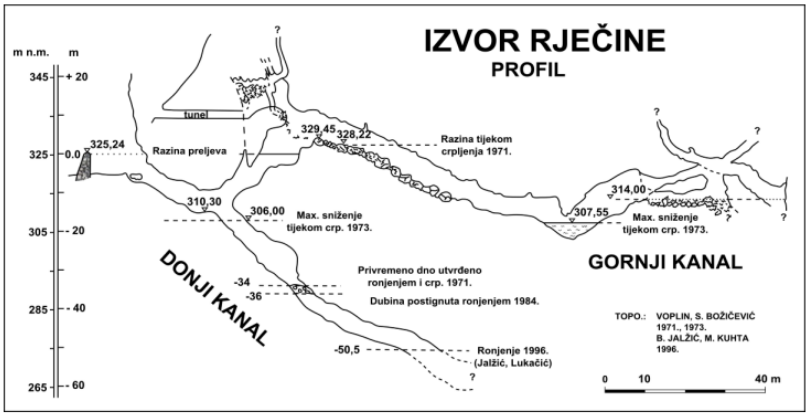
NIKAS – Rječina and Zvir



Schematic cCross sections of Rječina Spring-Zvir aquifer (from Biondić et. al. 2009)



Rječina spring photo (source: https://bike.visitjelenje.hr/izvor-rjecine-2/)



Speleological map of Rječina spring (source: Kuhta, 1999)

Zvir spring photo (Photo: M. Oštrić)

NIKAS – Gacka

Photo of Majerovo vrilo- spring with mills (source Majerovo-vrilo-Photo-Adria-3.webp (2000×1126)

„Sinačka pučina“ – a view towards the spring zone of the Gacka River (source Rubinić et al. 2021)