

Integrated management of relationship climate -
Insect migration in Srednjebanatski
District and Timis County



PROCEEDING
SCIENTIFIC CONFERENCE



Protection and sustainable
use of natural resources and
preservation of biodiversity in
cross border area.

Project is financed by European Union

Interreg -IPA CBC
ROMANIA – SERBIA

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**INTEGRATED MANAGEMENT OF RELATIONSHIP CLIMATE –
INSECT MIGRATION IN SREDNJEBAŃATSKI AND TIMIS
COUNTY**

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Cooperation beyond borders.

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Experimental approach of surface water quality analysis of Berzasca river

Abstract:

The paper presents the results obtained during implementation of a research project AEPS (RORS-462) financed thru Interreg IPA-CBC Romania-Serbia programme.

The project teams performed extensive evaluation of environmental current situation in cross border "sister" Danube banks nature reservation Djerdap (Serbia) and national parks Iron Gate (Romania), and on several Danube tributaries and two wet lands: Carska-Bara special nature reserve and Delta Nera nature reservation.

This paper presents in detail the results obtained for surface water quality analysis on Berzasca river, part of Iron Gate I national park, as one of the main Danube tributary in eligibility area, in Romanian side.

Keywords: *Surface water quality, heavy metals, Berzasca, COD, BOD.*

Introduction

The Berzasca River is a left tributary of the river Danube in Romania. It discharges into the Danube in the village Berzasca. Its length is 46 km and its drainage basin size is between about 1500 km², is a perennial river that never runs dry even in the hottest summer. [1]

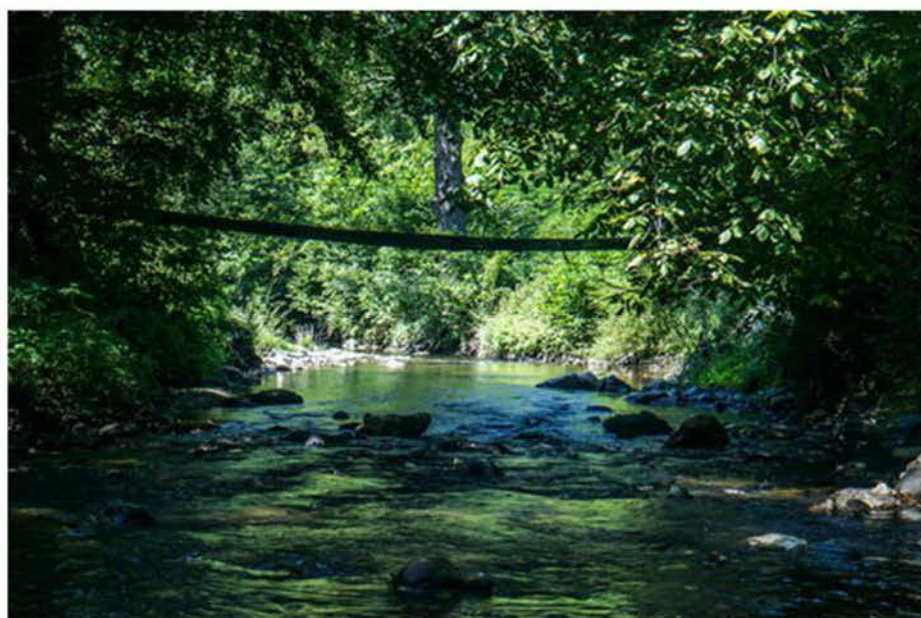
Based on water flow quantities, the Berzasca River can be considered as a big mountain river. The predominantly mountainous relief of the river basin areas induces high speed sediments flow, the majority being coarse dragged material (e.g. gravel and boulders) and a



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minority of sediments being in suspension. The brown trout (*Salmo trutta fario*) dominates in the upstream section until around 30 km sector and it is considered an indicator of a steady situation in the river over the last half of century in this section. Recent studies showed that Berzasca River experienced minor changes, a relatively stenotopic ichthyocenosis and smaller qualitative and quantitative changes over time, compared to historical data. [1]



Picture 1. View of Berzasca river.

The main advantage of the Berzasca river is that the only human settlement (Berzasca village) is located at the river mouth, as it spills into Danube, and almost all of its 46 km length between Banat mountains is in total wilderness, banked by forest and mountains, and untouched by human activity. The only upstream industrial activity used to be forest logging, which was closed in early 90's.



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1. Physical-chemical parameters of Berzasca river surface water

The surface water samples were taken in 8 spots on Berzasca river, in 12th and 13th August 2020. The in-situ analysis (for pH, temp, chlorides, total hardness, chromate and dissolved oxygen) were performed on site. All samples were preserved in-situ for laboratory analysis with acids: HNO₃ (nitric acid) for metal concentration analysis on ZEEnit 700P, H₃PO₄ (phosphoric acid) for total organic and inorganic analysis on Analytik Jena Multi N/C 3100 and H₂SO₄ (sulfuric acid) for Chemical Oxygen Demand analysis on Velp Eco6 and ammonia, phosphor, nitrite, nitrate, phosphate, a.o. on Analytik Jena Specord 250 plus.



Picture 2. View of sampling spots, Berzasca river

The results obtained from sampling campaigns, in August 2020 are given in Tables 1 and 2.



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Table 1: Results obtained for parameter analysis in samples of Berzasca river, on 12th August 2020

No	Parameter	Unit	Measured values - 12 th August 2020					Eco state
			B1	B2	B3	B4		
1.	pH	-	8.11	8.11	8.07	8.10	-	
2.	Conductivity	μS/cm	288	284	284	287	-	
3.	Dissolved oxygen (DO)	mgO ₂ /l	14.5	14.9	14.1	14.7	I st	
4.	Biochemical oxygen demand (BOD - CBO5)	mgO ₂ /l	1.4	1.4	1.5	1.6	I st	
5.	Chemical oxygen demand (COD - CCO-Cr)	mgO ₂ /l	5.8	5.9	6.1	5.7	I st	
6.	Ammonia (NH ₄ -)	mg/l	0.07	0.06	0.07	0.05	I st	
7.	Nitrates (NO ₃ -)	mg/l	0.22	0.14	0.11	0.09	I st	
8.	Nitrites (NO ₂ -)	mg/l	0.011	0.009	0.007	0.006	I st	
9.	Total Nitrogen (TN)	mg/l	0.78	0.51	0.47	0.42	I st	
10.	Orto phosphate (P-PO ₄ ³⁻)	mg/l	0.06	0.03	0.03	0.02	I st	
11.	Sulphates (SO ₄ ²⁻)	mg/l	8.4	5.4	4.2	3.8	I st	
12.	Chloride (Cl ⁻)	mg/l	0.2	0.2	0.2	0.2	I st	
13.	Sodium (Na ⁺)	mg/l	2.1	2.2	2.1	2.1	I st	
14.	Calcium (Ca ²⁺)	mg/l	2.7	3.1	2.8	2.7	I st	
15.	Mercury (Hg)	μg/l	0.008	0.007	0.007	0.006	I st	
16.	Arsenic (As ³⁺)	μg/l	0.074	0.072	0.062	0.061	I st	
17.	Lead (Pb)	μg/l	0.014	0.014	0.015	0.013	I st	
18.	Zinc (Zn ²⁺)	μg/l	1.14	0.89	0.77	0.91	I st	
19.	Cadmium (Cd)	μg/l	0.003	0.003	0.003	0.003	I st	
20.	Manganese (Mn - total)	μg/l	0.018	0.012	0.014	0.013	I st	
21.	Iron (Fe - total)	μg/l	0.087	0.068	0.071	0.070	I st	

Note: ambient air conditions: $t = 30.5$ °C, $RH = 55.6\%$, $pb = 1002.1$ mbar, Water temperature: 20.1 °C

Results presented in Table 1 and Table 2 allows us to assess the water quality during the study period according to national norms. In Romania water quality assessment is regulated by the Ministry of Environment and Water Management Ordinance no. 161 from 16.02.2006, on 5 ecological states are established for natural rivers and lakes: very good (I), good (II), moderate (III), poor (IV) and bad (V). [3]



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Table 2: Results obtained for parameter analysis in samples of Berzasca river, on 13th August 2020

No	Parameter	Unit	Measured values – 13 th August 2020					Eco state
			B5	B6	B7	BB		
1.	pH	-	8.07	8.07	8.07	8.08	-	
2.	Conductivity	μS/cm	289	291	290	289	-	
3.	Dissolved oxygen (DO)	mgO ₂ /l	14.5	14.9	14.1	14.7	I st	
4.	Biochemical oxygen demand (BOD - CBO5)	mgO ₂ /l	14.7	14.8	14.5	14.6	I st	
5.	Chemical oxygen demand (COD - CCO-Cr)	mgO ₂ /l	1.5	1.4	1.5	1.5	I st	
6.	Ammonia (NH ₄ -)	mg/l	5.5	5.4	5.3	5.4	I st	
7.	Nitrates (NO ₃ -)	mg/l	0.10	0.09	0.08	0.08	I st	
8.	Nitrites (NO ₂ -)	mg/l	0.006	0.006	0.005	0.006	I st	
9.	Total Nitrogen (TN)	mg/l	0.43	0.42	0.38	0.38	I st	
10.	Orto phosphate (P-PO ₄ ³⁻)	mg/l	0.02	0.03	0.02	0.02	I st	
11.	Sulphates (SO ₄ ²⁻)	mg/l	3.8	4.3	3.9	4.0	I st	
12.	Chloride (Cl ⁻)	mg/l	0.2	0.2	0.2	0.2	I st	
13.	Sodium (Na ⁺)	mg/l	2.1	1.8	1.8	1.8	I st	
14.	Calcium (Ca ²⁺)	mg/l	2.7	3.0	2.8	2.7	I st	
15.	Mercury (Hg)	μg/l	0.007	0.006	0.006	0.007	I st	
16.	Arsenic (As ³⁺)	μg/l	0.068	0.061	0.060	0.065	I st	
17.	Lead (Pb)	μg/l	0.014	0.014	0.012	0.013	I st	
18.	Zinc (Zn ²⁺)	μg/l	0.81	0.75	0.77	0.75	I st	
19.	Cadmium (Cd)	μg/l	0.003	0.003	0.003	0.003	I st	
20.	Manganese (Mn - total)	μg/l	0.015	0.012	0.014	0.014	I st	
21.	Iron (Fe - total)	μg/l	0.068	0.069	0.065	0.066	I st	

2. Conclusion

From all Danube's tributaries in the analyzed area during RORS-462 project implementation (Nera, Cerna, Berzasca, Pek, Porecka), the Berzasca river is by far of the highest ecological status, HIGH (quality). All measured parameters are well under Ist class of surface water quality, with values so low that we can talk about "ecological purity" of Berzasca river. Is not surprising that in the area of Berzasca river valley



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and Sirinia river valley is where we can find protected species as “Testudo hermanni boettgeri”, “Emys orbicularis” turtles and “salamandra”.

Aknowledgment

This research was conducted in the frame of AEPS project, “Academic Environmental Protection Studies on surface water quality in significant cross-border nature reservations Djerdap / Iron Gate national park and Carska Bara special nature reserve, with population awareness raising workshops”, financed thru INTERREG IPA-CBC Romania-Serbia programme, project RORS-46Z, www.aeps.upt.ro

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Environmental protection and
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