

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.

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**Interreg -IPA CBC**  
**ROMANIA – SERBIA**

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INSECT MIGRATION IN SREDNJEBANATSKI AND TIMIS  
COUNTY**

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**Cooperation beyond borders.**

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## Surface water quality on Delta Nera nature reservation

**Abstract:**

*The paper presents the results obtained during implementation of a research project coordinated by two relevant education and research Balkan institutions, University Politehnica Timisoara and University of Belgrade, project 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 Balta Nera special nature reserve.*

**Keywords:** *Surface water quality, heavy metals, Balta Nera, Nera*

## Introduction

"Balta" Nera is the newest declared Delta in Europe, a nature reservation that is part of the European Biogeographical Region, according to European norms and is classified as nature reserve class IV-IUCN, with specific wetlands protected habitats. The Balta Nera reserve is relatively difficult to access, in her vicinity one can drive on DN57 from East or DJ57A from north, by the junction of Nera and Danube Rivers. The area covered by Ramsar protection is 10 hectares. The reservation is located on the administrative territory of Socol



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commune, Caras-Severin County, being an integral part of the Iron Gates Natural Park. It was declared Nature reserve in 1994 by Decision of Caras-Severin County Council, reconfirmed by law 5/2000 - regarding the approval of the National Territory Planning Plan - Section III - protected areas.



*Picture 1. Aerial view of Balta Nera [1]*

The territory is located in the land of the Western Carpathians, the land of the Banat Mountains, the geomorphological unit of the Locva Mountains which are part of the group of mountains and limestone plateaus. However, the adjacent mountainous area is characterized by very low altitudes and granitic rocks. From a geological point of view, the territory is part of the Danube domain. Balta Nera is a European biogeographical region, at the confluence of the Nera and the Danube,



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being characterized by hydrophilic and hygrophilous vegetation, specific to wetlands.

## 1. Physical-chemical parameters of Balta Nera surface water

The surface water samples were taken in 5 spots from Balta Nera nature reserve, in 5<sup>th</sup> August 2020 and 23<sup>rd</sup> September 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: HNO<sub>3</sub> (nitric acid) for metal concentration analysis on ZEE nit 700P, H<sub>3</sub>PO<sub>4</sub> (phosphoric acid) for total organic and inorganic analysis on Analytik Jena Multi N/C 3100 and H<sub>2</sub>SO<sub>4</sub> (sulfuric acid) for Chemical Oxygen Demand analysis on Velp Eco6 and ammonia, phosphor, nitrite, nitrate, phosphate, a.o. on Analytik Jena Specord 250plus.



**Picture 2.** View of sampling spots, Nera / Balta Nera [2]

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



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Table 1: Results obtained for parameter analysis in samples of Balta Nera, on 5<sup>th</sup> August 2020

No	Parameter	Unit	Measured values – 5 <sup>th</sup> August 2020					Eco state
			BN1	BN2	BN3	BN4	BN5	
1.	pH	-	7.94	7.88	8.05	7.92	7.98	-
2.	Conductivity	µS/cm	293	302	296	299	308	-
3.	Dissolved oxygen (DO)	mgO <sub>2</sub> /l	10.4	9.9	10.1	9.7	10.9	I <sup>st</sup>
4.	Biochemical oxygen demand (BOD - CBOD <sub>5</sub> )	mgO <sub>2</sub> /l	2.9	2.8	3.1	3.1	2.9	I <sup>st</sup> -II <sup>nd</sup>
5.	Chemical oxygen demand (COD - CCO-Cr)	mgO <sub>2</sub> /l	9.7	10.2	10.1	9.7	10.2	I <sup>st</sup> -II <sup>nd</sup>
6.	Ammonia (NH <sub>4</sub> <sup>-</sup> )	mg/l	0.38	0.41	0.35	0.39	0.40	I <sup>st</sup> -II <sup>nd</sup>
7.	Nitrates (NO <sub>3</sub> <sup>-</sup> )	mg/l	0.53	0.61	0.56	0.55	0.54	I <sup>st</sup>
8.	Nitrites (NO <sub>2</sub> <sup>-</sup> )	mg/l	0.041	0.053	0.048	0.045	0.044	II <sup>nd</sup>
9.	Total Nitrogen (TN)	mg/l	1.12	1.14	1.12	1.16	1.14	I <sup>st</sup>
10.	Orto phosphate	mg/l	0.16	0.17	0.16	0.15	0.16	II <sup>nd</sup>
11.	Sulphates (SO <sub>4</sub> <sup>2-</sup> )	mg/l	15.6	14.3	15.1	14.7	14.9	I <sup>st</sup>
12.	Chloride (Cl <sup>-</sup> )	mg/l	0.4	0.4	0.4	0.4	0.4	I <sup>st</sup>
13.	Sodium (Na <sup>+</sup> )	mg/l	3.6	3.2	3.2	3.5	3.4	I <sup>st</sup>
14.	Calcium (Ca <sub>2</sub> <sup>+</sup> )	mg/l	33.7	34.5	29.7	30.4	33.1	I <sup>st</sup>
15.	Mercury (Hg)	µg/l	0.021	0.017	0.018	0.011	0.015	I <sup>st</sup>
16.	Arsenic (As <sub>3</sub> <sup>+</sup> )	µg/l	0.33	0.14	0.21	0.17	0.11	I <sup>st</sup>
17.	Lead (Pb)	µg/l	0.088	0.094	0.091	0.081	0.085	I <sup>st</sup>
18.	Zinc (Zn <sub>2</sub> <sup>+</sup> )	µg/l	12.7	14.1	13.7	12.9	13.5	I <sup>st</sup>
19.	Cadmium (Cd)	µg/l	0.007	0.007	0.010	0.008	0.007	I <sup>st</sup>
20.	Manganese (Mn - total)	µg/l	0.022	0.021	0.025	0.024	0.025	I <sup>st</sup>
21.	Iron (Fe - total)	µg/l	0.893	0.955	1.021	0.912	0.897	III <sup>rd</sup>

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. The Ordinance establishes 5 ecological states are



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established for natural rivers and lakes: very good (I), good (II), moderate (III), poor (IV) and bad (V). [3]

Table 2: Results obtained for parameter analysis in samples of Balta Nera, on 23<sup>rd</sup> September 2020

No	Parameter	Unit	Measured values – 23 <sup>rd</sup> September 2020					Eco state
			BN1	BN2	BN3	BN4	BN5	
1.	pH	-	7.45	7.44	7.51	7.52	7.49	-
2.	Conductivity	µS/cm	441	455	447	453	450	-
3.	Dissolved oxygen (DO)	mgO <sub>2</sub> /l	8.5	8.4	8.4	8.3	8.3	I <sup>st</sup>
4.	Biochemical oxygen demand (BOD - CBOD <sub>5</sub> )	mgO <sub>2</sub> /l	4.2	4.4	4.3	4.2	4.2	II <sup>nd</sup>
5.	Chemical oxygen demand (COD - CCO-Cr)	mgO <sub>2</sub> /l	14.4	14.8	14.5	14.7	14.5	II <sup>nd</sup>
6.	Ammonia (NH <sub>4</sub> <sup>+</sup> )	mg/l	0.45	0.48	0.43	0.46	0.48	II <sup>nd</sup>
7.	Nitrates (NO <sub>3</sub> <sup>-</sup> )	mg/l	0.68	0.66	0.65	0.66	0.67	I <sup>st</sup>
8.	Nitrites (NO <sub>2</sub> <sup>-</sup> )	mg/l	0.055	0.052	0.056	0.058	0.055	III <sup>rd</sup>
9.	Total Nitrogen (TN)	mg/l	1.33	1.28	1.30	1.29	1.28	I <sup>st</sup>
10.	Orto phosphate	mg/l	0.22	0.24	0.24	0.23	0.22	III <sup>rd</sup>
11.	Sulphates (SO <sub>4</sub> <sup>2-</sup> )	mg/l	20.1	21.1	20.5	20.6	20.3	I <sup>st</sup>
12.	Chloride (Cl <sup>-</sup> )	mg/l	0.3	0.4	0.5	0.3	0.4	I <sup>st</sup>
13.	Sodium (Na <sup>+</sup> )	mg/l	3.3	3.4	3.5	3.4	3.4	I <sup>st</sup>
14.	Calcium (Ca <sup>2+</sup> )	mg/l	30.7	29.8	29.4	30.1	28.9	I <sup>st</sup>
15.	Mercury (Hg)	µg/l	0.013	0.011	0.010	0.011	0.009	I <sup>st</sup>
16.	Arsenic (As <sub>3</sub> <sup>+</sup> )	µg/l	0.15	0.16	0.17	0.17	0.18	I <sup>st</sup>
17.	Lead (Pb)	µg/l	0.071	0.077	0.079	0.080	0.076	I <sup>st</sup>
18.	Zinc (Zn <sup>2+</sup> )	µg/l	14.9	14.7	15.1	14.7	14.9	I <sup>st</sup>
19.	Cadmium (Cd)	µg/l	0.006	0.006	0.008	0.008	0.007	I <sup>st</sup>
20.	Manganese (Mn - total)	µg/l	0.031	0.033	0.031	0.032	0.033	I <sup>st</sup>
21.	Iron (Fe - total)	µg/l	1.118	1.083	1.103	1.094	1.107	IV <sup>th</sup>

Note: ambient air conditions:  $t = 28.4$  °C,  $RH = 66.1$  %,  $pb = 1001.2$  mbar, Water temperature:  $18.2$  °C



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## 2. Conclusion

According to the limits set in this Order, values of measured nutrients (nitrites, phosphorus) range between class II (good) and class IV (poor). The oxygen status in Balta Nera for BOD, OD and COD ranges between I<sup>st</sup> and II<sup>nd</sup> quality class (very good to good).

The (heavy) metals concentrations in surface water on Balta Nera were all found at very low concentrations, well inside I<sup>st</sup> class for surface water quality, with the exception of iron (Fe) that was in class IV.

We can conclude that the surface water quality is under threat by so called nutrients pollutants - ammonia, nitrites and phosphorus. As Balta Nera is the delta formed by Nera, its surface water quality is directly depended on Nera surface water status and marginally by Danube, in the rare cases of high Danube waters. The pollution with ammonia, nitrites and phosphates is relatively normal and expected, as Nera flows at its 124 km directly thru numerous villages, with its inhabitants traditionally raising cattle's, pigs and chickens, and the manure by-products are traditionally spread on land for micro(family)-farming.

## 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-462, [www.aeps.upt.ro](http://www.aeps.upt.ro)

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