THE INTENSIVE MONITORING OF WATER QUALITY IN SOMESUL MIC RIVER, ROMANIA

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INTRODUCTION

Water quality is a major environmental concern worldwide, affecting ecosystems, economic development, and human health. According to the European Environment Agency, at the European level, only 37% of surface waters have good quality [1]. In this context, the Someșul Mic River, which flows through the city of Cluj-Napoca (Romania), needs special attentions, as it represents an important water source and habitat for a diverse ecosystem, while also serving as a relevant example of anthropogenic influence on water bodies in Romania [2]. Significant quantities of data are needed to perform such investigations: e.g., physico-chemical parameters measured at multiple locations along the river at high resolution sampling (ideally at one day or under). According to our knowledge such data is not available for the Somesul Mic River. Therefore, this study aims to gather a data basis from the monitoring of the water quality in the Someșul Mic River.

METHODS

The monitoring campaign has been carried out at daily frequency at two river sites starting January 2025 and will be continued until December 2025 in the frameworks of REWAT project. The upstream site is located in the Cluj-Napoca city centre (at the Elisabeta Bridge, coded RM1 in Figure 1), while the downstream site is located in the metropolitan area (at the 1 Mai street bridge in Sânnicoară, coded RM2). The measured indicators are water level, water flow, water temperature, pH, conductivity, turbidity, dissolved oxygen (DO) and chemical oxygen demand (COD). The pH and conductivity have been measured using Consort C863 (STAS 6325/75, SR ISO 10523/96; STAS 7722-84, SR EN-27888-97). Turbidity has been measured according to STAS 6323-88, DO according to SR EN ISO 5814:2023, and COD according to STAS 3002-85 and SR ISO 6060-96. The concentration of ammonium (NH_4^+), nitrite (NO_2^-), nitrate (NO_3^-), and phosphate (PO_4^{3-}) ions were determined spectrophotometrically using the T70+UV/VIS Spectrophotometer, PG Instruments Ltd: NH_4^+ with Nessler reagent (425nm, STAS 6328/85), NO_2^- with Sahzman reagent (520 nm, STAS 3048/2-96), NO_3^- with phenol-disulfonic acid (420 nm, SR ISO 7890-3:2000), and PO_4^{3-} with molybdate and ascorbic acid (880 nm, SR EN ISO 6878:2004).

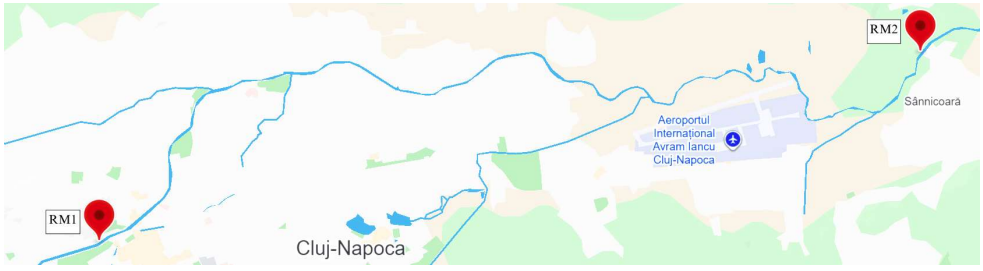

Figure 1. Sampling sites (RM1 and RM2) along the Someșul Mic River

RESULTS AND DISCUTIONS

Almost all monitored water quality indicators (except DO) exhibit higher values at RM2 compared to RM1, indicating a decrease in water quality downstream of Cluj-Napoca, due to multiple influences of different types. The increase in conductivity and ions concentration may reflect the influence of domestic and industrial effluents, while the rise in turbidity and COD indicates higher suspended solids and organic matter content. The pH remained nearly neutral,

while the dissolved oxygen (DO) decreased slightly at RM2, consistent with the increased organic load and oxygen consumption during decomposition processes. Figure 2 presents the variation of these water quality parameters at points RM1 and RM2, while **Table *1*** present the statistical indicators.

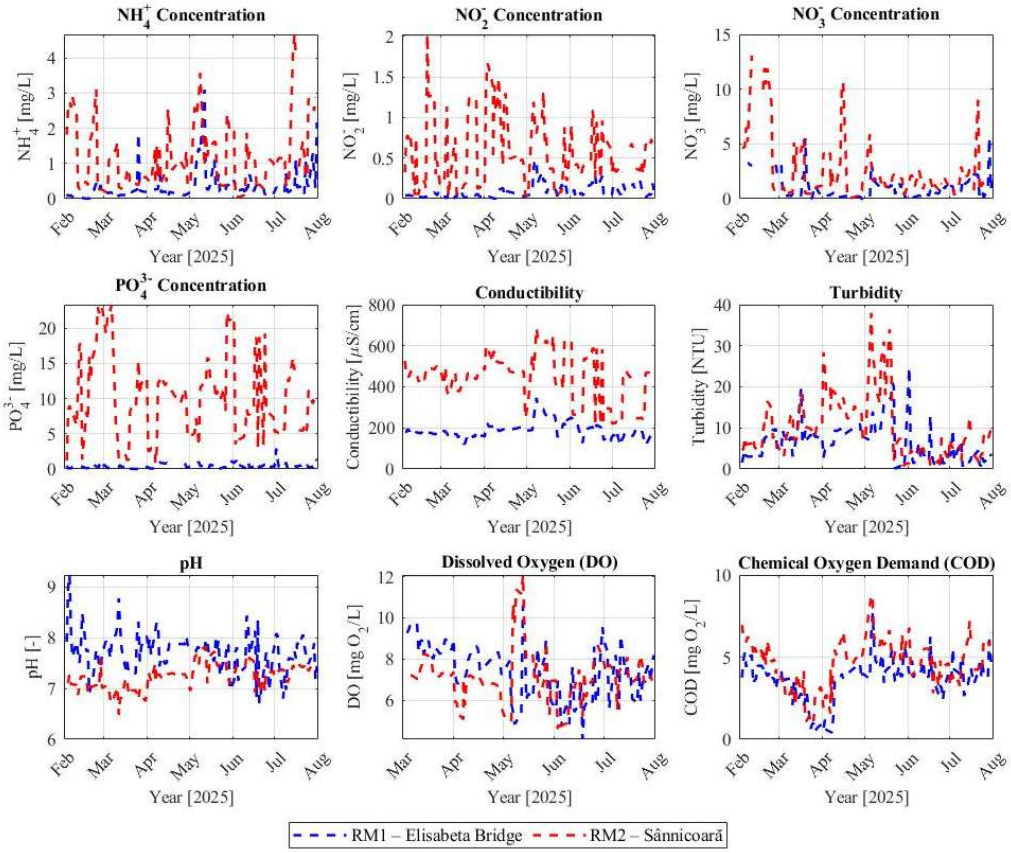

Figure 2. Water Quality Parameters at RM1 vs RM2 in Somesul Mic River

Table 1. The statistical indicators for the monitored parameters from January to August 2025

RM1	**Conductibility** µs/cm	**Turbidity** NTU	**pH**	**DO** mg O_2/L	**COD** mg O_2/L	**NH_4^+** mg/L	**NO_2^-** mg/L	**NO_3^-** mg/L	**PO_4^{3-}** mg/L
Min	113.500	0.060	6.710	4.110	0.400	0.002	0.002	0.003	0.004
Max	346.000	24.740	9.230	12.400	7.675	3.099	0.481	5.586	2.914
Mean	188.288	6.130	7.709	7.642	3.740	0.352	0.091	1.106	0.424
Median	179.900	5.100	7.720	7.650	3.838	0.232	0.060	0.769	0.301
Std. dev.	40.373	4.763	0.407	1.692	1.311	0.436	0.087	1.145	0.394
RM2	**Conductibility** µs/cm	**Turbidity** NTU	**pH**	**DO** mg O_2/L	**COD** mg O_2/L	**NH_4^+** mg/L	**NO_2^-** mg/L	**NO_3^-** mg/L	**PO_4^{3-}** mg/L
Min	208.000	0.290	6.480	4.610	1.119	0.040	0.022	0.024	0.852
Max	685.000	38.000	7.810	12.080	8.794	4.667	2.023	13.069	23.317
Mean	451.571	9.927	7.233	7.340	4.651	1.170	0.595	2.640	10.106
Median	471.000	7.400	7.240	7.220	4.797	0.909	0.462	1.534	9.377
Std. dev.	118.293	7.887	0.258	1.328	1.508	0.968	0.433	2.903	6.033

CONCLUSIONS

The monitoring campaign results highlight the anthropogenic impact on the river and the need for efficient pollution sources management and continuous monitoring.

REFERENCES

1. European Environment Agency (EEA). Europe's state of water 2024: The need for improved water resilience. Luxembourg: Publications Office of the European Union. 2024

2. SUVĂRĂȘAN, et al. (2020). Someșul Mic River (Cluj County, Romania) Water quality assessment under anthropogenic impact. In: Studia Universitatis Babes-Bolyai, Ambientum, 2020, 65(1), pp.87-96. DOI: http://dx.doi.org/10.24193/subbambientum.2020.1.06.

Acknowledgments. This work was supported by a grant of the Ministry of Research, Innovation and Digitization, CNCS - UEFISCDI, project number PN-IV-P2-2.1-TE-2023-0666, within PNCDI IV, REWAT.