

Overview of sediment quality and quantity over two decades - Case study of the Great Bačka Canal (Republic of Serbia)

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Conference theme number(s): 7

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Introduction: In the 20th century, extensive industrialization took place between Crvenka and Vrbas (R.Serbia). This led to an increased settlement of people in small towns along the canal. The canal is becoming more and more polluted, and in the worst part around Vrbas, the canal is completely filled with sediment. Industry (sugar beet processing, pig farms, edible oil, metal processing) are the worst polluters in addition to untreated sewage from cities. In addition to causing local problems, pollution in the Great Bačka Canal is a problem for the Tisza, and a significant source of pollution for the Danube. The low level of awareness of the local population about the state of the environment had a major impact on canal pollution. The amount of sediment in the vicinity of Vrbas was about 350,000 m³. The first data on this amount of sediment was obtained on the basis of the project financed by Norway and carried out by NIVA [1]. Furthermore, the study with the general project of dredging, deposition and remediation of the sediment of the Vrbas channel was carried out in 2015 [2], determined the same amount of sediment, but the methodology was done in more detail and the amount of sediment by sediment class was clearly identified. The aim of the work is to shed the light at the situation that has been happening in the Veliki Bačka canal for two decades and to look at the possibility of solving the long-standing problem.

Methods: The paper covers three periods of analysis of various parameters (metals, organic components, nutrients). The first period was two decades ago in 2003, when for the first time the problem of the Great Bačka Canal was shown through the project [1]. After that, the monitoring was done continuously, so in 2015, another case study with remediation techniques was conducted. Since the situation has not changed and no dredging and remediation works have been carried out on the canal, a scientific project is being carried out in 2022 [3]. All the samples that were analyzed within the studies presented were done according to standard methods.

Results: Through the town of Vrbas, the canal looks like a smelly, ugly septic tank. The sediment of the Veliki Bačka channel did not show a high load of organic micropollutants. Sporadically, in the

examined period of 20 years, in the case of polycyclic aromatic hydrocarbons, class 2 was determined, while the other samples were classified as class 0. In 2012, Serbia adopted a Regulation [4] based on which sediment can be classified. Therefore, the presented metal analysis included only two analyzed periods, 2015 and 2022 (Table 1).

Tab. 1: Metal concentrations through two series of monitoring

Metal	Year of monitoring			
	2015		2022	
	Measured value of in mg/kg	Class according to regulation ¹	Measured value of in mg/kg	Class according to regulation ¹
Arsenic	32.7	1	12.28	0
Cadmium	0.147	0	0.44	0
Chromium	64.4	0	70.36	0
Copper	220	4	131.2	3
Mercury	0.421	1	0.30	0
Lead	30.3	0	31.7	0
Nickel	53.2	3	34.2	2
Zink	286	1	250.2	1

The reduction in metal concentrations can be attributed to measures implemented in the last two decades. Certainly, one of the measures was that the industries did not discharge their untreated wastewater, which was mostly done, and certainly the change in the situation was influenced by the shutdown of two industries whose impact was great.

Discussion: Previous research have dealt with the analysis of sediment quality, which showed a slightly improved condition. What needs to be done is an assessment of the negative environmental impact and the possibility of beneficial use considering large amount.

Acknowledgement: This research was supported by the Science Fund of the Republic of Serbia, #7753609, BEuSED

References: [1] Revitalization of the Great Bačka Canal through Vrbas, which was financed by Norway and carried out by NIVA (Norwegian Institute for Water Research), (2006).

[2] Previous feasibility study with the general project of sludgement, deposition and remediation of the sediments of the Vrbas channel - Bezdán in Vrbas (2015)

[3] Research reinforcement within environmental aspects: step forward to beneficial use of sediment – BEuSED, Financed by Science Found of R. Serbia (2022-2024)

[4] Official Gazette - Regulation on Limit Values for Pollutants in Surface and Groundwaters and Sediments, and the Deadlines for Their Achievement. Belgrade, Serbia (2012) Gazette No. 50/2012

