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THE INFLUENCE OF INDUSTRIAL AND FACIAL WATER ON THE FIFTH CHANNEL SITUATION IN THE CITY OF BITOLA

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Abstract: *The concept of sustainability in urban waste water management is more commonly used and has a primary focus on ways to the environmental protection, public health and water resources (Ibrahimali A., 2014).*

The fifth channel is located in the City of Bitola and is filled with mountain water - Siva Voda. Half of the fecal wastewater from the City of Bitola and the village of Kravari and the industrial wastewater from the factory for yeast and alcohol, the beer factory, the factory for production of paper and cardboard packaging, the „Kiro Dandaro" printing plant and the Sugar Factory flow in it.The measuring points are along the fifth channel: Measuring point 1 - fifth channel at the exit from Bitola, Measuring point 2 - fifth channel at the village of Kravari, Measuring point 3 - fifth channel before it enters the Crna River. For determining the condition of the water, the following physical chemical parameters were examined in the fifth channel: the water temperature determined by a digital thermometer, turbidity (opacity) was determined by turbidimeters, suspended solids, dissolved oxygen, biological oxygen consumption (BOD), chemical oxygen consumption (COD) and together organic carbon (TOC) was determined with UV PASTEL - tool for directly reading of the values. All examinatios are conducted in March and September. By summarizing the results obtained, it can be concluded that the largest pollution is in the Measuring point 2, which is more pronounced in September. The value of BOD is 370mg / L, TOC is 72,0 mg / L in the same measuring place and the same month. This situation is due to the increased concentration with organic pollution in the Measuring point 2. Therefore, it is preferable to temporarily clean the channels and purify the wastewater in order to protect the environment.

Keywords: *Fifth channel, waste water, environmental pollution*

INTRODUCTION

Water is essential to all living organisms. According to Dalmacija, B., 2000, the water once used and untreated is returned to the aquatic system, it is wastewater. Such wastewater poses a threat to the environment and a favorable environment for the development of microorganisms (Belič, S., Belič, A., Rajkovič, M., 2007). The subject of this research is the water from the Fifth canal located in the city of Bitola. This canal is filled with mountain water from the river Siva Voda, which is a river with low water level, and into it flows half of the fecal wastewater from the city Bitola and the village the Kravari and the industrial wastewater. The aim of this research is to determine the quality of the water in the Fifth channel and its proper management.

MATERIAL AND METHODS

Work Material

The work material used in this study is water from the fifth channel. The measuring points were selected along the fifth channel. Measuring point 1 MM1 of the fifth channel is the section where the wastewater flows from: the Beer Factory, Yeast and Alcohol Factory, the Printing Factory "Kiro Dandaro", the Factory for production of paper and cardboard packaging and part of the waste from the City of Bitola. Measuring point 2 MM2 is the fifth channel in which the waste faecal waters flow from the village of Kravari. The measuring point 3 MM3 is the fifth channel in which the waste from septic tanks and livestock farms near the village of Egri is discharged. The water samples were taken in March and September and was made physical-chemical analysis.

Methods of work

The following analyzes were made for the examination of physical-chemical parameters: the water temperature determined by a digital thermometer, turbidity (opacity) was determined by turbidimeters, suspended solids, dissolved oxygen, biological oxygen consumption (BOD), chemical oxygen consumption (COD) and together organic carbon (TOC) was determined with UV PASTEL - tool for directly reading of the values.

RESULTS AND DISCUSSION

In order to obtain a realistic picture of the current state of water quality in the fifth channel,were analyzed the physical and chemical parameters , which are shown in Table 1.

Table 1. Physical- chemical parameters of the water from the fifth channel in March and September

Measuring Points	MM1	MM1	MM2	MM2	MM3	MM3
	March	September	March	September	March	September
Water temperature [^{0}C]	10,4	20,5	10,9	20,0	10,2	16,0
Turbidity NTU	20,2	34,1	28,2	102	37,5	18,9
Suspended substances. mg/L	201	42,5	14,6	142	27,0	46,5
pH	6,60	6,60	6,78	6,34	6,53	6,54
O_2 mg/L	5,05	1,08	2,66	0,0	9,68	0,0
BOD mg/L	12,4	13,4	11,7	370	16,8	13,4
COD mg/L	28,4	36	31,0	1140	36,0	34,5
TOC mg/L	11,6	10,8	9,5	72,0	11,2	10,4

Each outside work it was measured the temperature of the water. The water temperature is correlated with seasonal variations. The highest value of the temperature is expressed in MM1 20,5 ^{0}C in September and the lowest in MM3 10,2^{0}C in March. According to Lokoska, L., 2004, the temperature limits the activity of microorganisms.

The first visual impression about the state of the water is the turbidity. The highest value was detected at the measuring point 2 102 NTU month of September as a result of the discharge of communal wastewater from the village of Kravari. With the departure of the fifth channel from the settlements and the value of the turbidity decreases. Lowest value is recorded at the measuring point 3 18,9 NTU.

Suspended substances determine the presence of organic and inorganic substances in the water. The highest value is determined at the measuring point 1, 201mg / L in March as a result of heavy rainfalls and increased soil erosion.

According to Dalmacija, B., 2000, there is a regulating mechanism in the aquatic ecosystem that controls the pH value of the water. And in our measurements there are not great variations in the pH value in all measuring points.

According to Mulev (2003), and Jovanov, D., 2012 the content of dissolved oxygen and water temperature influence the activity of microorganisms. The highest content of dissolved oxygen is recorded at the measuring point 3, 9.98 mg/L in March, as a consequence of the higher water level of the channel in the channel and the greater dilution of organic matter. The state of water at the measuring points 2 and 3 is alarming in September, where the dissolved oxygen content is 0.0 mg/L, the temperature is higher, and the metabolic activity of microorganisms is more pronounced. According to Adebayo, S.A. & Usman, L.A., 2009), BOD is correlated with the amount of organic matter present in the water. The highest value of BOD was found at the measuring point 2, 370 mg/L in September, where the amount of TOC is highest 72.0 mg/L. At the measuring point 2, there is a large metabolic activity by microorganisms for decomposition of organic matter. The highest value of COD was found at the measuring point 2, 1140 mg/L in September in all measuring points, as a result of the higher concentration of organic matter in the water from the canal.

The content of the total organic carbon according to Ivancev-Tumbas (2009), is an indicator of the present amount of organic matter in the water. The highest value is recorded at the measuring point 2, 72,0 mg/L, in September, where the content of dissolved oxygen content is the lowest 0,0 mg / L in the same month and the same measuring point.

CONCLUSION

From the conducted research of the water from the fifth channel where the industrial and fecal waste waters from the city of Bitola and the village of Kravari enter, the greatest burden on organic matter can be found in the measuring point 2. At the same measuring point and the content of BOD for degradation of the organic matter by the microorganisms is the largest, and the content of dissolved oxygen is the smallest. In this measuring place the greatest anthropogenic influence is felt, which is reduced by distancing the canal from the populated areas.

Therefore, this survey provides guidelines for conducting continuous cleaning of the channels and purification of industrial wastewater before being discharged into the canels.

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