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SURFACE WATER QUALITY OF FRUSKA GORA

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Abstract

During the period from September 2011 to February 2012 was carried out monitoring of spring, surface and groundwater of Fruska Gora to 8 permanent and 15 temporary points for sampling. Selected river basins on the southern and northern slopes of the as interesting from the point of view of production of organic agricultural products. The waters were determined ammonia content (0-3.5 mg / l), nitrite (0-18.3 mg / l), $KMnO_4$ consumption (7.6-10.9), orthophosphate (0.15-2.8 mg / l) and phenol (0-0093 mg / l). These parameters are over MAC (by legislation) for use in drinking water, bottling and productive use in ponds of fish. Samples were taken in outside the growing season of low temperatures and exceptional dry year.

Keywords: *orthophosphates, phenols, ponds*

Introduction

Fruska Gora belongs to the low mountains, because only the highest peak Crveni Cot barely exceeding 500 m a.s.l.. Morphologically any mountainous stretches from east - west length of about 80 km and a width of up to 15 km. The northern border of the Danube, while the southern boundary of approximate contour 100.00 m a. s. l. and offers a line of Sid - Erdevik - Irig - Maradik - Krcedin - Stari Slankamen.

On the northern slopes of the majority of whom are permanent watercourses with a crest on the fan-source terrain elevations above 400 m. In the band density of river network is 0.778. Regional erosion basis for all river flows and the Danube and for a river basins covered by research: Kozarski, Kamenarski and Ešikovački stream. All three basins have a permanent or intermittent sources along the valley side of the crest headwaters to the mouth of the Danube. They have a steady flow variable, even in arid 2011th year (Koscal et all., 2005; Stojiljkovic and Stanic, 2007).

Unfortunately none of the basins as well as the storage reservoir at Mount Fruska Meteorological Service of Serbia has no interest to establish the monitoring of water resources.

Method and material

In the annual study determines the 8 observational points for field and laboratory testing of water. The basic unit of a reinterpretation of existing documentation and setting up a network of observation points was topographical and hydrological basin. Water resources are the type of porosity, sediment genesis and occurrence in the basin divided in spring, surface and ground water (Stojiljković, 1980, 2003, 2004; Stojiljkovic and Zrnic, 2004; Zrnić, et al., 2005).

In interpreting the results were used for longer time series of various parameters of the chemical composition of spring water and groundwater, which enabled the application of methods of statistics. The paper presents preliminary results for the surface water to the northern slopes of the basin on the following: Kozarski in Beocin creek, Kamenarski stream in Novi Ledinci and Esikovac stream in Sremski Karlovci .

Results and Discussion

On the northern slopes of the basin Kozarski, Kamenarski and Esikovac streams were placed point under the catastral number 3, 4 and 7 (Fig. 1). On all the streams were made two complete analysis and two truncated, only some micro-components and organic matter (Table1).

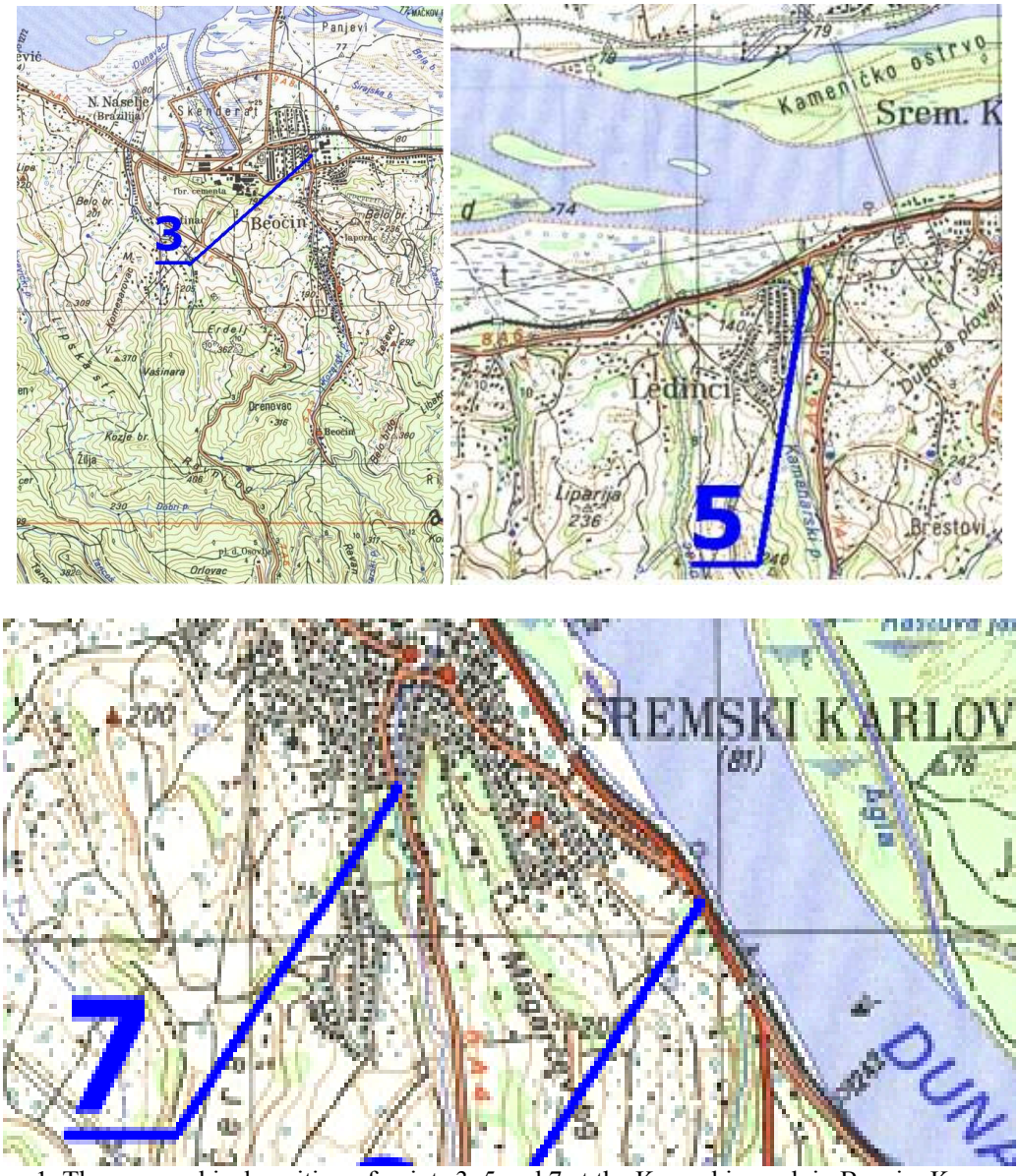

Figure 1. The geographical position of points 3, 5 and 7 at the Kozarski creek in Beocin, Kamenarski stream in Ledinci and Esikovac creek in Sremski Karlovci

Based on the results of chemical analysis of groundwater, water are analyzed hydrocarbon classes, magnesium-calcium-sodium group (according to the classification AleKino's). On Selerovom diagram shows a variability in the major anions and cations in water as a result of pollution in the basin (Fig. 2,3,4). In table one you are given the maximum and minimum values of the parameters in the water according to the criteria of the MAC in ponds.

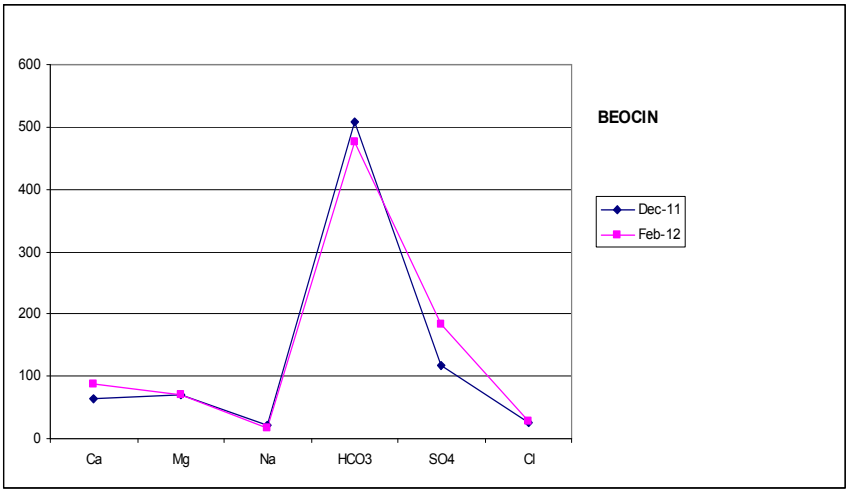

Figure 2. Diagram of Seler of permanence in the major ions in leather surface water stream in Beocin

The waters are set high content of ammonia nitrogen triad (0 - 0.33 mg / l), nitrate (0-8.96 mg / l), nitrate (10.09-38.07), and KMnO4 consumption (an indicator of organic pollution 7.6-13.7). Anions and cations from water containing excess calcium (63.3-112.7), magnesium (47-72) chloride (24.8-85.5) and sulfate (49.2-182.6). In this case, sulfates were detected in the chemical analysis, and MDK in water is related to sulfur. Water contains orthophosphates (0.83-1.35 mg / l) and phenols (0-0036 mg / l). Some parameters are less than the MDK in drinking water.

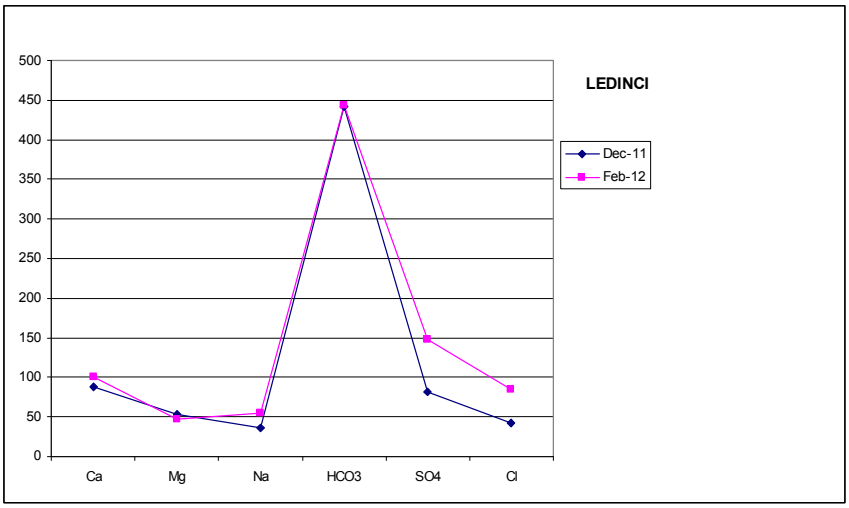

Figure 3. Diagram of Seler of permanence in the major ions in leather surface water stream in Ledinci

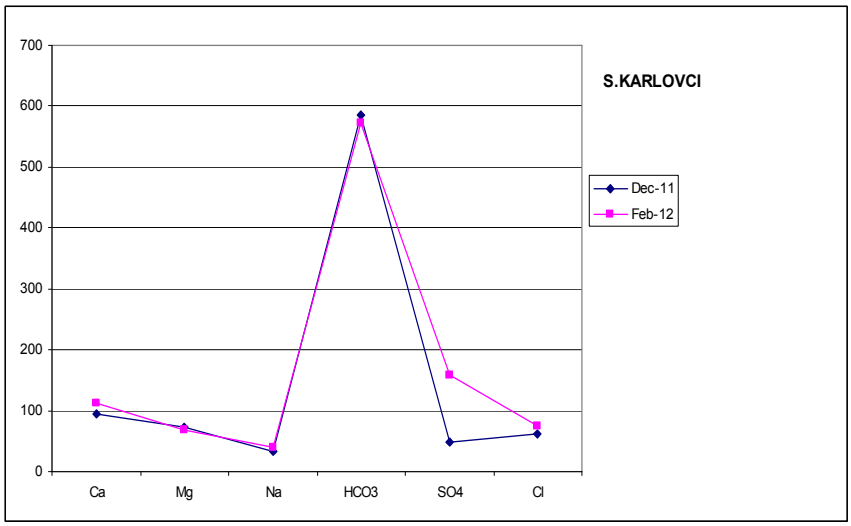

Figure 4. Diagram of Seler of permanence in the major ions in leather surface water stream in Sremski Karlovci

Conclusion

Surface waters were observed with one monthly; modern sample in three watersheds on the northern slopes of Fruska Gora. According to the classification of Alekin all waters are hydrocarbon-class magnesium - calcium - sodium group. In all analyzes, the criteria for the production of surface water fish-ponds Fruška Gora maximal above contain (MAC) over prescribed. following parameters: **ammonia, nitrites, nitrates, organic matter, calcium, magnesium, potassium, then sulfates and chlorides, orthophosphates, phenols, chromium and boron.** Analysis of water quality by Water Quality Index (WQI) puts this water into another class with a tendency to transition into the third class. Due to the extremely dry years and low temperatures we believe that there was a large dissolution and transport of pollutants from higher terrain to the local and regional erosion basis and that picture of the quality of surface water is not realistic. According WQI water can be used in production ponds, but when the strict application of standards for the quality of surface waters in the fishing pattern in a single observation period does not meet the standards of usability water.

Table 1. The results of complete physical and chemical analysis of surface water at three locations

Parameters (mg/l)	Kozarski , Beočin	cat. No 3	Kamenarski Ledinci	cat. No 5	Ešikovački, S. Karlovci	cat. No 7	MAC For ponds (US Envir.Protec. Agen.)
Dat.	22.12.2011	23.2.2012	22.12.2011	23.2.2012	22.12.2011	23.2.2012	
EC	1107	1211	1170	1250	1257	1332	1000
NH4	0.33	0.18	0.27	0.06	0	0.3	<0,02*
NO3	10.17	13.1	10.09	12.7	38.07	34.15	3*
NO2	0.39	10.1	0.57	8.96	0	0.75	<0,1
KMnO4	11.8	13.7	10.6	7.6	9.6	10.1	8
HPK	2.97	3.4	2.67	1.9	2.42	2.55	-
TDS	728.9	786.3	788.9	776.3	807.1	822.4	-
Cl	24.8	27.3	42.9	85.5	60.9	75.9	<0.003*
HCO3	508.7	475.8	442.3	444.1	586.2	573.4	-
SO4 (S)	117.1	182.6	81.8	147.7	49.2	159.2	<1
Fe	0.04	0.07	0.03	0.07	0.03	0.07	<0.1*
Ca	63.3	88.2	87.9	100	94.3	112.7	50-80*
Mg	70.5	69.5	54	47	72	68.5	<15*
Na	20.5	17.5	36.8	54.3	33.3	39	<75*
K	8.4	9.9	7.7	8.8	3.3	3.6	<5*
pH	8.3	8.1	8.2	8.1	7.9	7.9	6.5-8*
ortofosfati	1.35	2.8	0.91	0.83	1	0.85	0.15
Fenoli	0	0.036	0.004	0.077	0	0	0.001
Ba	0.46	0.50	0.48	0.13	0.53	0.35	5
Cr	0.03	0.04	0.04	0.03	0.04	0.04	0.03*
Pb	0.01	0.01	0.02	0.01	0.03	0.01	<0,02
B	<0,5	<0,5	<0,5	<0,5	<0,5	<0,5	0.3

Values marked **bold** above MAC water for pond

MAC for ponds marked * are less than the MAC values for drinking water

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