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QUALITY EVALUATION OF WELLS WATER FROM TELEORMAN COUNTY

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Abstract

The aim of present paper is quality evaluation of wells water from some operational sites located in Teleorman County. Were taken well water samples from 5 localities situated along Vedea river. Those samples were analyzed for determine nitrate, nitrite, inorganic nitrogen and phosphorus. The samples were taken in two seasons, spring and autumn. We observed that the well water from analyzed areal are vulnerable of pollution with nitrites came from agriculture and husbandry actions and from some surface aquiferes can appear the eutrophication problem. The presence of different forms of nitrites in well water is a major problem for a human health, for children under 6 months old, esspecially.

Key words**:** *pollution, well water.*

INTRODUCTION

The quality of surface water is a parameter which needs continuous and carefully monitoring, because the chemical, physical and biological process from water mass are dynamic, are inside in cycling compartments of nutrients and are most vulnerable compartments to nitrites pollution from agricultural and husbandry fields. The continuous monitoring of surface water is a necessity because their quality influences the quality of fresh and underground water. During the 2004-2007 period, the vulnerable zones to nitrites pollution represented perimeters of 251 localities from 34 counties and 10 hydrographical basins, which means 1.217.147 ha surface and 8.2% from total agriculture surface. [2].

MATERIAL AND METHOD

The samples taken were realised along altitudinal gradient, from west to south, using the quantitative methods, from wells existed in villages. The frequency of samples taken was by season, in spring and autumn, respectively. The conservation and working water samples were made by classical methods.

For determine the $N\text{-}NH_4$ was used the „indophenols blue" method. The method principle consist in reaction of phenol with ammonia in presence of oxidant agent (sodium hypochlorite) and formatting in alkaline conditions a colour compound which absorb the energy with $\lambda = 660$ nm.

For determine the nitrate ion was used a spectrophotometric method with salicylic acid as chromate agent. This method take a long time and is under influences of organic matter and $N\text{-}NO_2$ interferences, for water surface analyzed samples got good results due to small content of them in compound which can give interferences.

The method principle consists of aromatic compounds nitrating in environment with very small pH and measurement to 410 nm of new compound absorbance after NaOH adding. Nitrite ions determine by photocolourimetry.

The small values of reactive phosphorus dissolved in surface water, need choosing an analyze method more sensitive and free of interferences. For this purpose we applied a modified method of Hess and Derr which used malachite green to form a complex with PO_4 ion [4].

The results obtained were compared with maximum allowed concentrations of those ions: 0.4 mg/l for $N\text{-}NH_4$, 11,2 mg/l for $N\text{-}NO_3$, 0,15 mg/l for $N\text{-}NO_2$ and 0,01 mg/l for phosphorus [3].

RESULTS AND DISCUSSIONS

The results of chemical analyze for surface water samples from determine area, are presented in table 1, by season. At the first taken, in spring season, it's observed exceed to maximal limits for nitrates taken from localities situated up the river. This fact happened because those localities haven't sewage system and nutrients, including those came from agricultural and husbandry sources are washed from soil and taken in surface water.

The same trend happened to nitrites. The phosphorus concentration is in normal limits, and ammonia ion has a concentration above allowed limit in 4 from 14 studied localities (situated upstream of the river, too).

Table 1.Average concentration of biogene elements in well water for site 1

Indicator (U.M.)	Well water		
	Up	Middle	Down
$N\text{-}NH_4$ (mg N/l)	0.37	0.36	0.4
$N\text{-}NO_2$ (mg N/l)	0.14	0.0149	0.152
$N\text{-}NO_3$ (mg N/l)	9.7	9.7	9.9
$P\text{-}PO_4$ (mg P/l)	0.00	0.01	0.00

Table 2. Average concentration of biogene elements in well water for site 2

Indicator (U.M.)	Well water		
	Up	Middle	Down
$N\text{-}NH_4$ (mg N/l)	0.6	0.58	0.6
$N\text{-}NO_2$ (mg N/l)	0.189	0.188	0.19
$N\text{-}NO_3$ (mg N/l)	10.8	10.5	10.8
$P\text{-}PO_4$ (mg P/l)	0.02	0.02	0.024

Figure 1 shows that there is an increased ammonium ion concentration in well water, along the altitudinal gradient. This phenomenon is due to further accumulation of the Vedea river to fermentable materials (manure washed off the land and the pastures used for grazing domestic faeces percolating water and infiltrates into the soil, the area is not sewage, fertilizers natural or synthetic without strict rules apply and whose concentration was not monitored), etc.

Table 3. Average concentration of biogene elements in well water for site 3

Indicator (U.M.)	Well water		
	Up	Middle	Down
$N\text{-}NH_4$ (mg N/l)	0.87	0.95	1.02
$N\text{-}NO_2$ (mg N/l)	0.144	0.151	0.157
$N\text{-}NO_3$ (mg N/l)	10.0	10.5	10.8
$P\text{-}PO_4$ (mg P/l)	0.021	0.025	0.025

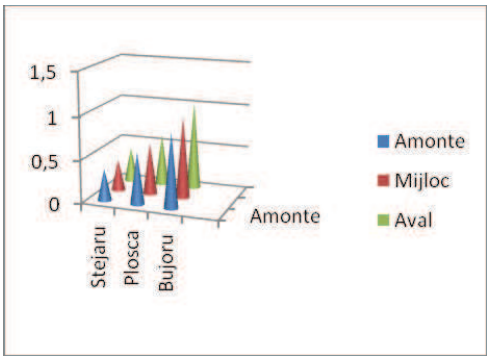

Fig. 1. Dynamic of $N\text{-}NH_4$ concentration in well water alonside of altitudinal gradient

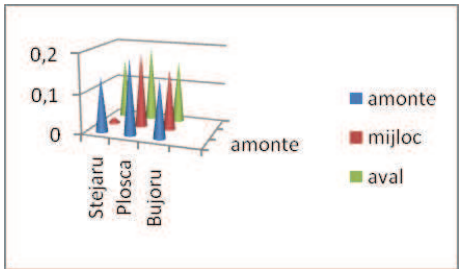

Fig. 2. Dynamic of $N\text{-}NO_2$ concentration in well water alonside of altitudinal gradient

Note that the highest concentration of nitrates in the water fountain located in the village flasks, probably because this area is currently and historically vegetable in primary and secondary livestock. This requires an intense fertilization of the soil throughout the year there is a supply of nutrients that migrate from the soil and surface water to groundwater. Nitrates - concomitant presence of ammonia and nitrates show a continuous pollution and inadequate disinfection. Small amounts of nitrates can be found in almost all waters. Nitrates comes of these sources of pollution: fertilizer used in large amounts in intensive agriculture,

pesticides with nitrogen fertilizer storage sites damaged or built too close to private wells. Even if an additional quantity of nitrate does not reach the earth will pass much time until the nitrate content of existing water will degrade. In surface water nitrate concentrations can range from 0 to 8 mg / l and in highly polluted waters can reach up to 50-150 mg / l or more. In 1988, 36% of wells in Romania had nitrate concentrations above 45 mg / l.

CONCLUSIONS

The nitrites presence in surface and well water asociated with nitrates and ammonia ion presences shown as an impurity of water with organic matters and a long presence of pollution process, because transformations of the organic matters in nitrites take long time (weeks) [1].

The Teleorman county area is predominance cereal, exist a great number of households where are exploited animals, without respect the minimal standards of surface water protection against pollution with nitrates and nitrites came from agricultural and husbandry sources. Those facts leads to nitrites appearance in surface water, infiltrations in water table and them consumption by peoples and animals; existing the risk to appearance “the blue disease” at small babies (0-6 months), oesophagus or stomach cancer, etc., at adult peoples [5].

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