

QUALITY EVALUATION OF SURFACE AQUIFER FROM TELEORMAN COUNTY

Dana Popa, Cristiana Diaconescu, R. Popa, M. Maftai, Livia Vidu,
Carmen Nicolae, Georgeta Diniță, Nicoleta Ișfan, Andra Șuler

*University of Agricultural Sciences and Veterinary Medicine, Bucharest
e-mail: danasandulescu@yahoo.com*

Abstract

The aim of present paper is quality evaluation of surface water from hydrographical basin Vedea, from Teleorman County. Were taken surface water samples from 14 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 surface water from analyzed areal are vulnerable of pollution with nitrites came from agriculture and husbandry actions and from some of them appear the eutrophication problem.

Key words: surface water, nitrites, water quality

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]. The zone of Teleorman county is a agricultural field, where the number of households with many husbandry species is great and it represented an area with a hydrographical net must be carefully supervised for minimise the risk of nitrites pollution and eutrophication appearance.

MATERIAL AND METHOD

The samples taken were realised along altitudinal gradient, in water flow sense, from west to south, using the quantitative methods. 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-NH₄ 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-NO₂ 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 PO₄ ion [4].

The results obtained were compared with maximum allowed concentrations of those ions: 0.5 mg/l for N-NH₄, 50 mg/l for N-NO₃, 0,02 mg/l for N-NO₂ and 0,2 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 The chemical analyze results for water samples

Sample/ locality	Spring					Autumn				
	N-NH ₄	N-NO ₃	N-NO ₂	N _{inorg}	P	N-NH ₄	N-NO ₃	N-NO ₂	N _{inorg}	P
	mg/l					mg/l				
1	0.39	45.3	0.081	45.771	0.12	0.41	46.7	0.087	47.197	0.13
2	0.41	51.8	0.087	52.297	0.13	0.41	52.0	0.096	52.506	0.13
3	0.54	53.4	0.092	54.032	0.11	0.57	54.2	0.098	54.868	0.11
4	0.55	55.8	0.087	56.437	0.21	0.55	56.1	0.092	56.742	0.20
5	0.52	54.3	0.088	54.908	0.14	0.51	54.8	0.094	55.404	0.15
6	0.51	56.9	0.085	57.495	0.10	0.54	57.1	0.094	57.734	0.09
7	0.50	49.5	0.079	50.079	0.94	0.47	50.2	0.087	50.757	0.97
8	0.48	47.2	0.067	47.747	0.20	0.50	51.4	0.075	51.975	0.19
9	0.47	41.9	0.072	42.442	0.19	0.49	50.6	0.086	51.176	0.20
10	0.31	48.1	0.064	48.474	0.14	0.39	49.5	0.084	49.974	0.15
11	0.38	44.6	0.062	45.042	0.10	0.41	45.6	0.079	46.089	0.08
12	0.39	46.7	0.057	47.147	0.16	0.42	48.7	0.078	49.198	0.15
13	0.40	51.9	0.080	52.38	0.12	0.41	50.2	0.089	50.699	0.11
14	0.45	50.3	0.048	50.798	0.11	0.48	50.7	0.074	51.254	0.09

At the second taken, in autumn season, it's observed exceed to maximal limits for ammonia ion for the same localities which registered exceeds for the first taken (sample: 3, 4, 5 and 6); nitrate ion registered exceed for almost all samples, exception samples 1, 10, 11 and 12 (at the first taken was 7 localities where this ion exceed); nitrite ion registered exceed for almost all samples

(exception the samples 8, 11, 12 and 14). For phosphorus, the concentrations are in normal limits. The dates obtained from seasons taken were compared by Student test for seen if exist the significant differences between seasons for the analyzed ions concentration. The results obtained for Student test are presented in table 2.

Table 2 Results of Student test for comparison between seasons for analyzed ions concentration

Specification	N-NH ₄	N-NO ₃	N-NO ₂	N _{inorg}	P
T calculated	0,74	0,97	2,82**	1,01	0,02
T table to $\alpha=0,05$ (26 FD)	2,056				
T table to $\alpha=0,01$ (26 FD)	2,779				

We observed that for nitrite ion concentration registered a very significant difference between taken samples seasons. First, this fact due to transformation in surface water mass of nitrate ion in nitrite ion and secondly to nutrients washed from soil and take in surface water.

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].

CONCLUSIONS

The nitrites presence in surface 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].

ACKNOWLEDGEMENTS

This paper was elaborated during the project POS-DRU/89/1.5/S/63258.

BIBLIOGRAFY

- [1] Bumbu I., Bumbu I., Vîrlan Ludmila: Controlul și monitoringul mediului, Ed. Universității Tehnice din Moldova, Chișinău, 2006, 31-33.
- [2] Ministerul Mediului și Gospodării apelor: Cod de bune practice agricole pentru protecția apelor împotriva poluării cu nitrați din surse agricole, București, 2005, 8-9.
- [3] Ministerul apelor și Protecției Mediului: Normativ privind obiectivele de referință pentru clasificarea calității apelor de suprafață, publicat în Monitorul Oficial nr. 197/2003.
- [4] Săndulescu Dana: Teză de doctorat, U.S.A.M.V. București, 2005.
- [5] www.meteo.md.