ASPECTS REGARDING THE MONITORING OF THE NUTRIENT REGIME OF JIU RIVER, ON GORJ COUNTY TERRITORY

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ABSTRACT: *Monitoring allows the achievement of four main objectives in knowing water quality, namely supervision, forecasting, warning and intervention. Water quality monitoring allows to make a systematic assessment of water qualitative features, which are in permanent dynamics with significant social and economic implications. The paper presents aspects of water monitoring programs and applications monitoring system about nutrient regime for the river Jiu, Gorj county territory.*

KEY WORDS: monitoring, water surfaces, nutrient

1. INTRODUCTION

Natural waters have the function of receiving waste waters loaded with waste or "losses" resulted from human activities, which alters the initial quality of water. In the contemporary society characterized by an accelerated rhythm of social and economic development, there is the tendency of a dangerous increase of water sources pollution process, with the possibility of getting into totally inadequate circumstances. This is why, taking into consideration the two main characteristics: water – environmental factor and water – raw material, it is necessary to develop an adequate program of measures for protecting water quality for periods corresponding to the social and economic development. But, in order to draft and efficiently apply such a program, the first necessary condition is to have some accurate and complete information regarding the loading level (pollution) of natural waters, as well as the potential pollution sources [1].

In this sense, water quality knowledge is the specific activity that takes places systematically and periodically in order to get the fundamental elements for appreciating the evolution of waters quality and for drawing-up the decisions in the field of waters quality management. Designing and implementing a monitoring program at zonal and national level is an essential condition for knowing water quality and an integrating part of environmental integrated monitoring.

Waters pollution with nitrates which has had a significant role lately is mainly generated by four main pollution sources: nitrates resulting from waste and garbage mineralization; nitrates resulted from undirected or poorly directed fermentation of waste and waste waters coming from the zootechnical field; nitrates resulted from chemical fertilizers and nitrates resulted from humus mineralization. The order of these classes of polluting agents reflects their weight as polluting agents [2].

Nitrates concentrations growth over the limit in waters has unfavourable consequences on their quality. Nitrates are therefore responsible for the eutrophication of surface waters, when microorganisms' growth and plants division is very stimulated. Therefore we face exaggerated division of aquatic flora, algae and therefore a large consumption of oxygen which has harmful effects on fish and on the other aquatic beings [4].

2. ELEMENTS RELATED TO THE MONITORING OF THE WATER QUALITY

In the complex activity of protecting the water quality, the main element consists of always knowing its quality and based on the obtained and analysed data, there may be a prognosis of the evolution tendency of the water quality on hydrographical basins or on reduced areas. The main activities helping to the achievement of these purposes are the following:

1. Activities of keeping track and measurement accomplishment, on a limited term, in a certain purpose, such as settling fish units;

2. The continuous surveillance by measurements and observations of the water quality, on certain sections or affluents for the case when the waters have certain important uses, such as potable water source;

3. The long term monitoring activity based on standardized measurements for studying the water resources quality and the evolution of the water quality in time and space.

The monitoring activity in general and especially the water monitoring activity has the following main purposes:

- Alarming for the case when there are pollution value increases which may become dangerous;
- Checking the validity of the strategies for the water quality protection;
- Evaluating and forecasting the evolution tendency of the water quality;
- A tool for determining the water polluters in case of some investigations for the ecological accidents.

When accomplishing a professional monitoring system for water quality, we should start from establishing the problems and the basic criteria. Table 1 presents the criteria specific to the establishment of a professional water monitoring system [5].

*Tab.1. The criteria specific to the establishment of a professional water monitoring system***.**

Selection	Selection criteria and important elements
Establishing the list containing the substances that are to be investigated	- The list containing the chemical substances that are to be investigated; - The toxic features of accumulation and persistency; - The availability of the analytic methods; - Financing funds.
Investigation methods	- Standard methods; - Automatic stations; - Classic chemical analyses.
The stations placement	- Upstream the town; - Downstream the town.
Analyses frequency	- Continuous monitoring; - With a certain periodicity.
Sampling methods	- Continuously with investigation in time; - With a certain settled periodicity; - With a high frequency in case of major risk.
Analytic methods	- Analyses stipulated by the APM regulations; - High accuracy methods.
Data stocking techniques	- Standard periodic reports; - Centralising tables; - Time evolution graphics.
Techniques for presenting the results	- Presenting only the essential data; - Using the statistics techniques.

In case of the emissions monitoring, we start from the premise according to which the limits of the polluting compounds of the waters evacuated into the emissaries do not depend on the change of the quality level of the river and the basic element is the prevention of the emissary pollution. The requests regarding the reduction of the polluting substance quantity from the waters evacuated into the emissaries depend on the toxicity of these substances and on their persistency and tendency of accumulation and bioaccumulation in the water environment.

Referring to the immissions monitoring, it should provide an ensemble image of the entire basin with all the affluents introducing waters with different pollution degrees, it should survey the effects on the water environment and also on the purpose which the waters are used for, but it should also study the cumulated effect of the polluters and of the products of decomposing and spotlighting the diffuse pollution sources.

If we want to project a monitoring system for a certain hydrographical basin or for an affluent, we should necessarily cross at least two steps:

1. Inventorying of all the possible emissions, from the viewpoint of the features: components, concentrations, frequency, variation amplitudes;
2. Detecting and systematically evaluating the complexity degree of the chemical composition and of the samples that are to be done in the laboratory.

Once we establish these preliminary phases, we will establish the monitoring variables, the placement areas of the monitoring stations, the sampling frequency and the result interpretation [3,5].

3. THE MONITORING OF THE NUTRIENT REGIME OF JIU RIVER, ON GORJ COUNTY TERRITORY

The nutrient regime of Jiu river, the main water flow that crosses the territory of Gorj county was characterized by following chemical indicators: NH_4^+, NO_2^-, NO_3^-, P_{total}. Measured value of these indicators during 2011 are presented in table 2-4.

Tab.2. The nutrient regime of Jiu river (upstream confluence with Sadu and downstream Tg. Jiu)

Nr. crt	Jiu- upstream confluence with Sadu			Jiu- downstream accumulation Tg. Jiu			Maximal admitted value		
	NH_4^+ mg/l	NO_2^- mg/l	NO_3^- mg/l	NH_4^+ mg/l	NO_2^- mg/l	NO_3^- mg/l	NH_4^+ mg/l	NO_2^- mg/l	NO_3^- mg/l
1	0,094	0,054	0,92	0,108	0,059	1,06	0,3	0,03	3
2	0,099	0,012	1,05	0,135	0,057	1,08	0,3	0,03	3
3	0,076	0,046	1,02	0,066	0,02	0,97	0,3	0,03	3
4	0,065	0,046	1,1	0,057	0,032	1,03	0,3	0,03	3
5	0,094	0,075	1,05	0,068	0,06	1,02	0,3	0,03	3
6	0,011	0,021	0,92	0,091	0,07	0,83	0,3	0,03	3
7	0,063	0,047	0,82	0,050	0,049	0,86	0,3	0,03	3
8	0,042	0,042	1,1	0,031	0,051	1,28	0,3	0,03	3
9	0,081	0,083	2,23	0,162	0,03	2,05	0,3	0,03	3
10	0,012	0,026	2,42	0,057	0,034	3,24	0,3	0,03	3
11	0,033	0,052	1,23	0,038	0,034	1,98	0,3	0,03	3
12	0,042	0,01	1,61	0,042	0,046	2,32	0,3	0,03	3

Tab. 3. The nutrient regime of Jiu river by section Jiu-Bâlteni.

Nr. crt.	NH_4^+ mg/l	Maximal admitted value	NO_2^- mg/l	Maximal admitted value	NO_3^- mg/l	Maximal admitted value
1	0,156	0,3	0,055	0,03	0,90	3
2	0,144	0,3	0,059	0,03	1,02	3
3	0,067	0,3	0,034	0,03	1,08	3
4	0,06	0,3	0,033	0,03	1,03	3
5	0,051	0,3	0,036	0,03	0,93	3
6	0,10	0,3	0,012	0,03	0,97	3
7	0,052	0,3	0,046	0,03	1,03	3
8	0,058	0,3	0,051	0,03	2,85	3
9	0,162	0,3	0,023	0,03	3,25	3
10	0,057	0,3	0,034	0,03	3,11	3
11	0,124	0,3	0,062	0,03	3,02	3
12	0,082	0,3	0,036	0,03	2,92	3

Tab. 4. Total phosphorus content of Jiu river.

Nr. crt.	Phosphorus $_{total}$			Maximal admitted value
	Jiu- upstream confluence with Sadu	Jiu- downstream accumulation Tg. Jiu	Jiu- Bâlteni	
1	0,054	0,059	0,061	0,4
2	0,057	0,060	0,091	0,4
3	0,060	0,061	0,076	0,4
4	0,056	0,054	0,052	0,4
5	0,061	0,056	0,060	0,4
6	0,054	0,057	0,104	0,4
7	0,054	0,057	0,06	0,4
8	0,054	0,058	0,063	0,4
9	0,061	0,059	0,089	0,4
10	0,057	0,062	0,052	0,4
11	0,062	0,056	0,098	0,4
12	0,053	0,058	0,04	0,4

The monitoring of the chemical indicators of the nutrient regime for Jiu water flow and their report to the maximal admitted values stipulated in NTPA 001/2002, has led to the following conclusions:

- *regarding the charging degree with nitrogen compounds,* we determined the indicators NH_4^+ , NO_2^- and NO_3^- . From the analysis of the values measured for these water quality indicators, it results that there were overflows of the maximal admitted concentration for NO_2^- and NO_3^-, in the sections: Jiu- downstream Târgu-Jiu and Jiu-Bâlteni.

- *regarding the charging degree with phosphor compounds,* from the value analysis of P_{tot} indicator, there was no overflow in any of the monitored sections: Jiu- upstream Sadu confluence, Jiu- downstream Târgu-Jiu and Jiu-Bâlteni.

4. CONCLUSION

The monitoring activity has a determining role, being the main instrument in water policies development and related management. Being a basic activity in water integrated management, their quality monitoring has become an indispensable instrument of spatial and temporal evaluations regarding concentrations evolution trends and polluters loading, as well as compliance with the quality criteria and objectives provided by the relevant legislation. In order to provide an adequate quality and water protection, as well as to check the compliance of protection regulations, it is necessary to achieve a complete database on their polluters loading level.

The water quality monitoring constitutes an extremely important activity which is primordial in the actions of preventing and combating the water pollution. The activity of monitoring and controlling the water quality is based on legislative regulations meant to protect the water resources and to provide their corresponding quality.

The nutrient effects on the quality of the surface waters support the necessity to monitor the content of these polluters and the application of the measures for preventing and combating the pollution in case of overflowing the limits admitted by the valid legislation.

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