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EVOLUTION OF WATER QUALITY IN THE BUZAU- IALOMITA BASIN

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Abstract

The paper presents the evolution of Water Quality in Romania during the period 2004-2009 in the Buzau-Ialomita Basin who includes the rivers Buzau, Ialomita, Prahova, Calmatui, Mostistea. It is based on the statistical data provided by Ministry of Environment and Climate Change. The information has been processed into the following indicators: water quality, phisico-chemical and biological status of water quality, accidental pollution. During the analyzed period, was found an increase in the length of river sections with water quality framed in IIIrd class, but the IVth and the Vth classes have registered an decrease by few percents. The average flow rate taken from 2004 to 2009 has modified in most areas.*distribution according to the National Administration of "Romanian Waters".*

Key words*: water quality, biological status, physico-chemical structure of the water, Buzau – Ialomita Basin*

INTRODUCTION

Rivers are the main source of drinking and industrial water in Romania, which are characterized by flowing phenomenon (influencing the amount of suspended solids and colloidal, physical and chemical characteristics, shape of the riverbed, flow variation and water level) and by water contact with the atmosphere (which influences oxygenation capacity, variation in daily and seasonal temperature) and by purification ability. (Teodosiu, 2001)

Generally, rivers are characterized by lower mineralization, amount of dissolved salts is below 400mg/l, and consists of sodium chlorides and sulphates, potassium, calcium and magnesium.

The main feature of rivers is the load with suspended solids and organic matter, the load is proportionally related to weather conditions and climate.

The discharge of insufficiently treated effluents led to alteration in the water bodies and the emergences of a wide range of contamination and in some cases are exacerbated bacterial contaminations. (Rojanschi et al., 1997)

Ialomita- Buzau Basin is located in the south-east of the country with a surface of 19 040km^2 representing about 8% of the country. Water resources in the studied area are mostly of Ialomita and Buzau Rivers, the resources of Mostistea River and Calmatui River are insignificant for major uses.

On the studied area 87 treatment plants are in operation out of which only 10 shows satisfactory operations. 22.2% of the total discharged debits does not require treatment, and of those treated 58.4% are insufficiently purified, 18.3% are purified in a satisfying manner, while 1.1% is not purified being directly discharged (Ilie, 2007).

MATERIALS AND METHODS

In order to characterize the quality of the water in the Ialomita – Buzau Basin, the following indicators were used: physico - chemical water quality, bacteriological characteristics of water, the length of river investigated and accidental pollution.

The period analyzed in this study was 2004 – 2009.

The data have been collected from Ministry of Environment and Climate Change and they have been processed and interpreted based on simulation models.

RESULTS AND DISCUSSIONS

Romania's water resources potential and technical used from inland rivers are (thousand m^3):

- Theoretical resource 40.000.000;
- Existing resource according to the level of spatial watershed 13.952.663:
- Water requirement of land use according to the ability to capture in operation 3.545.744

Water requirement decreased from 20.4 thousand m^3 in 1990 to 5.3 thousand m^3 in 2006 and reaching the value 8.5 thousand m^3 according to statistics from 2009, due to: decrease of industrial activity, reducing water consumption in the technological processes, reduce losses, applying economic mechanism in water management.

Water levies, during the analyzed period, have been 60 – 80% of total water demands because of overestimation of requirements, especially in industry and agriculture. Measurements were performed on the combined lengths of river that reach 1175 km in the interval 2004 to 2006 and getting to 1308 km in 2009; number of sampling points have increased from 37 to 45 over the same period. Quality of water has been analyzed in terms of physico-chemical and bacteriological structure of the water. observing the quality of the water courses Biologically (bacteriological), was founded on the following elements: macro-invertebrates, phytobenthos and phytoplankton. Ecological status is the structure of aquatic ecosystems, emphasized by biological quality elements, general bacteriological and physico-chemical elements with a classification system in 5 classes: high, good, moderate, poor and bad.

Table1. Evolution of the ecological status

	2004	2005	2006	2007	2008	2009
High	2.5	6	23.6	16.73	16.25	19.95
Good	19	32	28.2	29.54	36.85	23.55
Mod	24	37	41.7	46.28	39.02	47.71
Poor	25	12	5.8	6.65	7.88	8.79
Bad	29.53	12	0.7	0.8	0	0

As can be seen in Figure 1, in 2004, poor and bad ecological statuses were recorded on approximately half of the river length on which measurements were made.

And, in 2008 and 2009, in Ialomita- Buzau Basin, have not registered sections in bad ecological status, but the largest share has been the III[rd] water quality class – the moderate ecological status.

The physico-chemical tests include measurements of temperature, turbidity, odor, color, total solid, total dissolved solid, pH, conductivity, total suspended solid and iron content. (Shittu, 2008)

For evaluation of physico-chemical water quality overall, in each monitored section, were calculated for each indicator the 90% and 10% insurance values of dissolved oxygen and these were compared the limit values as set out in the normative with five quality classes, resulting in inclusion in one of five quality classes.

The chemical state is represented by the concentrations of pollutants which must conform to the environmental quality standards to ensure protection of human health and the environment.

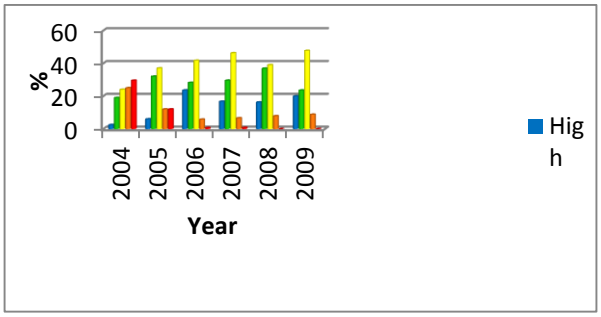

Figure1. Evolution of the physico-chemical status (Percentage)

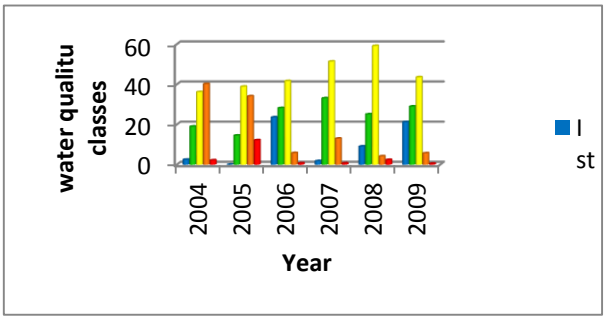

Figure2. Evolution of the physico-chemical status (Percentage)

Table2. Evolution of the physico-chemical status

	2004	2005	2006	2007	2008	2009
I st	2.5	0	23.6	1.8	9.1	21.2
II nd	19	14.5	28.2	33.1	25.1	29
III rd	36.2	38.9	41.7	51.4	59.2	43.6
IV th	40.2	34.6	5.8	13	4.2	5.7
V th	2.2	12.1	0.7	0.7	2.4	0.5

The physico-chemical properties of water in Ialomita- Buzau Basin have improved in the last years as you can see in Figure 2, the IVth and Vth quality classes have registered a slight decrease, but the largest share has been the IIIrd water quality class.

The overall aim of the Water Framework Directive is to achieve by 2015 a "good status" for of all water bodies in Europe, which involves providing similar living conditions in terms of the aquatic environment for all European citizens. (Water Law 107/1996)

River Basin Management Plan is the main instrument for implementing the Water Framework Directive, presents aspects of water quality management based on knowledge status of water bodies, set target goals over a period of six years (2009-2015) and propose measures to achieve "good status "of waters for their sustainable use. (Water Framework Directive)

Figure3. View from Buzau River

Because only 42% of population is connected to the sewage system, the degree of connection to wastewater treatment plants by about 31%, inadequate protection of soil when sludge is used from sewage treatment plants pollution with organic substances occurs: an excess of organic matter due to untreated wastewater, affecting aquatic life and state waters.

Nutrient pollution due untreated wastewater, agricultural practices unsuitable to new requirements, industry and transportation, all leading to eutrophication of waters. (Leau. 2011).

In 2008, after physico-chemical analyzes, was found an increase of 8.2% of the river sectors who fall into IIIrd water quality class due to pollution by oil products with substances both organic and inorganic, due to negligence of some operators during the development processes, and by the lack of upgrading of technological processes in some industrial units.

In Figure 4 are outlined river lengths framed into a class depending on the biological and physico-chemical status.

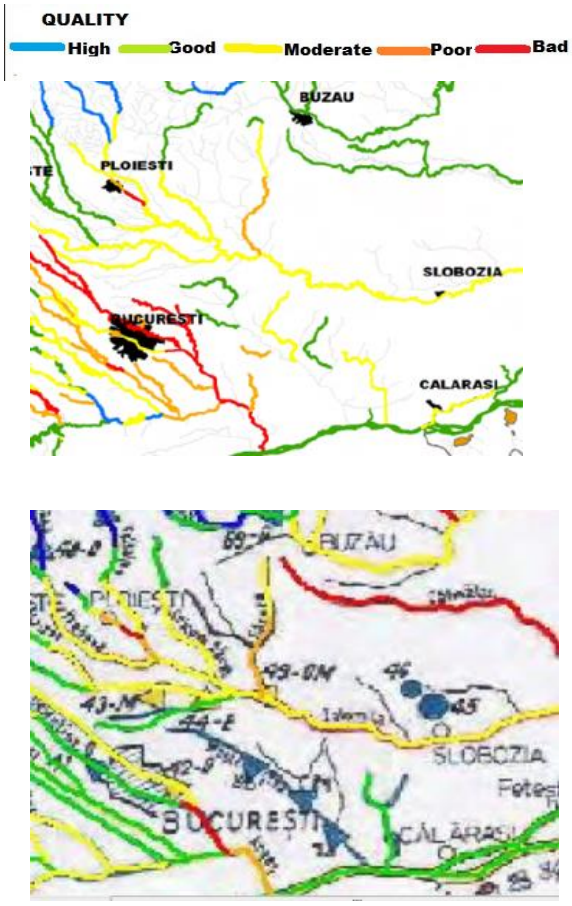

Figure 4.Biological status of the basin (left) and physico-chemical (right) in 2009

CONCLUSIONS

From 1990 to 2009 water demand decreased by 41.7% due to decrease of industrial activity, reducing water consumption in the technological processes, reduce losses, applying economic mechanism in water management.

The physico-chemical status of water has registered an increase of the IIIrd water quality class during the period under review but it can be seen a slight decrease of IVth and Vth quality classes.

Biological analysis revealed that most part of the length analyzed fall into the third class of water quality. Water from this category can be used as water supply for irrigation systems, water supply for industry.

By 2015, Romania proposes measures to achieve "Good status" of waters for their sustainable use, measures in accordance with River Basin Management Plan, the main instrument for implementing the Water Framework Directive.

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