NATIONAL ACADEMY OF SCIENCES OF THE REPUBLIC OF ARMENIA
SCIENTIFIC CENTER OF ZOOLOGY AND HYDROECOLOGY
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GEVORGYAN GOR

ECOLOGICAL EVALUATION OF THE VOGHCHI AND MEGHRIGET RIVERS (ARMENIA) BY THE HYDROCHEMICAL AND HYDROBIOLOGICAL PARAMETERS

Geographical map of the Republic of Armenia

GOAL AND ISSUES OF STUDY

The aim of the present work was to study and evaluate the current ecological situation of the Voghchi and Meghriget rivers and to reveal the main sources of the pollution of the rivers.

According to the aforementioned goal, the following issues were posed:

- *To carry out the monitoring studies of some physicochemical and hydrobiological parameters of the Voghchi and Meghriget rivers.*

- *To reveal the main sources of the pollution of the hydroecosystems.*

- *To evaluate the ecological situation of the rivers according to the studied water quality parameters.*

OBJECT OF SYUDY

Schematic map of the selected sampling sites in the the Voghchi and Meghriget rivers

Selected sampling sites in the Voghchi and Meghriget rivers

1. Voghchi – 1.7 km before Qajaran town
2. Voghchi – 1.7 km after Qajaran town
3. Voghchi – 0.8 km before Kapan town
4. Voghchi – 6.8 km after Kapan town

1. Meghriget - 0.5 km before Meghri town
2. Meghriget – river mouth

▼ - *Sampling site*

○ - *Residential area*

STUDY METHODS

- *Temeperature, pH, dissolved oxygen content and oxygen saturation were determined by the WTW multi-parameter field meter.*

- *As a determination index of organic matter content in water, the values of permanganate oxidation index measured by the Kubel method were used.*

- *The quantitative analysis of bacterioplankton were carried out by the "RIDA COUNT" series ready-made culture chromogenic medium sheets.*

NORM pH = 6.5-8.5

pH values in the Voghchi river waters

Season	*Sampling site*			
	1	*2*	*3*	*4*
2008				
Spring	8.12	7.98	8.17	8.26
Summer	8.01	8.39	8.43	8.01
Fall	7.15	8.76	8.5	8.08
Winter	7.35	8	7.91	8.33
2009				
Spring	8.31	8.23	8.26	8.02
Summer	7.92	8.02	7.74	7.8
Fall	7.04	8.04	8.1	7.97
Winter	8.18	7.89	8.55	8.27

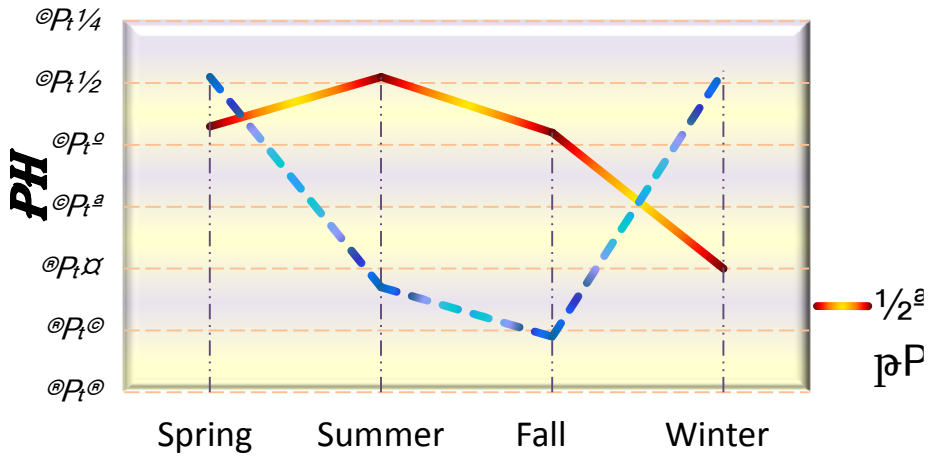
pH values in the Meghriget river waters

Season	*Sampling site*	
	1	*2*
2008		
Spring	7.92	8.08
Summer	7.90	8.34
Fall	7.73	8.12
Winter	7.69	8.18
2009		
Spring	7.98	8.33
Summer	7.58	7.48
Fall	7.21	8.81
Winter	8.08	8.20

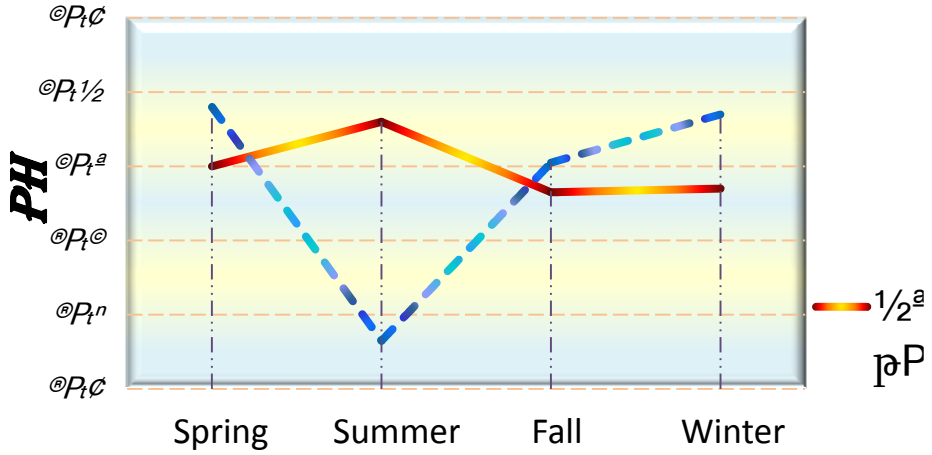
The classification of the waters of the rivers according to the pH value

Meghriget – water with neutral, weak alkaline and alkaline reactions

Voghchi – water with neutral, weak alkaline and alkaline reactions

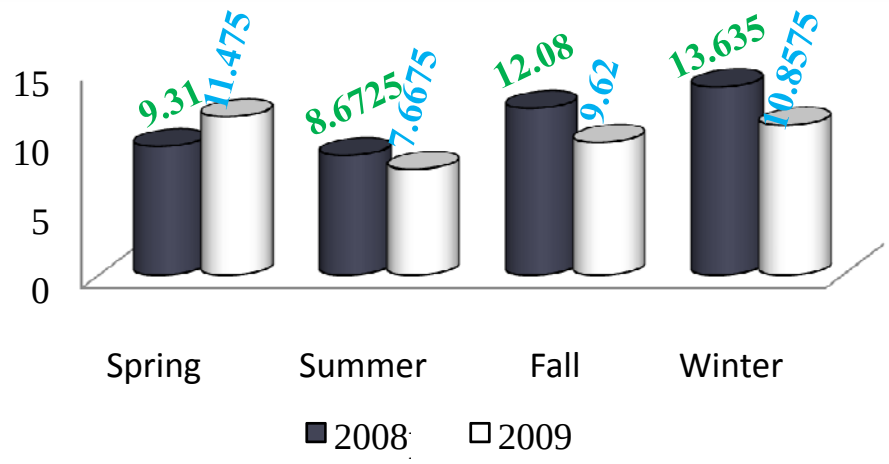


Seasonal dynamics of pH average seasonal values in the Voghchi river waters

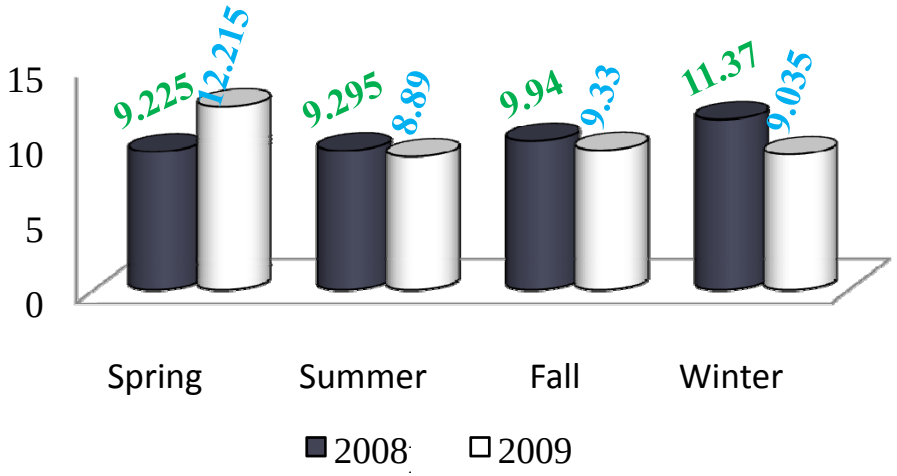


Seasonal dynamics of pH average seasonal values in the Meghriget river waters

NORM DO > 6mg/l



Seasonal dynamics of dissolved oxygen content average seasonal values in the Voghchi river waters



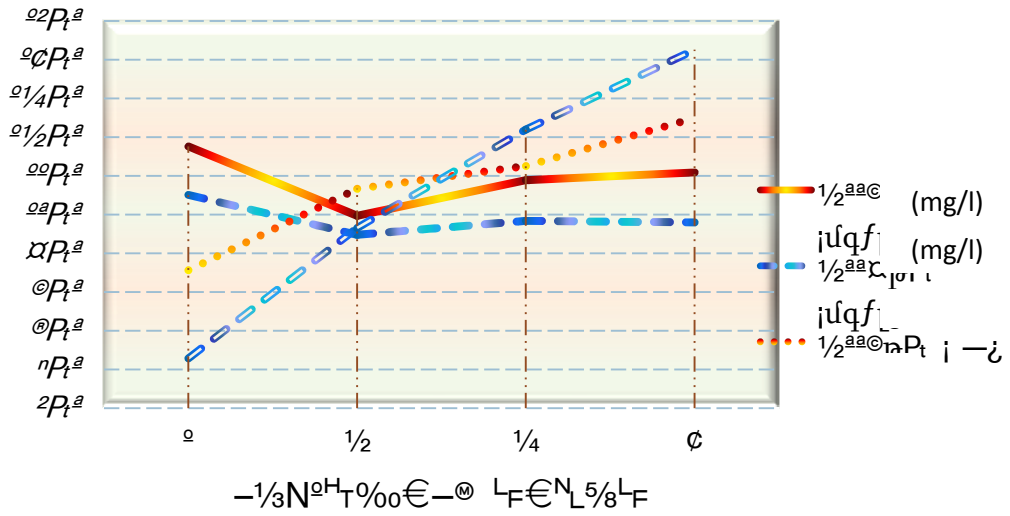
Seasonal dynamics of dissolved oxygen content average seasonal values in the Meghriget river waters

Oxygen saturation in the Voghchi river waters (%)

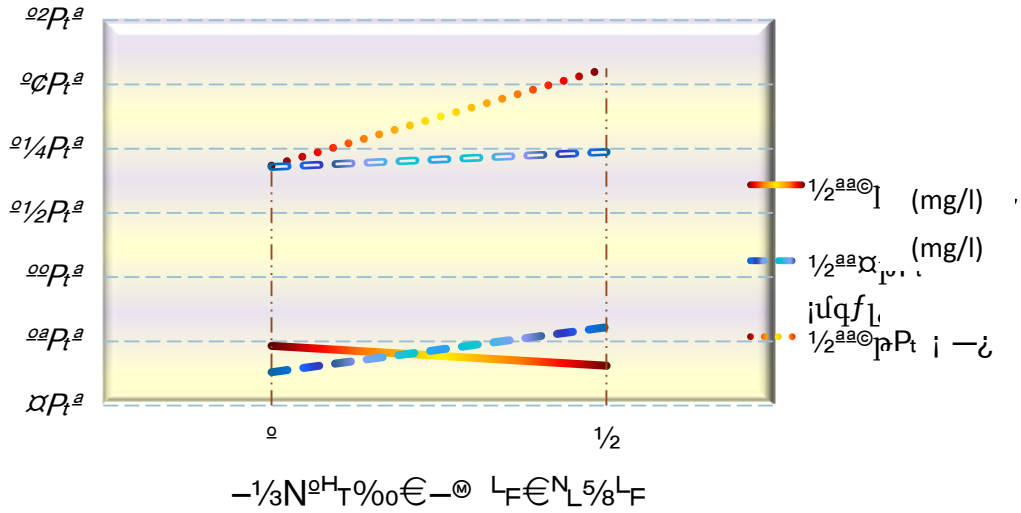
Season	Sampling site			
	1	2	3	4
2008				
Spring	76.0	80.0	82.0	94.0
Summer	77.7	88.8	97.6	85.0
Fall	134.5	120.1	120.6	108.3
Winter	104.1	84.5	96.3	116.1
2009 թ.				
Spring	97.4	100.6	98.7	118.7
Summer	80.4	79.4	81.0	73.9
Fall	92.4	89.6	96.3	87.0
Winter	85.4	71.3	91.8	93.4

Oxygen saturation in the Meghriget river waters (%)

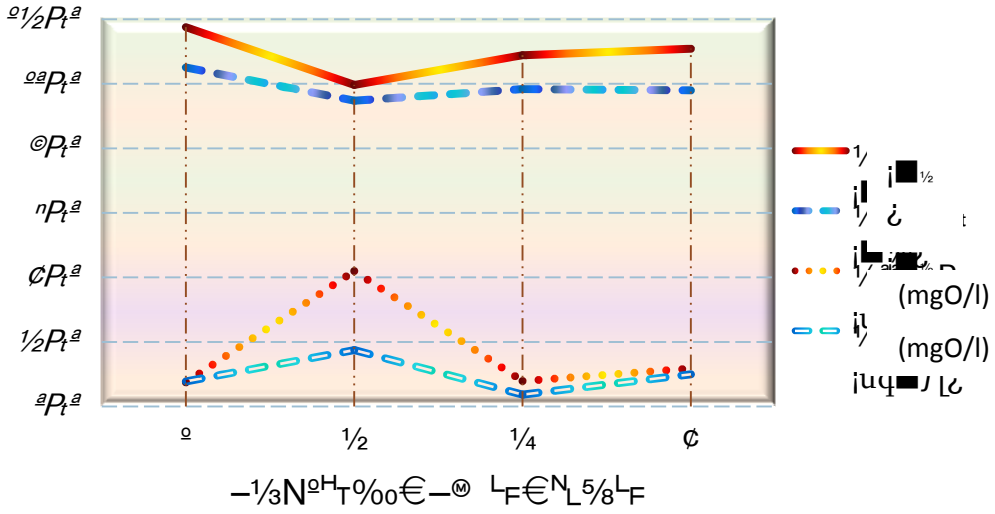
Season	Sampling site	
	1	2
2008		
Spring	86.0	86.0
Summer	87.4	106.6
Fall	108.7	107.1
Winter	91.6	92.7
2009		
Spring	107.1	108.2
Summer	86.2	95.7
Fall	86.7	99.7
Winter	76.9	86.7



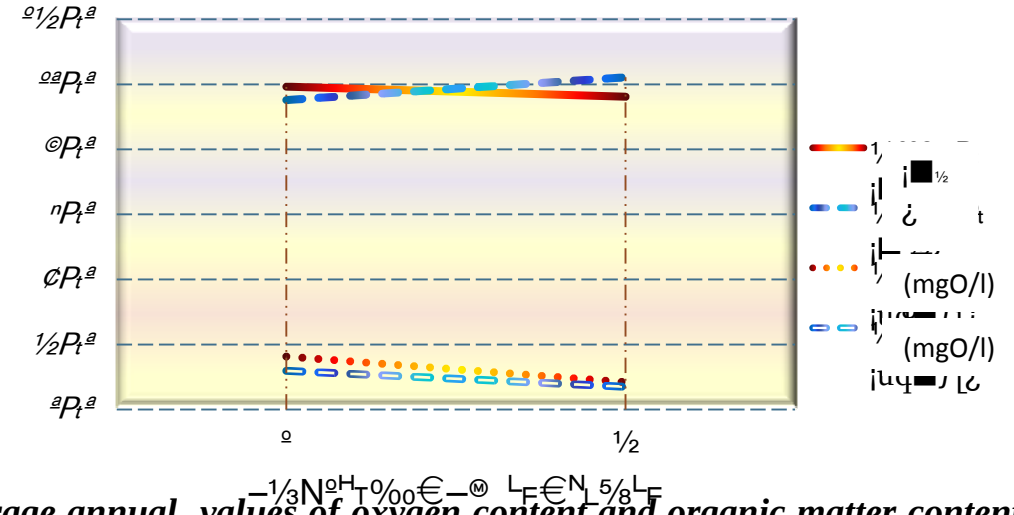
Dynamics of the average annual values of oxygen content and temperature in the Voghchi river waters according to flow



Dynamics of the average annual values of oxygen content and temperature in the Meghriget river waters according to flow



Dynamics of the average annual values of oxygen content and organic matter content in the Voghchi river waters according to flow



Dynamics of the average annual values of oxygen content and organic matter content in the Meghriget river waters according to flow

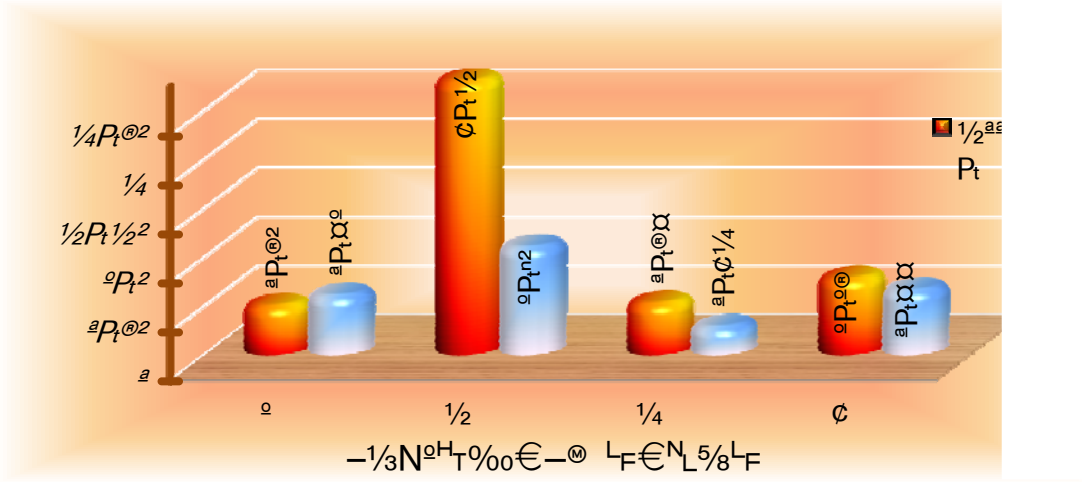
Maximum permissible concentration
MPC = 2 - 5 ılqO/l

Permanganate oxidation values in the Voghchi river waters

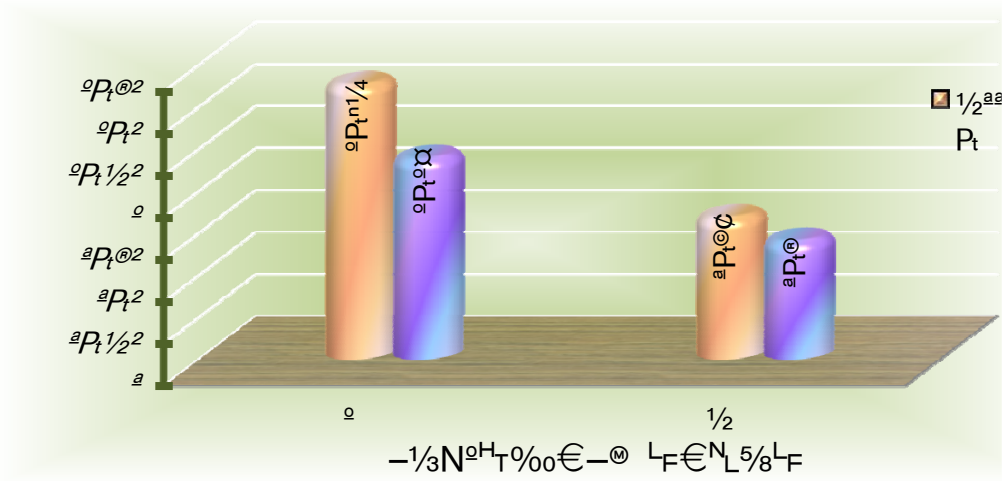
Season	*Sampling site*			
	1	*2*	*3*	*4*
2008				
Spring	0.19	0.93	1.30	2.03
Summer	0.20	0.20	0.20	0.49
Fall	0.02	6.71	1.07	2.05
Winter	2.59	8.96	0.59	0.13
2009				
Spring	1.74	1.22	0.93	1.30
Summer	0.37	0.37	0.22	0.74
Fall	1.41	1.48	0.37	1.86
Winter	0.13	3.51	0.2	0.06

Permanganate oxidation values in the Meghriget river waters

Season	*Sampling site*	
	1	*2*
2008		
Spring	1.15	1.44
Summer	0.34	0.56
Fall	1.07	0.77
Winter	3.97	0.59
2009		
Spring	1.44	1.88
Summer	0.22	0.37
Fall	0.44	0.22
Winter	2.65	0.34



Dynamics of the average annual values of permanganate oxidation index according to the Voghchi river flow (mgO/l)



Dynamics of the average annual values of permanganate oxidation index according to the Meghriget river flow (mgO/l)

Classification of the waters of the Voghchi and Meghriget rivers according to permanganate oxidation values

1. Voghchi river (1.7 km before Qajaran town) - very pure – moderate polluted

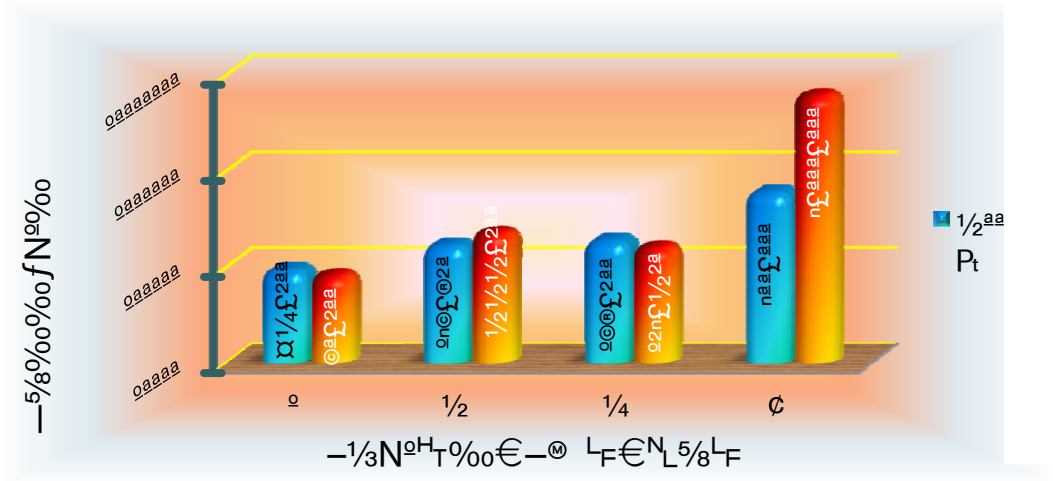
2. Voghchi river (1.7 km after Qajaran town) - very pure – dirty

3. Voghchi river (0.8 km before Kapan town) - very pure

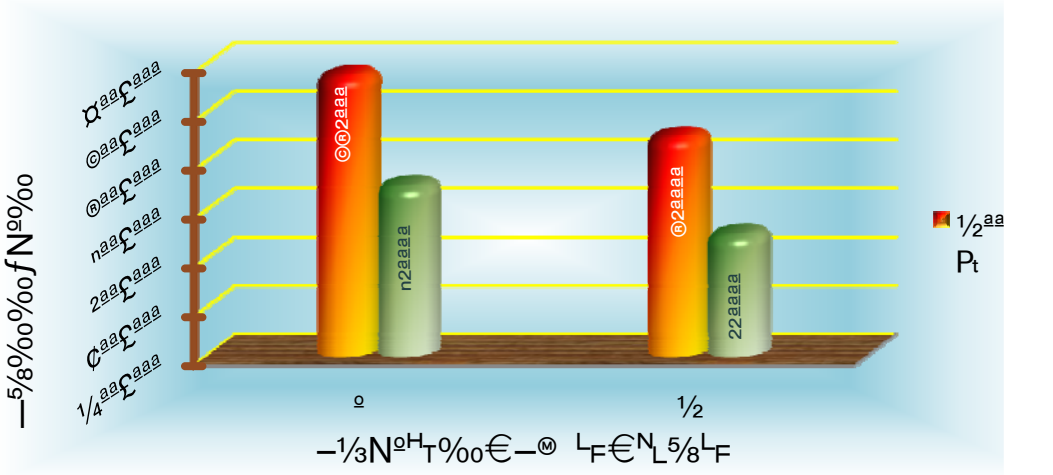
4. Voghchi river (6.8 km after Kapan town) - very pure - pure

1. Meghriget river (0.5 km before Meghri town) - very pure - polluted

2. Meghriget river (delta, after Meghri town) - very pure - pure



Bacteria average annual quantity in the Voghchi river waters according to flow



Bacteria average annual quantity in the Meghriget river waters according to flow

Classification of the waters of the Voghchi and Meghriget rivers according to the total number of bacteria

1. Voghchi river (1.7 km before Qajaran town) - very pure
2. Voghchi river (1.7 km after Qajaran town) - very pure
3. Voghchi river (0.8 km before Kapan town) - very pure
4. Voghchi river (6.8 km after Kapan town) - very pure - dirty

1. Meghriget river (0.5 km before Meghri town) - very pure – moderate polluted
2. Meghriget river (delta, after Meghri town) - very pure – moderate polluted

Evaluation of the situation of the hydroecosystems according to the ecological modification scale

Voghchi and Meghriget rivers - background situation - hydroecosystems were capable of self-recovery without significant changes in species compositions

CONCLUSIONS

1. pH values and dissolved oxygen content varied within the ranges which are favorable for the growth of the most hydrobionts.
2. According to the permanganate oxidation values, the water quality of the Voghchi river ranged from very pure to dirty, the water quality of the Meghriget river ranged from very pure to polluted.
3. The high contents of organic matters in the Voghchi river waters were mainly conditioned by industrial and domestic wastewaters and in the Meghriget river waters were mainly conditioned by agricultural wastewaters.
4. According to the total number of bacteria, the pollution level of the Voghchi river waters ranged from very pure to dirty and the Meghriget river waters ranged from very pure to moderate polluted.
5. The evaluation of the situaton of ecosystems, according to the ecological modification scale (according to the bakterioplankton growth parameters), revealed that the hydroecosystems were in the background situation which means the ecosystems were capable of self-recovery without significant changes in species compositions.

SUGGESTIONS

To rebuild the existing biological water cleaning stations and build new stations.

To implement the recovery of sewerage systems and technical re-equipment, staff trainings.

To build manure collection systems.

THANK YOU FOR ATTENTION