POLITICAL ISSUES OF TRANSITIONAL WATER RESOURCES USE IN UZBEKISTAN AND ANALYSIS OF THE CURRENT ECOLOGICAL STATUS OF RESOURCES (ON THE EXAMPLE OF NUKUS CITY AND AMUDARYA DISTRICT)

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ABSTRACT

This article analyzes the complexity of water use in Uzbekistan. Because we can understand that solving these problems is considered as a significant issue by looking at Central Asia andthe whole ecosystem. The unequal distribution of water resources in the regions and the lack of demand for resources complicate the livelihoods of the local population. Especially, due to the tragedy of the Aral Sea problem in our republic, not only the population of our republic, but also the neighboring countries have been affected. However, the living environment of the population of small areas near the South Aral Sea has deteriorated, resulting in a negative change in the socio-economic status of the local population. Therefore, human safety comes first, especially in the current environmental situation in the Republic of Karakalpakstan. The issue of drinking water is much more complicated than other regions in improving the socio-economic situation of the population. This problem is a humanitarian problem that is in the focus of our republic and Central Asian states. In determining the current ecological status of water resources entering the country from open water basins, we can compare the physical and chemical properties of drinking water resources in Nukus and Amudarya district, especially the quantitative indicators of nitrate anions over the years with deep empirical and rational mathematical statistical methods.As reason forimproving the ecological condition of the population of a small ecosystem, where such a difficult ecological situation has arisen, it is necessary to constantly monitor clean drinking water.

Keywords: Environment and policy, factors, ecosystems, drinking water resources, chemical pollution, nitrate anions, monitoring, empirical and rational.

INTRODUCTION:

It is known that neighboring countries in the Central Asian region, such as Uzbekistan, Kazakhstan, Kyrgyzstan, Turkmenistan and Tajikistan, are suffering from socio-economic problems due to water shortage. In this large ecosystem, after the Aral Sea problem, there is a difficult ecological situation in these regions. If we analyze the root cause of this problem, we can see that the balance between nature and society has been formed incorrectly for a long time and the negative activity of thesociety [1;2;3;4].

In this region, water resources are the basis for the development of countries. In particular, after gaining their independence, each state in the region focused its efforts mainly on economic growth and the formation of new state institutions politically. As a result, one of the most important problems in the region, the distribution of water resources of transboundary rivers, has become more complicated and is currently unresolved. However, water resources in these regions are not in demand. In particular, we can see the example of some ecologically difficult areas of our republic. Based on this, we can show the water resources of Nukus and Amudarya districts of the Republic of Karakalpakstan. The reason is that the Aral Sea problem has caused socio-economic damage to the population of these ecosystems, and the problem of clean drinking water in these areas is currently the most complex. In addition, the current transboundary water problem between countries is complicating the livelihoods of the people living in these areas [5;6;7;9]. For example, because clean drinking water is not 100% in demand, it is common for people to suffer from many diseases. We think that in order to find a solution to these problems to some extent, we need to properly analyze the facilities that supply water to open water bodies entering the country. This is due to the fact that the main sources of drinking water for the population of Uzbekistan are two major rivers, the Amudarya and the Syrdarya [7;8;10;11;15].

We know that most of the water used in this large ecosystem comes from two major rivers, the Syrdarya and the Amudarya, which form in the Pamirs and Tianshanmountains. The Syrdarya flows from Kyrgyzstan through Tajikistan to Uzbekistan (including the densely populated Fergana Valley) and Kazakhstan, and the Amudarya flows from Tajikistan to Uzbekistan and Turkmenistan. The water resources of the Syrdarya River, with an average perennial flow of 37 km^3, are distributed as follows: 74% of it goes to Kyrgyzstan, 14% to Uzbekistan, 9% to Kazakhstan and 3% to Tajikistan. 'ri is coming. The average perennial flow is 78 km^3. More than 80% of the Amudarya flows in Tajikistan, 6% in Uzbekistan, 2.4% in Kyrgyzstan and 3.5% in Turkmenistan (with Iran) and 7.9% i- are formed in Afghanistan [12;13;14;18].

The main reason for the deterioration of relations between the upper reaches of the transboundary rivers in Central Asia (Tajikistan, Kyrgyzstan) and the lower reaches (Kazakhstan, Turkmenistan, Uzbekistan) was the improper distribution of water flow. In Central Asia, Kazakhstan and Uzbekistan are industrialized countries with large reserves of oil, gas and other mineral resources [15;17]. These countries have the largest populations among the states in the region. Because these countries are located downstream, Kyrgyzstan and Tajikistan, which have the largest water supply to the “upper” countries and practically control the main water flows of the Amudarya and Syrdarya, remain dependent on water.

THE AIM AND TASKS OF THE RESEARCH:

Determination of nitrate pollution of drinking water resources in Nukus city and Amudarya district by statistical methods and political analysis of water shortage problems in these ecosystems.

Based on the above goal, we were able to perform the following tasks:

- Analysis of scientific materials on transboundary water issues in Central Asia;
- Analysis of water policy in the country;
- Application of statistical methods for quantitative determination of nitrate pollution of drinking water resources in Nukus and Amudarya districts of the Republic of Karakalpakstan;
- Develop appropriate recommendations for problem solving.

OBJECTS AND SUBJECTS:

In identifying the political issues of drinking water resources and the state of resource pollution, we have identified two ecosystems as drinking water in the city of Nukus and the Amudarya district.

The components of the object to be studied, which reveal the essence of the object, are the quantitative changes of NO_3^-anions in drinking water over the years, the main similarities in the physical and chemical properties of local water, we set the basis for the study on the basis of empirical and rational differences and differences over the years.

MATERIALS AND METHODS:

Any process in the environment, including the scientific application of changes in the state of living organism,the elements that cause negative or positive changes in it, and their view as a general complex. Through study, the mechanism of action of the laws of nature leads to a smooth operation [2;7]. In other words, it is possible to prevent imbalances in nature.

In general, it is not possible to study the natural conditions by separating the components of any condition. This is because the mechanism of the laws of nature operates unconsciously, in which the elements of the environment complement each other or can completely replace this element [6;8]. We know that this can lead to imbalances in nature over time. Of course, at this time it is very difficult to see changes in any ecosystem with the naked eye, and the conclusions drawn from it leads us to misunderstand. However, through the process of empirical knowledge of natural or artificial ecosystems in nature, that is, by experimenting in natural and artificial conditions and studying the data obtained from it on the basis of deep rationality, the researcher can change objects in the environment to negative or positive changes.

Based on the above basic concepts, we apply the changes in the drinking water resources of the population of the Republic of Karakalpakstan, that is, the current ecological status of these resources. At the same time, the object we are studying is the drinking water resources of the population of Nukus city (№1 object) and Amudarya district (№2 object).

Based on the data from 2015, 2016, 2017, 2018, and 2019, we used mathematical statistical methods to determine, compare, and find the difference between the average values of nitrate anions (NO_3^-) in water resources. The following comparisons show the pollution of water resources.

Table 1: Monthly and annual average values of NO_3^- anions in the water resources of №1 object and №2 objects for 2015

№	X_i	Y_i	X^2	Y^2	X_iX	Y_iY
1	0,8	1,6	0,64	2,56	0,8 x 2,16 = 1,73	1,6 x 1,87 = 3,00
2	1,7	1,5	2,89	2,25	1,7 x 2,16 = 3,67	1,5 x 1,87 = 2,8
3	2,5	2,00	6,25	4,00	2,5 x 2,16 = 5,4	2,00 x 1,87 = 3,74
4	2,8	2,9	7,84	8,41	2,8 x 2,16 = 6,05	2,9 x 1,87 = 5,42
5	2,5	3,2	6,25	10,24	2,5 x 2,16 = 5,4	3,2 x 1,87 = 5,98
6	2,1	2,1	4,41	4,41	2,1 x 2,16 = 4,54	2,1 x 1,87 =3,93
7	0,75	0,5	0,56	0,25	0,75 x 2,16 = 1,62	0,5 x 1,87 = 0,93
8	2,00	1,2	4,00	1,44	2,00 x 2,16 = 4,32	1,2 x 1,87 = 2,24
9	1,76	0,9	3,1	0,81	1,76 x 2,16 = 3,8	0,9 x 1,87 = 1,68
10	3,76	2,76	14,14	7,62	3,76 x 2,16 = 8,12	2,76 x 1,87 = 5,16
11	1,5	0,00	2,25	0,00	1,5 x 2,16 = 3,24	0,00 x 1,87 = 0,00
12	3,75	3,75	14,1	14,1	3,75 x 2,16 = 8,1	3,75 x 1,87 = 7,01
N	**E=2,16**	**E=1,87**	**E=66,36**	**E= 56,1**	**E= 55,99**	**E= 41,89**

$$\partial 1 = \frac{\sqrt{\Sigma X^2 - XiX}}{n-1} = \frac{\sqrt{66,36 \quad - \ 55,99}}{12-1} = \frac{\sqrt{10,37}}{11} = 0,29$$

$$\partial 2 = \frac{\sqrt{\Sigma Y^2 - YiY}}{n-1} = \frac{\sqrt{56.1^{-}41{,}89}}{12-1} = \frac{\sqrt{14{,}21}}{11} = 0{,}34$$

$$\boldsymbol{S}(\partial 1^2 - \partial 2^2) = \Sigma \frac{\sqrt{\partial 1^2 + \partial 2^2}}{n^2} = \frac{\sqrt{(0{,}29)^2 + (0{,}34)^2}}{12^2} = \frac{\sqrt{0{,}08 + 0{,}11}}{144} =$$

$$= \frac{\sqrt{0{,}19}}{144} 0{,}003$$

Table 2: Monthly and annual average values of NO_3^- anions in the water resources of №1 object and № 2 objects for 2016.

№	X_i	Y_i	X^2	Y^2	X_iX	Y_iY
1	3,75	2,75	14,1	7,56	3,75 x 2,8 = 10,5	2,75 x 2,8 = 7,7
2	2,75	2,5	7,56	6,25	2,75 x 2,8 = 7,7	2,5 x 2,8 = 7,00
3	3,25	3,25	10,56	10,56	3.25 x 2,8 = 9,1	3,25 x 2,8 = 9,1
4	3,75	3,1	14,1	9,61	3,75 x 2,8 = 10,5	3,1 x 2,8 = 8,68
5	2,7	2,25	7,29	5,06	2,7 x 2,8 = 7,56	2,25 x 2,8 = 6,3
6	2,5	2,00	6,25	4,00	2,5 x 2,8 = 7,00	2,00 x 2,8 = 5,6
7	2,8	2,8	7,84	7,84	2,8 x 2,8 = 7,84	2,8 x 2,8 = 7,84
8	2,15	2,75	4,62	7,56	2,15 x 2,8 = 6,02	2,75 x 2,8 = 7,7
9	2,55	3,15	6,5	9,92	2,55 x 2,8 = 7,14	3,15 x 2,8 = 8,82
10	2,75	2,75	7,56	7,56	2,75 x 2,8 = 7,7	2,75 x 2,8 = 7,7
11	2,1	3,1	4,41	9,61	2,1 x 2,8 = 5,88	3,1 x 2,8 = 8,68
12	2,25	3,2	5,06	10,24	2,25 x 2,8 = 6,3	3,2 x 2,8 = 8,96
N	E=2,8	E=2,8	E=95,85	E=95,77	E= 93,24	E= 94,1

$$\partial 1 = \frac{\sqrt{\Sigma X^2 - XiX}}{n-1} = \frac{\sqrt{95{,}85 \quad - \ 93{,}24}}{12-1} = \frac{\sqrt{2{,}61}}{11} = 0{,}15$$

$$\partial 2 = \frac{\sqrt{\Sigma Y^2 - YiY}}{n-1} = \frac{\sqrt{95{,}77^{-}94{,}1}}{12-1} = \frac{\sqrt{1{,}67}}{11} = 0{,}12$$

$$\boldsymbol{S}(\partial 1^2 - \partial 2^2) = \Sigma \frac{\sqrt{\partial 1^2 + \partial 2^2}}{n^2} = \frac{\sqrt{(0{,}15)^2 + (0{,}12)^2}}{12^2} = \frac{\sqrt{0{,}02 + 0{,}01}}{144} =$$

$$= \frac{\sqrt{0{,}03}}{144} 0{,}001$$

Table 3: Monthly and annual average values of NO_3^- anions in the water resources of №1 object and № 2 objects for 2017

№	X_i	Y_i	X^2	Y^2	X_iX	Y_iY
1	2,55	3,25	6,5	10,56	2,55 x 1,7 = 4,33	3,25 x 1,5 = 4,87
2	3,5	2,7	12,25	7,3	3,5 x 1,7 = 5,95	2,7 x 1,5 = 4,05
3	2,25	1,75	5,1	3,1	2,25 x 1,7 = 3,82	1,75 x 1,5 = 2,62
4	3,5	4,10	12,25	16,81	3,5 x 1,7 = 5,95	4,10 x 1,5 = 6,15
5	1,7	1,2	2,89	1,44	1,7 x 1,7 = 2,89	1,2 x 1,5 = 1,8
6	1,3	0,6	1,69	0,36	1,3 x 1,7 = 2,21	0,6 x 1,5 = 0,9
7	1,3	1,00	1,69	1,00	1,3 x 1,7 = 2,21	1,00 x 1,5 = 1,5
8	1,25	1,00	1,56	1,00	1,25 x 1,7 = 2,12	1,00 x 1,5 = 1,5
9	0,88	0,5	0,77	0,25	0,88 x 1,7 = 1,5	0,5 x 1,5 = 0,75

10	0,13	0,52	0,02	0,27	0,13 x 1,7 = 0,22	0,52 x 1,5 = 0,78
11	0,88	0,7	0,77	0,49	0,88 x 1,7 = 1,5	0,7 x 1,5 = 1,05
12	0,66	0,66	0,43	0,43	0,66 x 1,7 = 1,12	0,66 x 1,5 = 1,00
N	**E=1,7**	**E=1,5**	**E=45,92**	**E=43,01**	**E= 33,82**	**E= 26,97**

$$\partial 1 = \frac{\sqrt{\Sigma X^2 - XiX}}{n-1} = \frac{\sqrt{\mathbf{45,92} \quad \mathbf{-33,82}}}{12-1} = \frac{\sqrt{12,1}}{11} = 0,3$$

$$\partial 2 = \frac{\sqrt{\Sigma Y^2 - YiY}}{n-1} = \frac{\sqrt{\mathbf{43,01} \quad \mathbf{-26,97}}}{12-1} = \frac{\sqrt{16,04}}{11} = 0,4$$

$$\boldsymbol{S}(\partial 1^2 - \partial 2^2) = \Sigma \frac{\sqrt{\partial 1^2 + \partial 2^2}}{n^2} = \frac{\sqrt{(0,3)^2 + (0,4)^2}}{12^2} = \frac{\sqrt{0,09 + 0,16}}{144} =$$

$$= \frac{\sqrt{0,11}}{144} 0,003$$

Table 4: Monthly and annual average values of NO_3^- anions in the water resources of №1 object and №2 objects for 2018

№	X_i	Y_i	X^2	Y^2	X_iX	Y_iY
1	2,00	0,66	4,00	0,43	2,00 x 1 = 2,00	0,66 x 0,56 = 0,4
2	2,5	1,9	6,25	3,61	2,5 x 1= 2,5	1,9 x 0,56 = 1,1
3	0,52	0,06	0,27	0,004	0,52 x 1 = 0,52	0,06 x 0,56 = 0,03
4	2,9	0,88	8,41	0,8	2,9 x 1 = 2,9	0,88 x 0,56 = 0,5
5	0,75	0,53	0,56	0,3	0,75 x 1 = 0,75	0,53 x 0,56 = 0,3
6	0,53	0,17	0,28	0,03	0,53 x 1 = 0,53	0,17 x 0,56 =0,1
7	0,13	0,07	0,02	0,0049	0,13 x 1= 0,13	0,07 x 0,56 = 0,04
8	0,22	0,24	0,05	0,06	0,22 x 1= 0,22	0,24 x 0,56 = 0,13
9	0,12	0,14	0,01	0,02	0,12 x 1= 0,12	0,14 x 0,56 = 0,1
10	0,31	0,4	0,1	0,16	0,31 x 1= 0,31	0,4 x 0,56 = 0,22
11	0,75	0,75	0,56	0,56	0,75 x 1= 0,75	0,75 x 0,56 = 0,42
12	0,84	0,97	0,7	0,94	0,84 x 1= 0,84	0,97 x 0,56 = 0,54
N	**E= 1,00**	**E= 0,56**	**E=21,21**	**E= 6,92**	**E= 11,57**	**E= 4,00**

$$\partial 1 = \frac{\sqrt{\Sigma X^2 - XiX}}{n-1} = \frac{\sqrt{\mathbf{21,21} \quad - 11,57}}{12-1} = \frac{\sqrt{9,64}}{11} = 0,3$$

$$\partial 2 = \frac{\sqrt{\Sigma Y^2 - YiY}}{n-1} = \frac{\sqrt{\mathbf{6,92} \quad - 4,00}}{12-1} = \frac{\sqrt{2,92}}{11} = 0,15$$

$$\boldsymbol{S}(\partial 1^2 - \partial 2^2) = \Sigma \frac{\sqrt{\partial 1^2 + \partial 2^2}}{n^2} = \frac{\sqrt{(0,3)^2 + (0,15)^2}}{12^2} = \frac{\sqrt{0,09 + 0,02}}{144} =$$

$$= \frac{\sqrt{0,11}}{144} 0,002$$

Table 5: Monthly and annual average values of NO_3^- anions in the water resources of facilities obyekt1 and № 2 for 2019

№	X_i	Y_i	X^2	Y^2	X_iX	Y_iY
1	0,22	0,16	0,05	0,02	0,22 x 0,51= 0,11	0,16 x 0,49 =0,08
2	0,7	0,26	0,49	0,07	0,7 x 0,51= 0,36	0,26 x 0,49 =0,13

3	0,62	0,83	0,38	0,69	0,62 x 0,51= 0,32	0,83 x 0,49 =0,41
4	0,35	0,37	0,12	0,14	0,35 x 0,51= 0,18	0,37 x 0,49 =0,18
5	0,22	0,31	0,05	0,1	0,22 x 0,51= 0,11	0,31 x 0,49 =0,15
6	0,37	0,26	0,14	0,07	0,37 x 0,51= 0,19	0,26 x 0,49 =0,13
7	0,66	1,19	0,43	1,42	0,66 x 0,51= 0,34	1,19 x 0,49 =0,58
8	0,48	0,75	0,23	0,56	0,48 x 0,51= 0,24	0,75 x 0,49 =0,37
9	0,88	0,52	0,77	0,27	0,88 x 0,51= 0,45	0,52 x 0,49 =0,25
10	0,53	0,48	0,28	0,23	0,53 x 0,51= 0,27	0,48 x 0,49 =0,23
11	0,84	0,33	0,70	0,11	0,84 x 0,51= 0,43	0,33 x 0,49 =0,16
12	0,26	0,38	0,07	0,14	0,26 x 0,51= 0,13	0,38 x 0,49 =0,19
N	**E=0,51**	**E=0,49**	**E=3,71**	**E=3,72**	**E= 3,13**	**E=2,86**

$$\partial 1 = \frac{\sqrt{\Sigma \mathrm{X}^2 - \mathrm{X}iX}}{\mathrm{n}-1} = \frac{\sqrt{3{,}71 \quad - 3{,}13}}{12-1} = \frac{\sqrt{0{,}58}}{11} = 0{,}06$$

$$\partial 2 = \frac{\sqrt{\Sigma \mathrm{Y}^2 - \mathrm{Y}iY}}{\mathrm{n}-1} = \frac{\sqrt{3{,}72 \quad - 2{,}86}}{12-1} = \frac{\sqrt{0{,}86}}{11} = 0{,}08$$

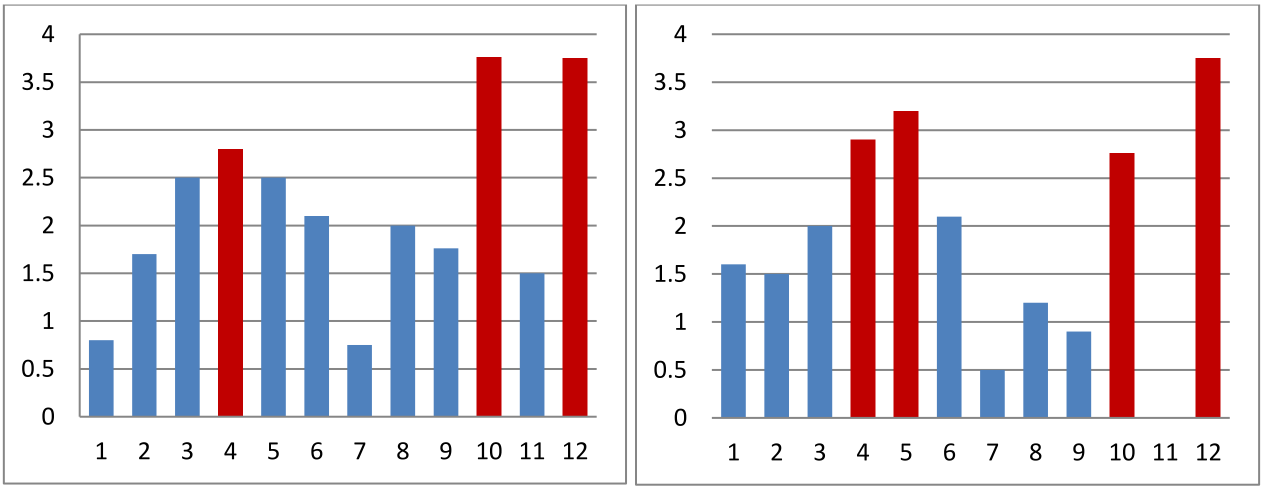
$$\boldsymbol{S}(\partial 1^2 - \partial 2^2) = \Sigma \frac{\sqrt{\partial 1^2 + \partial 2^2}}{n^2} = \frac{\sqrt{(0{,}06)^2 + (0{,}08)^2}}{12^2} = \frac{\sqrt{0{,}0036 + 0{,}0064}}{144} =$$

$$= \frac{\sqrt{0{,}01}}{144} 0{,}001$$

RESULTS:

Analyzing the results of the calculations, the incidence of nitrate anion contamination of water resources in 2015 was higher at both facilities, as can be seen in the diagram below.

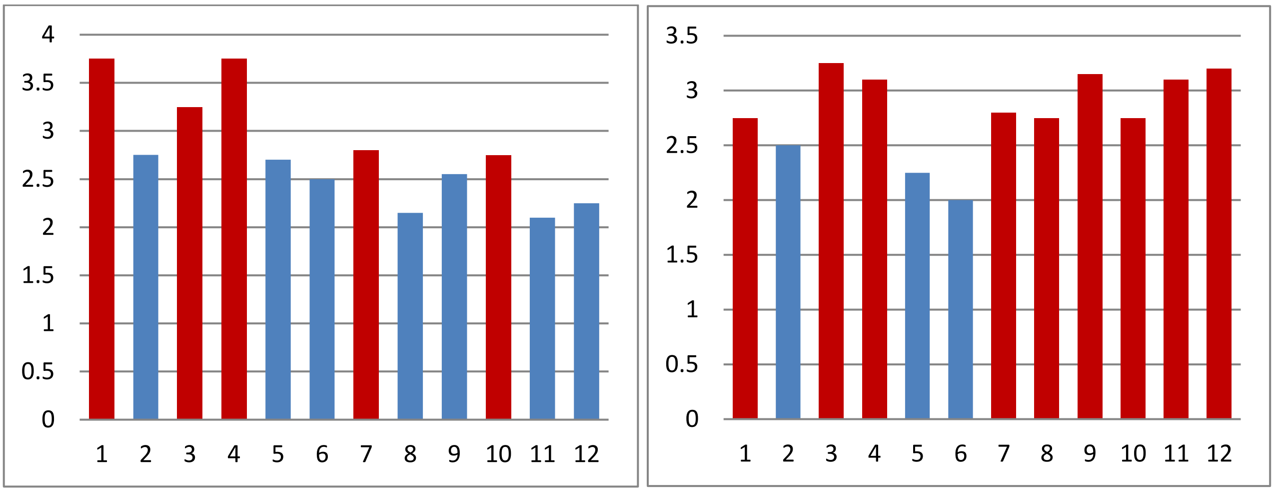
Diagram 1: QUANTITY GROWTH OF NITRATE ANIONS IN WATER RESOURCES IN 2015 № 1 № 2 OBJECTS



Objects № 1 on the left and № 2 on the right

In 2015, nitrate contamination of water content at both facilities occurred in October and December, in object 1 facility the maximum values were 3.76:3.75 and the difference between them was 0.01 mg/l. as long as In № 2 objects, the highest values correspond to May and December,ie in the ratio of 3.2:3.75, and the difference between them is 0.55 mg/l.

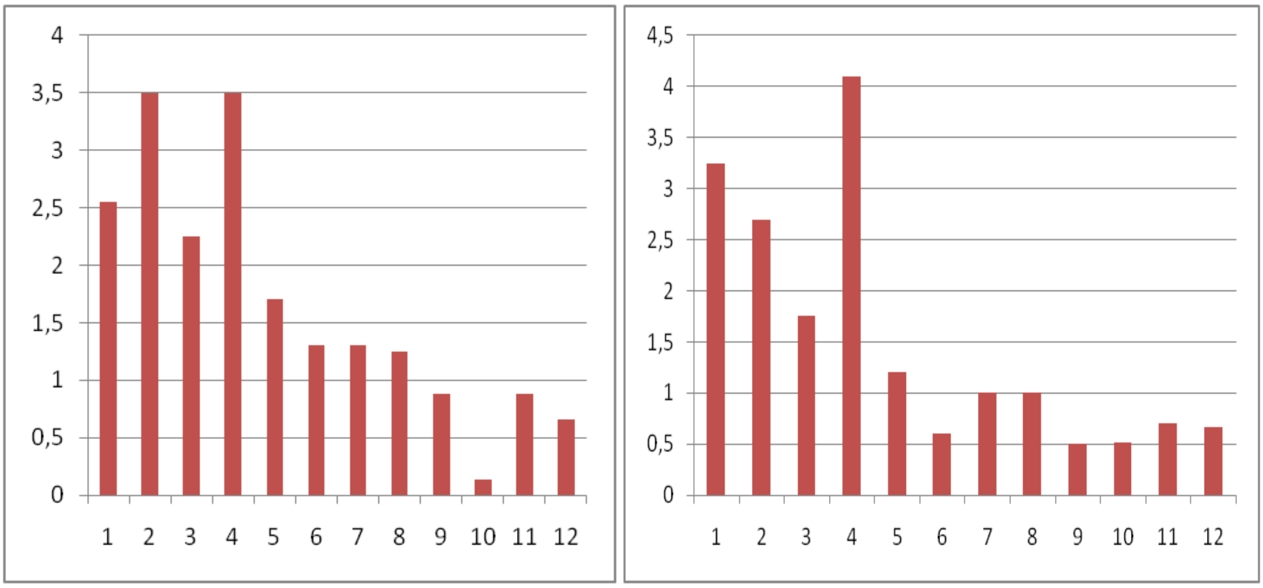
Diagram 2: QUANTITY GROWTH OF NITRATE ANIONS IN WATER RESOURCES FOR 2016



Objects № 1 on the left and № 2 on the right

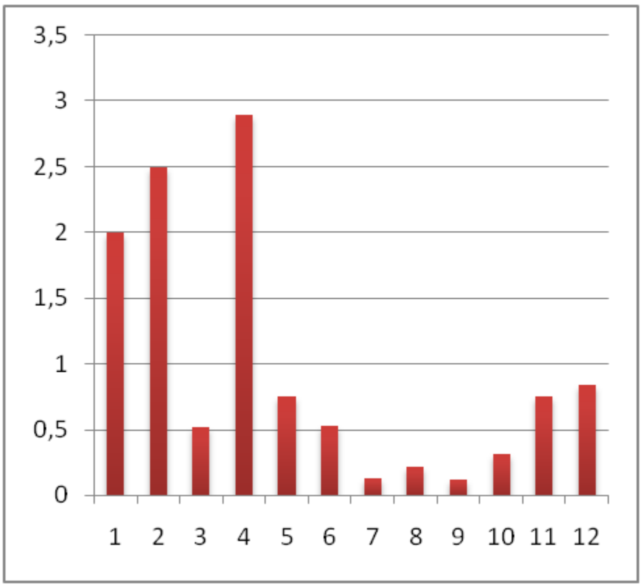
If we compare the values of nitrate anions in two objects, the highest amount in № 1 object corresponds to January, March and April, i.e. the difference between them in the ratio of 3.75:3.25:3.75 is 0.5 mg/l. If we compare the values of dagi 2 objects, the highest values are in March and December, ie 3.25:3.2, the difference between them is 0.05 mg/l.

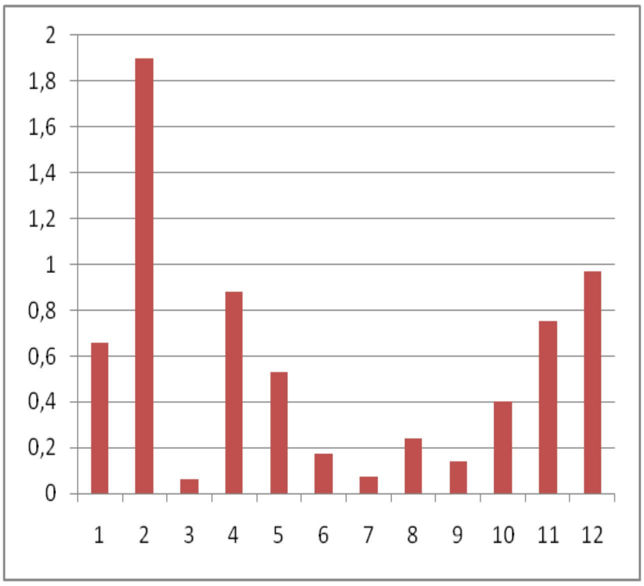
Diagram 3: QUANTITY GROWTH OF NITRATE ANIONS IN WATER RESOURCES FOR 2017



Objects № 1 on the left and № 2 on the right

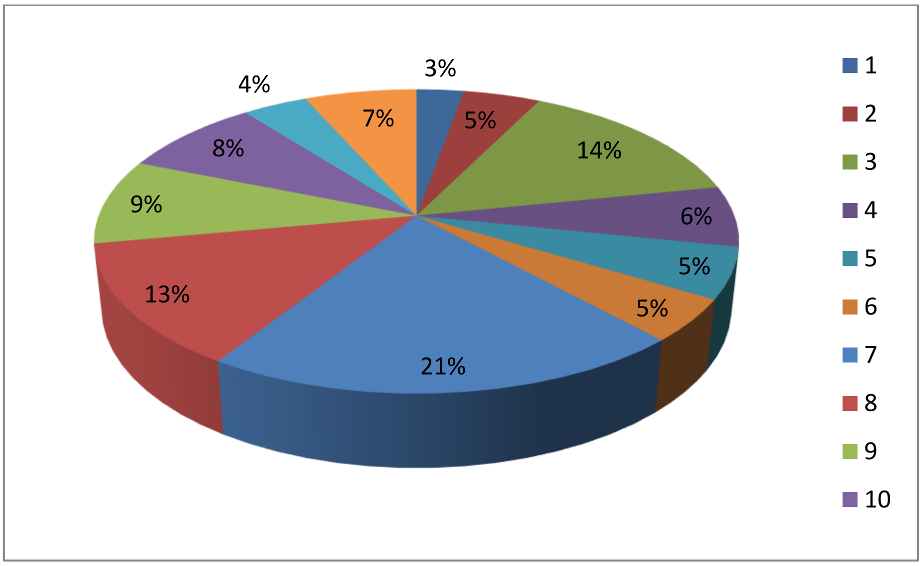
Diagram 4: QUANTITY GROWTH OF NITRATE ANIONS IN WATER RESOURCES FOR 2018





Objects № 1 on the left and № 2 on the right

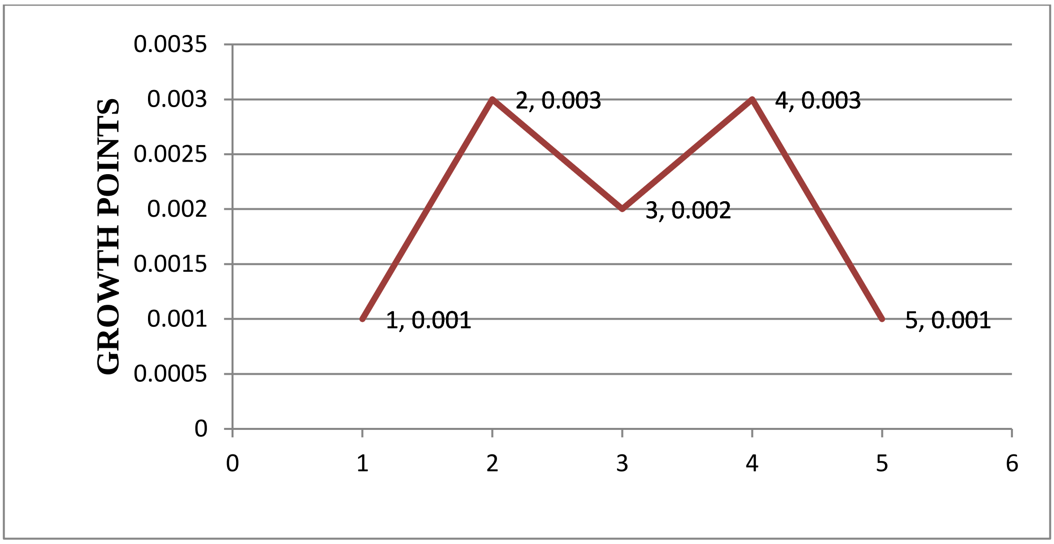
Diagram 5: PERCENTAGE OF QUANTITY GROWTH OF NITRATE ANIONS IN WATER RESOURCES FOR 2019



Our observations at the facilities in 2019 show that the level of water pollution is much lower than in previous years. Nitrate contamination has occurred this year in October and December.

Now let's compare the values that we calculated based on the statistical mathematical tables above. The ratios are 1:3:2:3:1. We can see this in the diagram below.

Diargamma 6: GENERAL VALUES FROM STATISTICAL CALCULATIONS



In general, during the study of the object, we found that there is a certain difference between the water resources, despite the fact that the water resources in them are taken from one place. In both cases, there is an increase in the amount of certain chemicals in the water.

CONCLUSION:

If water pollution continues in this way, we will be able to forecast the ecological status of water resources over the next five years through these growth rates. If the sequence of numbers continues as we have predicted, the overall environmental condition of local drinking water resources may not meet the required level. So, more needs to be done. It is important to note that the policy of water use in agriculture and the use of open water bodies by the population, should be constantly monitored by the relevant authorities. It is important to increase the environmental literacy of citizens, especially those working in the agricultural sector, in the use of chemicals and other substances, and to grow green algae in local conditions that can purify water in water bodies as much as possible. In our opinion, it is not a problem to clean the water resources in the open basins to a certain extent with green plants in the local conditions. Because today, not only in foreign countries, but also in our country, many scientists have done research and achieved positive results.

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