TECHNICAL SCHOOL OF PROTECTION OF ENVIRONMENT

RESEARCH FLOWS ORUŃSKIEGO

Executed:

Magdalena Krefta
Ewelina Kamińska

1. Abstract.

The aim was to answer the following questions:

- What is the amount of pollution carried by Flow Oruński to Radunia Canal and them to the Baltic Sea?
- What is the condition of chemical and biological purity of the flow?
- What are the possible sources of pollutrion?

The time of examining :from September 2002 to April 2003, the scale of physicochemical examining included an indicators according to GLOBE methodology, Frequency of examining: according to GLOBE methodology – once a week.

The state of flow purity was defined on the ground of surveying physicochemical indicators and notations of bioindicators. Physicochemical estimations was done according to standards used in European union Biological estimation was based on the ground that there are strict connections beetwen living organisms and the environment they live in. Algae and bottom spineless macrofauna are good bioindicators.

All observations, surveying and callculations allowed to answer questions which were asked and elaborate the findings as a report about Flow Oruński.

2. Introduction.

From among many flows and water reservoirs which occur in the Tri-city area we have chosen one that runs through one of Gdańsk districts – Orunia.

Flows

The reason of our choice was that it flows through interesting grounds and is its characteristic reservoir on the other hand the flow carries pollution which directly influences the state of purity of waters Gdańsk Gulf. The flow runs through the beautiful park and embellishes this part of Gdańsk.

Orunia Park is one out of three the most beautiful and the oldest parks in Gdańsk (the remaining two are Park in Oliwa and Dolina Królewska – King's Valley)

Park Oruński

Flow Oruński is a left- sided tributary of Radunia Canal. Water from drainage ditches in places like Kowale, Zakoniczyn, Łostowice flows into Flow Oruński. The flow rises in Kolbudy commune and runs from the west to the east. The waters from under the dumping ground “Szadułki” framer in concrete main drain are the source of Flow Oruński. Bellow the dumping ground the flow runs natural sandy river-bed and through arable land which may be the cause of pollution. Then it runs through Łostowice along streets: Świętojańska, Bieszczadzka, Wielkopolska and Białowieska and through allotment gardens. In the end it runs through Oruński Park and flows into Radunia Canal. The fun length of the flow is 8 km.

Pond

Oruński Park is located near the school and that is why Radunia Canal was the scope of our Globe research in 1997. There was a flood in Gdańsk in 2001 and severe damages were done to Orunia district. The cause of the flood was the overflow of Radunia Canal. Water burst the canal banks in several places and one of those was our point of collecting water for Globe research.

Damages eaused by the flood were the reason for the deepening and cleaning the bottom of the canal (when those works began the water) from the canal was not useful for our research and from September 2002 the place of collecting sampes was changed, moved a for metres further, to the place where Flow Oruński flows to Radunia Canal. We've decided to check what is the amount of pollution carried by the flow to Radunia Canal and then to Baltic Sea and what is the chemical and biological state of water purity.

The research of Flow Oruński allowed to compare the purity of canal water in the period before the flood with its left-sided tributary and estimate direct influence of Flow Oruński on purity of canal water.

3. Description of sample collecting points.

To carry out the examining of water we fixed three points of sample collecting which were 50 m. away from each other.

Investigated stream

The first point is located hear the place where Flow Oruński flows into Radunia Canal, its coordinates:

N 54 19,412
E 18 37,746

The second point is 50 m. away from to the west, its coordinates:

N 54 19,399
E 18 37,707

The third point is 100 m. away from the first to the west, its coordinates:

N 54 19,399
E 18 37,707

4. The findings.

The findings of physical and chemical research are presented in tables in the order of sample dates collection.

30.09.2002r.

Lp.	Kind of executed mark	PointI	Point II	Point III	Individual
1	Temperature	15	15	15	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,61	0,62	0,60	mS
4	Translucerce	38	44	50	cm
5	Dissolved oxygen	10,15	10,15	10,15	mg O_2/dm^3
6	Nitrates	0,1	0,3	0,2	mg N_{NO3}^-/dm^3
7	Nitrites	0,003	0,035	0,04	mg N_{NO2}^-/dm^3
8	Alkality	5,0	5,5	5,1	mval/dm^3
9	Salinity	0,9	0,9	0,9	‰

7.10.2002r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	7	7	7	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,39	0,38	0,37	mS
4	Translucerce	15	8	12	cm
5	Dissolved oxygen	12,17	12,17	12,17	mg O_2/dm^3
6	Nitrates	0,76	0,86	0,92	mg N_{NO3}^-/dm^3
7	Nitrites	0,007	0,09	0,1	mg N_{NO2}^-/dm^3
8	Alkality	3,5	3,6	3,7	mval/dm^3
9	Salinity	0,9	0,9	0,9	‰

21.10.2002r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	4	4	4	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,20	0,19	0,19	mS
4	Translucerce	15	19	19	cm
5	Dissolved oxygen	13,13	13,13	13,13	mg O_2/dm^3
6	Nitrates	0,55	0,45	0,54	mg N_{NO3}^-/dm^3
7	Nitrites	0,004	0,007	0,1	mg N_{NO2}^-/dm^3
8	Alkality	5,4	5,3	5,0	mval/dm^3
9	Salinity	1,0	1,0	1,0	‰

4.11.2002r

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	3,5	3,5	3,5	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,47	0,47	0,47	mS
4	Translucerce	28	28	28	cm
5	Dissolved oxygen	13,36	13,26	13,23	mg O_2/dm^3
6	Nitrates	0,82	0,91	0,73	mg N_{NO3}^-/dm^3
7	Nitrites	0,014	0,016	0,020	mg N_{NO2}^-/dm^3
8	Alkality	4,6	4,7	4,5	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

18.11.2002r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	4	4	4	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,25	0,33	0,32	mS
4	Translucerce	25	25	25	cm
5	Dissolved oxygen	13,13	13,12	13,13	mg O_2/dm^3
6	Nitrates	0,56	0,39	0,92	mg N_{NO3}^-/dm^3
7	Nitrites	0,016	0,016	0,016	mg N_{NO2}^-/dm^3
8	Alkality	6,0	5,5	5,5	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

25.11.2002r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	6	6	6	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,30	0,28	0,31	mS
4	Translucerce	30	30	30	cm
5	Dissolved oxygen	12,48	12,48	12,48	mg O_2/dm^3
6	Nitrates	0,105	0,106	0,104	mg N_{NO3}^-/dm^3
7	Nitrites	0,008	0,007	0,009	mg N_{NO2}^-/dm^3
8	Alkality	5,4	5,3	5,0	mval/dm^3
9	Salinity	1,0	1,0	1,0	‰

2.12.2002r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	2	2	2	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,34	0,35	0,35	mS
4	Translucerce	26	25	25	cm
5	Dissolved oxygen	13,84	13,84	13,84	mg O_2/dm^3
6	Nitrates	0,106	0,098	0,94	mg N_{NO3}^-/dm^3
7	Nitrites	0,014	0,016	0,006	mg N_{NO2}^-/dm^3
8	Alkality	5,1	5,0	5,1	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

9.12.2002r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	0	0	0	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,28	0,29	0,29	mS
4	Translucerce	32	32	32	cm
5	Dissolved oxygen	14,62	14,62	14,62	mg O_2/dm^3
6	Nitrates	0,069	0,072	0,106	mg N_{NO3}^-/dm^3
7	Nitrites	0,003	0,016	0,014	mg N_{NO2}^-/dm^3
8	Alkality	6,0	5,9	6,1	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

16.12.2002r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	0	0	0	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,31	0,32	0,33	mS
4	Translucerce	28	28	28	cm
5	Dissolved oxygen	14,62	14,62	14,62	mg O_2/dm^3
6	Nitrates	0,101	0,099	0,94	mg N_{NO3}^-/dm^3
7	Nitrites	0,01	0,016	0,006	mg N_{NO2}^-/dm^3
8	Alkality	5,5	5,6	5,1	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

20.01.2003r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	1,5	1,5	1,5	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,26	0,25	0,25	mS
4	Translucerce	22	22	22	cm
5	Dissolved oxygen	13,56	13,29	13,82	mg O_2/dm^3
6	Nitrates	0,106	0,098	0,094	mg N_{NO3}^-/dm^3
7	Nitrites	0,014	0,015	0,020	mg N_{NO2}^-/dm^3
8	Alkality	5,0	4,5	4,6	mval/dm^3
9	Salinity	0,08	0,08	0,08	‰

10.02.2003r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	2	2	2	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,28	0,27	0,28	mS
4	Translucerce	30	30	30	cm
5	Dissolved oxygen	13,84	13,84	13,84	mg O_2/dm^3
6	Nitrates	0,326	0,330	0,298	mg N_{NO3}^-/dm^3
7	Nitrites	0,0044	0,0035	0,0026	mg N_{NO2}^-/dm^3
8	Alkality	5,5	5,6	5,4	mval/dm^3
9	Salinity	0,09	0,09	0,08	‰

24.02.2003r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	0	0	0	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,37	0,41	0,42	mS
4	Translucerce	28	28	28	cm
5	Dissolved oxygen	14,6	14,2	14,6	mg O_2/dm^3
6	Nitrates	3,6	3,2	3,3	mg N_{NO3}^-/dm^3
7	Nitrites	0,027	0,019	0,016	mg N_{NO2}^-/dm^3
8	Alkality	6,0	5,8	5,9	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

.

3.03.2003r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	0	0	0	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,37	0,36	0,38	mS
4	Translucerce	27	27	27	cm
5	Dissolved oxygen	14,62	14,62	14,62	mg O_2/dm^3
6	Nitrates	2,7	2,8	3,4	mg N_{NO3}^-/dm^3
7	Nitrites	0,02	0,019	0,018	mg N_{NO2}^-/dm^3
8	Alkality	6,5	6,0	6,2	mval/dm^3
9	Salinity	0,05	0,05	0,04	‰

9.03.2003r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	1	1	1	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,38	0,37	0,37	mS
4	Translucerce	26	25	25	cm
5	Dissolved oxygen	14,23	14,23	14,23	mg O_2/dm^3
6	Nitrates	4,0	4,1	3,9	mg N_{NO3}^-/dm^3
7	Nitrites	0,017	0,016	0,016	mg N_{NO2}^-/dm^3
8	Alkality	5,0	4,9	5,1	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

17.03.2003r.

Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	3	3	3	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,37	0,39	0,41	mS
4	Translucerce	31	30	31	cm
5	Dissolved oxygen	13,48	13,47	13,48	mg O_2/dm^3
6	Nitrates	2,6	2,8	2,9	mg N_{NO3}^-/dm^3
7	Nitrites	0,015	0,016	0,017	mg N_{NO2}^-/dm^3
8	Alkality	5,4	5,1	5,1	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

24.03.2003r.

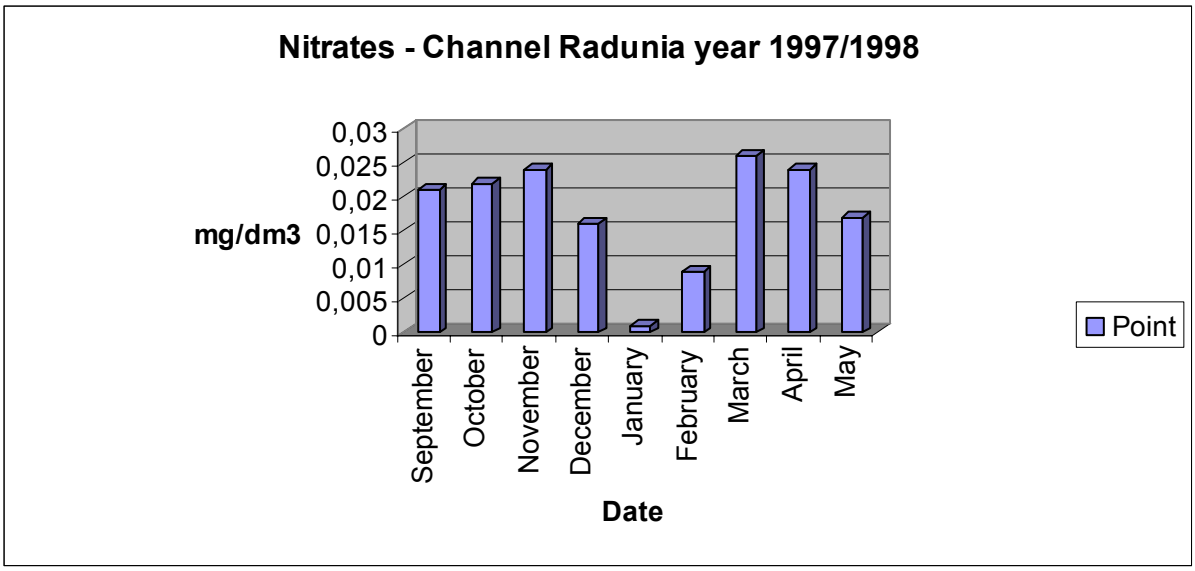
Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	3	3	3	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,36	0,37	0,37	mS
4	Translucerce	19	19	19	cm
5	Dissolved oxygen	13,48	13,48	13,48	mg O_2/dm^3
6	Nitrates	2,8	2,8	2,9	mg N_{NO3}^-/dm^3
7	Nitrites	0,015	0,016	0,017	mg N_{NO2}^-/dm^3
8	Alkality	5,7	5,4	5,5	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰

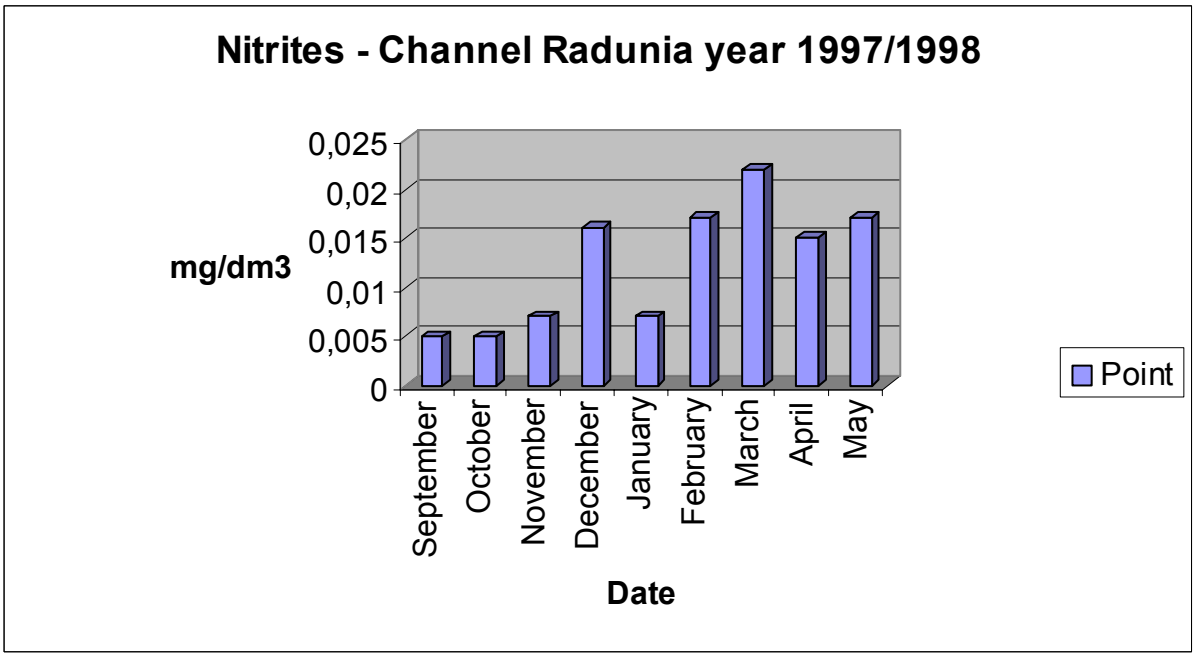
31.03.2003r.

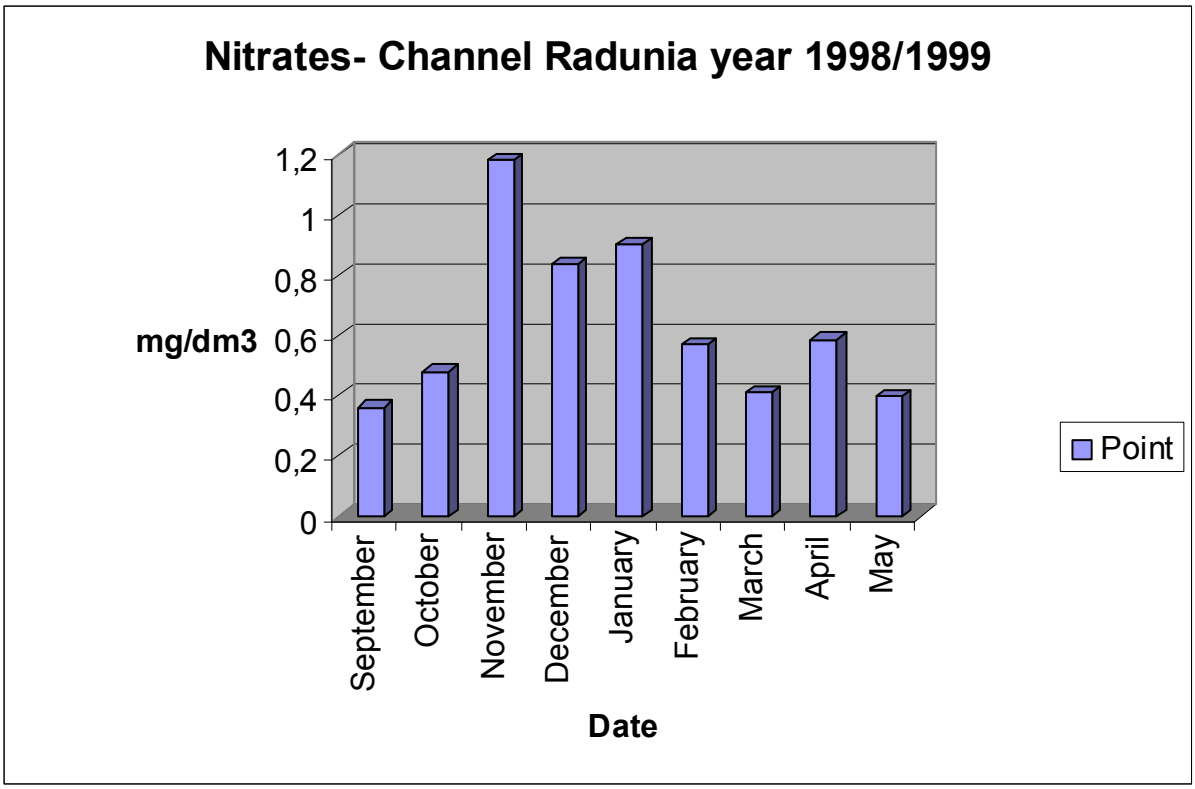
Lp.	Kind of executed mark	Point I	Point II	Point III	Individual
1	Temperature	4	4	4	°C
2	pH	6,2	6,2	6,2	—
3	Leadership	0,36	0,37	0,37	mS
4	Translucerce	48	48	48	cm
5	Dissolved oxygen	13,13	13,12	13,13	mg O_2/dm^3
6	Nitrates	1,8	2,0	2,2	mg N_{NO3}^-/dm^3
7	Nitrites	0,016	0,019	0,017	mg N_{NO2}^-/dm^3
8	Alkality	5,2	4,8	4,7	mval/dm^3
9	Salinity	0,05	0,05	0,05	‰
10		0,017	0,017	0,017	mgPO_4^{3-}/dm^3

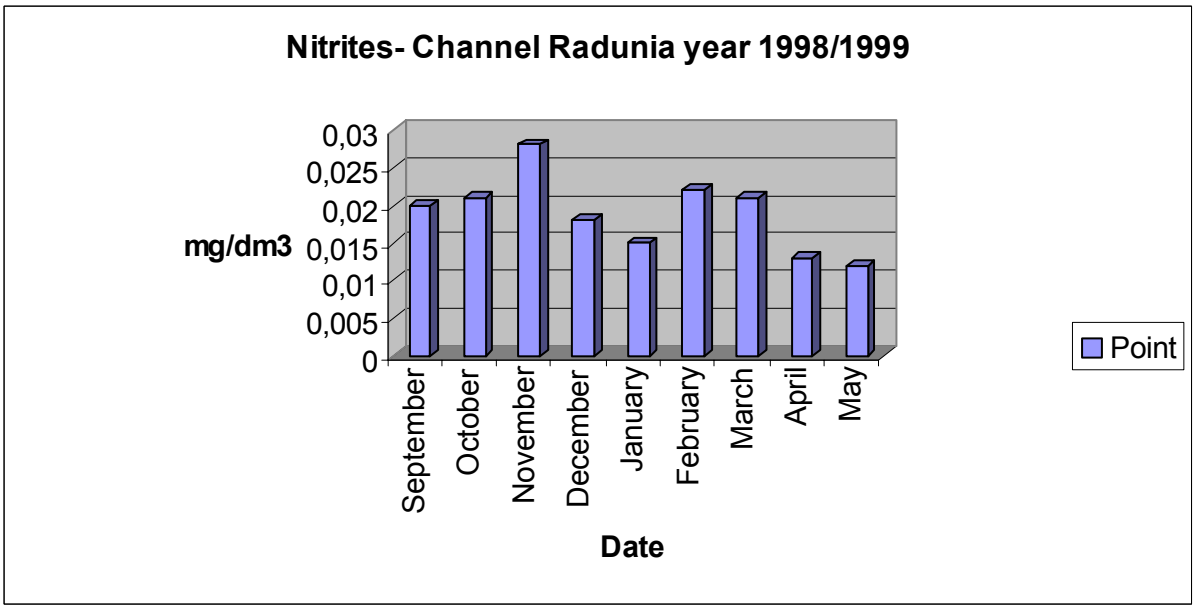
Findings show that examined indicators are classified in the I purity class (M.O.Ś. and Z.N.L. decree from 1991)

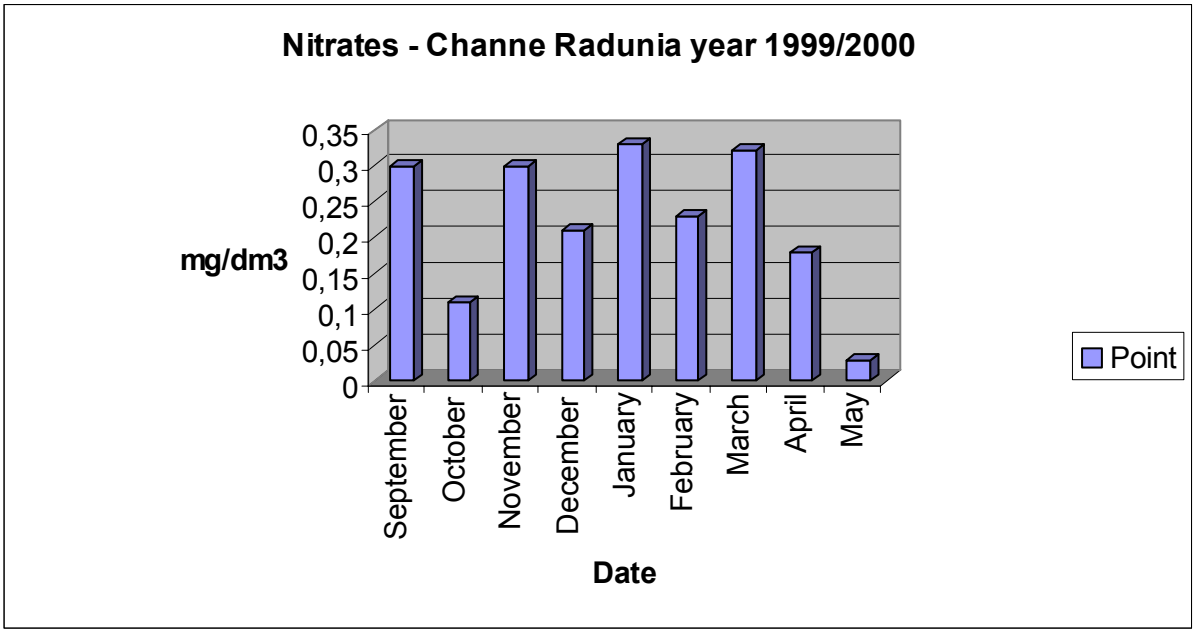
Proper amount of oxygen is distinct 've for Flow Oruński and teslifies for self - cleanness of the river.

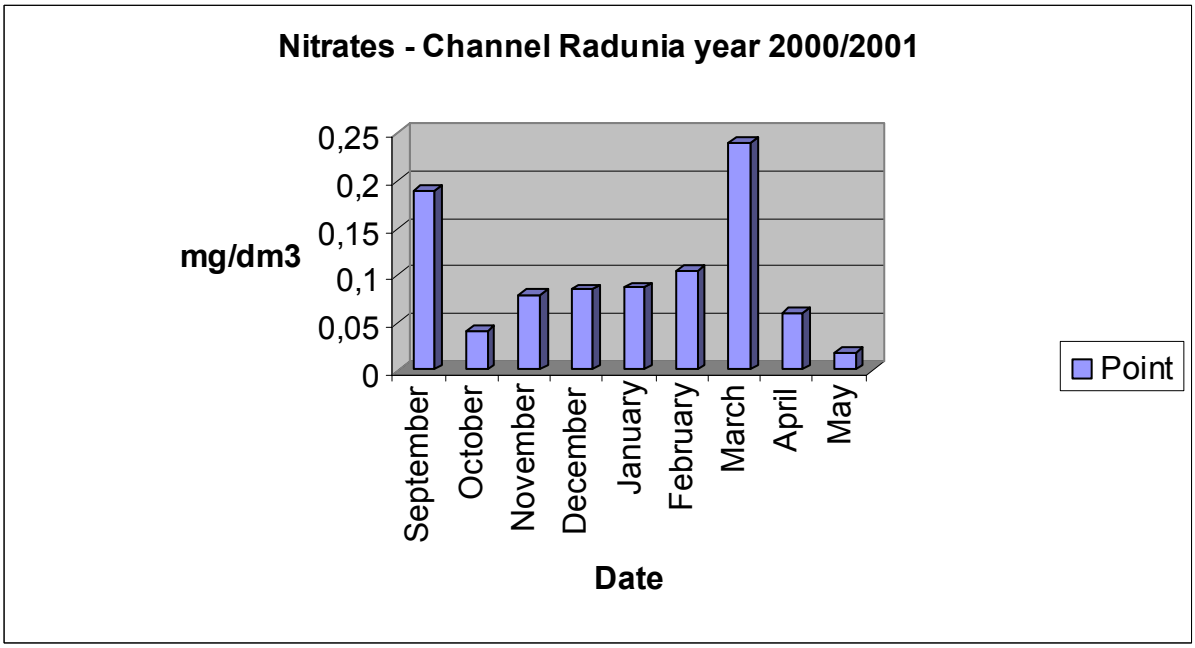

Nitrates - Channel Radunia year 1997/1998
mg/dm3
0,03
0,025
0,02
0,015
0,01
0,005
0
September
October
November
December
January
February
March
April
May
Date
Point

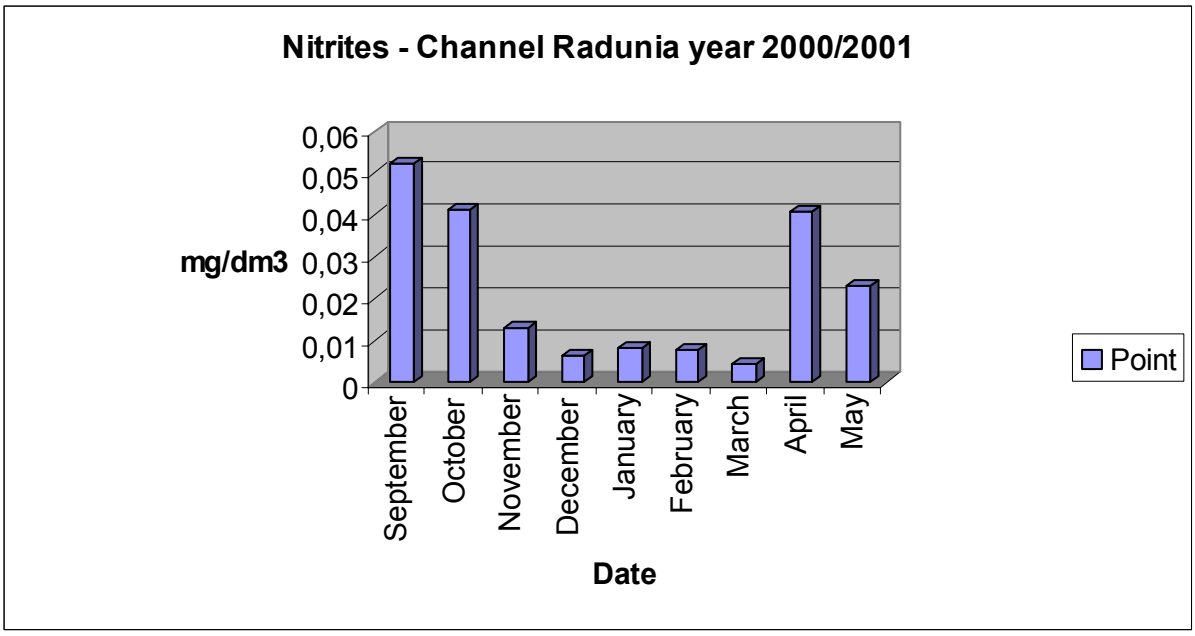

Nitrites - Channel Radunia year 1997/1998
mg/dm3
0,025
0,02
0,015
0,01
0,005
0
September
October
November
December
January
February
March
April
May
Date
Point

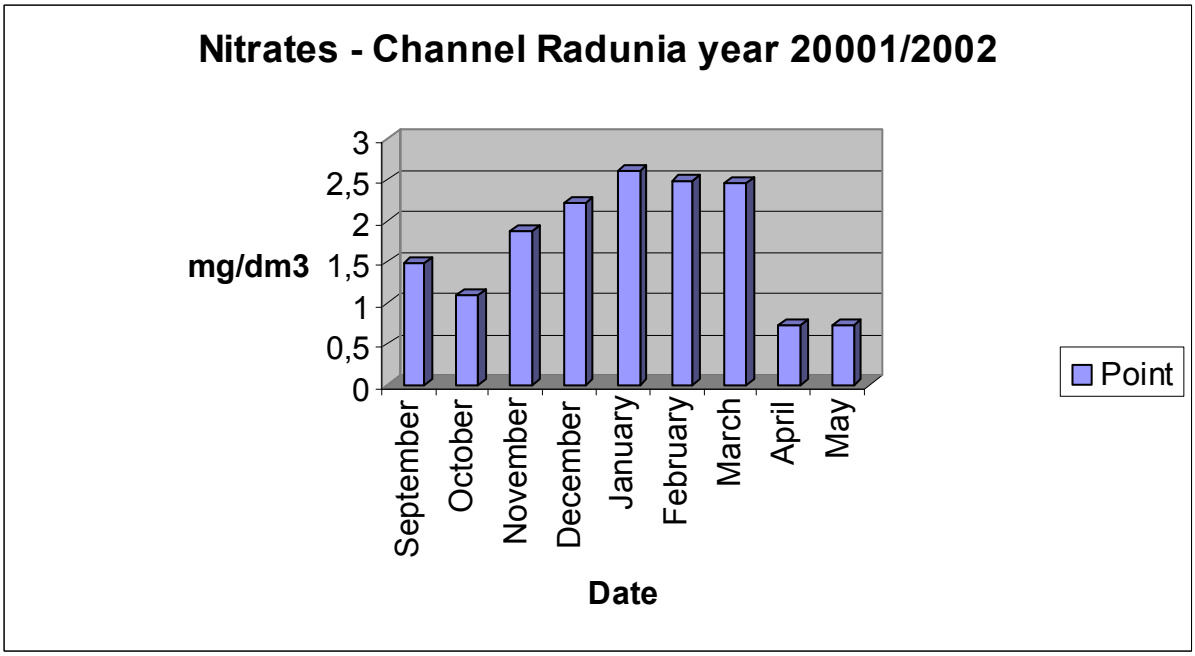

Nitrates- Channel Radunia year 1998/1999
1,2
1
0,8
mg/dm3 0,6
0,4
0,2
0
September
October
November
December
January
February
March
April
May
Date
Point

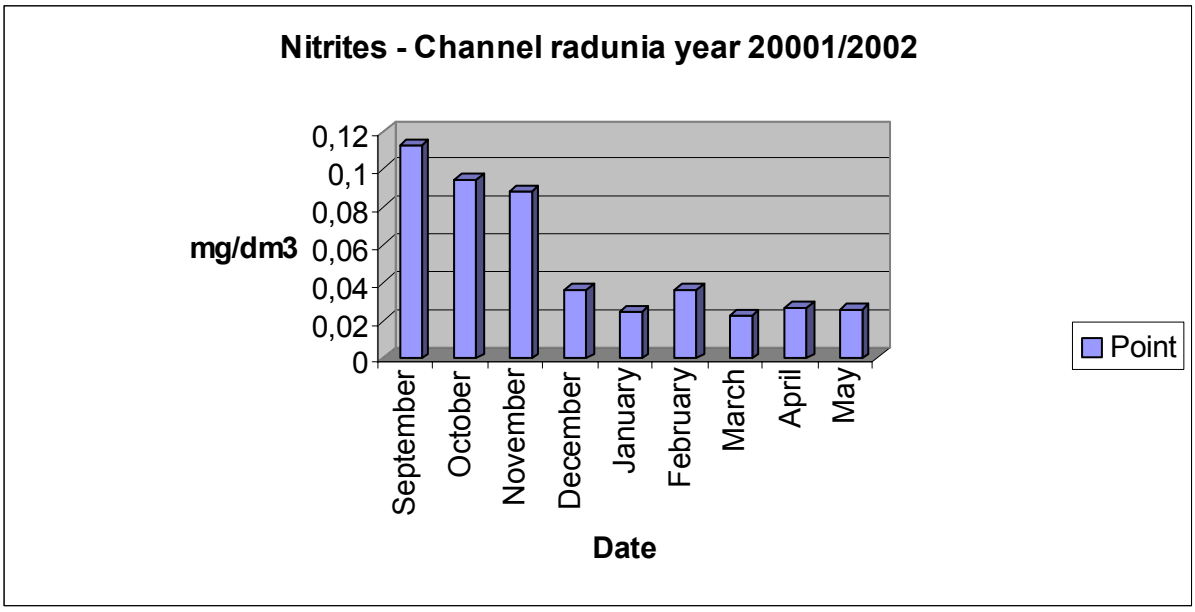

Nitrites- Channel Radunia year 1998/1999
0,03
0,025
0,02
mg/dm3 0,015
0,01
0,005
0
September
October
November
December
January
February
March
April
May
Date
Point

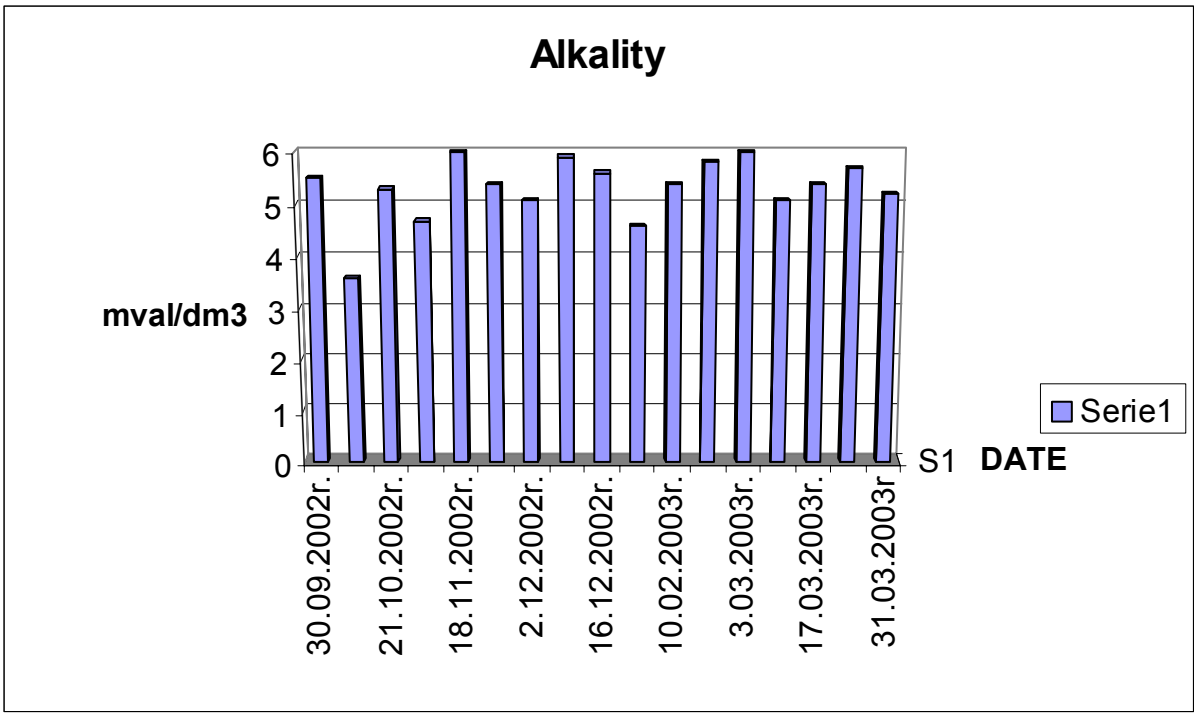

Nitrates - Channe Radunia year 1999/2000
mg/dm3
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
September
October
November
December
January
February
March
April
May
Date
Point

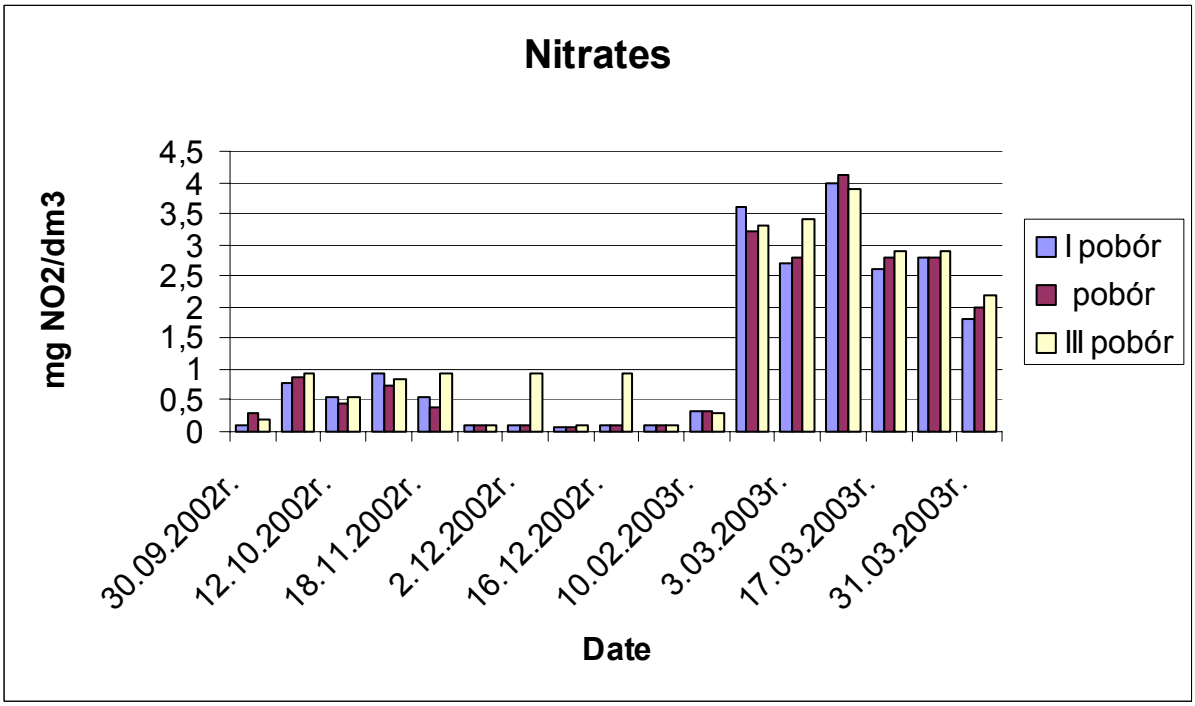

Nitrates - Channel Radunia year 2000/2001
mg/dm3
0,25
0,2
0,15
0,1
0,05
0
September
October
November
December
January
February
March
April
May
Date
Point

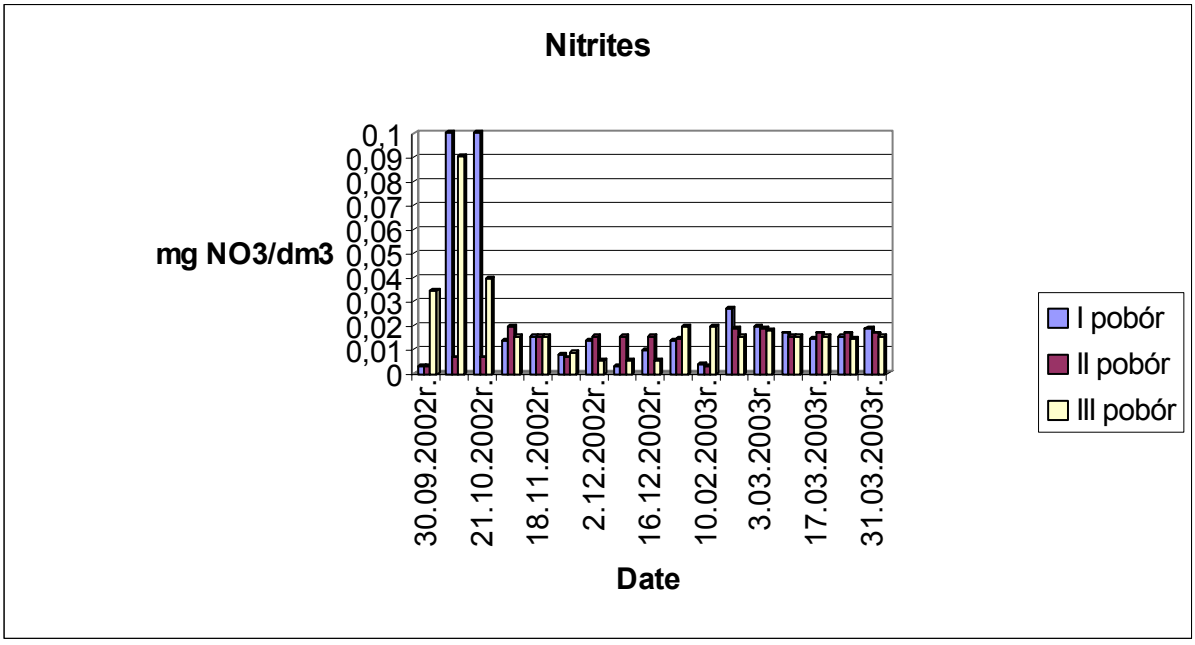

Nitrites - Channel Radunia year 2000/2001
mg/dm3
0,06
0,05
0,04
0,03
0,02
0,01
0
September
October
November
December
January
February
March
April
May
Date
Point


Nitrates - Channel Radunia year 20001/2002
mg/dm3
3
2,5
2
1,5
1
0,5
0
September
October
November
December
January
February
March
April
May
Date
Point


Nitrites - Channel radunia year 20001/2002
mg/dm3
0,12
0,1
0,08
0,06
0,04
0,02
0
September
October
November
December
January
February
March
April
May
Date
Point


Alkality
mval/dm3
6
5
4
3
2
1
0
30.09.2002r.
21.10.2002r.
18.11.2002r.
2.12.2002r.
16.12.2002r.
10.02.2003r.
3.03.2003r.
17.03.2003r.
31.03.2003r
S1
DATE
Serie1


Nitrates
mg NO2/dm3
4,5
4
3,5
3
2,5
2
1,5
1
0,5
0
30.09.2002r.
12.10.2002r.
18.11.2002r.
2.12.2002r.
16.12.2002r.
10.02.2003r.
3.03.2003r.
17.03.2003r.
31.03.2003r.
Date
I pobór
pobór
III pobór


Nitrites
mg NO3/dm3
0,1
0,09
0,08
0,07
0,06
0,05
0,04
0,03
0,02
0,01
0
30.09.2002r.
21.10.2002r.
18.11.2002r.
2.12.2002r.
16.12.2002r.
10.02.2003r.
3.03.2003r.
17.03.2003r.
31.03.2003r.
Date
I pobór
II pobór
III pobór

5.Physical and chemical examining.

Analytic methods which were used physical and chemical examining of water. Among physical examining we marked: temperature, transparency and conductivity and among chemical pH reaction, diluted oxygen, salinity, N_{No3}, N_{No2} and alkalinity.

Temperature:

Surface and underground waters have changing temperature according to the seasons. Taking temperature should be done directly in the reservoir.

Transparency:

Water transparency is marked by optician property and depends on contents and nature of suspension. Transparency is measured visually by tube suspension.

Measurement of conductivity:

Measurement of conductivity tells us about contents of mineral compounds.
Organic compounds dissociate slightly or not at all. Conductivity which results from organic pollution in water is usually small. On the ground of conductive power we may deduce the contents of ions diluted in water [mg / m3]. Marking should be done by the use of conductometer [μS].

pH reaction:

It depends on concentration of hydrogen ions and precisely activity of hydrogen ions. It mostly depends on chemical compounds diluted in water especially calcium carbonate. For most organisms the most advantageous is reaction close to neutral waters is contained within limit of pH 4 - 9 but most waters have pH of 6,5 - 8,5.

Diluted oxygen:

It comes mainly from the air but it can also be a product of photosynthesis of water plants. It is the most important indicator of water purity as it is essential for water organisms. In surface waters polluted by organic substances diluted oxygen is used for biochemical process of decay of these substances. The more polluted the water is the less contents of oxygen contains.

According to contents of oxygen power of corrosion is changing. Significance of oxygen contents depends on aggressive carbon dioxide. If water contains aggressive CO_2 the contents of oxygen present in the water is conductive to corrosion. If water doesn't contain aggressive CO_2 the contents of oxygen is of no importance to pipe corrosion.

To estimate contents of diluted oxygen we've used Winkler's method.
In Winkler's titrate method in alkaline solution diluted oxygen oxidizes recently precipitated hydroxide manganese (II) to MNO $(OH)_2$. After acidifying the sample manganese compound (IV) which was made oxidizes iodine potassium added to free iodine in the amount equal to the amount of oxygen in the water. Liberated iodine is titrated by the solution of thiosulphate sodium ($Na_2S_2O_3$) in the presence of starch as an indicator.

Nitrates:

Nitrates usually occur in the surface waters in small concentration. They are the utmost degree of oxidation organic and not organic nitrogen compounds. Nitrates can flow into surface water which urban and industry sewage, mine drainage and also which water coming from fields where artifical nitrogen fertilizer was put. Plants assimilate nitrogen from nitrates. It is basic component of vegetable and animal protein. The amount of nitrates in water is changeable.

To indicate nitrates we used spectroscope method with sodium salicylate .

In concentrated medium of sulphuric acid nitric ions react witch sodium salisylate. The result of that reaction is a mixture of 3-nitrosalicylic and 5-nitrosalicylic acids, their chemical salt in alkaline medium have yellow color.

Nitrites:

Nitrites are the temporary product of nitric course which happens in natural water. Organic nitrogen compounds undergo biochemical decomposition and form ammonia first and them in medium containing oxygen- nitrites. They oxidize easily to nitrites .In anaerobic condition nitrites can be the result of reduction of nitrites. The occurence of nitrites in water tell us that there. Nitrites in water are undurable product, and easily transform to nitrite and ammonia.

In natural waters which are not polluted there is minimum amount of nitrites. They sometimes occur in bigger amount in boggy and forest water up to thousandth part of a millimetre in one cubic decimetres ($1dm^3$) in water.

Nitrites witch sulphamilic acid solution (pH 2,0 - 2,5) form diazo-compownol which combines L-naphthylamine and produces nitric pigment of red-purple color. The intensity of pigment is proportional to concentration of nitrites in water.

Alkalinity:

Alkalinity is a property of water to neutralize mineral acids. Water alkalinity is a result of occurence of hydrocarbonate and carbonate, hydroxide, silicates and borates.

In natural waters there is also $MgCO_3$ and in small concentration $CaCO_3$. Apart from these in some waters there are carbonate and hydrocarbonate sodium and potassium.

When marking the alkalinity we indicate the contents of chemical compounds which react of alkalinity in the presence of the right indicator. Alkalinity of this compounds is marked by titration of strong acid solution up to pH reaction 8,3 at first and then to 4,5.Chemical reactions during alkaline marking goes as flows:

titration to pH about 8,3 $OH^- + H^+ \rightarrow H_2O$
titration to pH about 4,5 $CO_3^{2-} + H^+ \rightarrow HCO_3$

In the marking done we have used titration method to phenolphtaleine and methyl orange. Alkali compounds present in the water are neutralizated by determined strong mineral acid solution to pH 8,3 which the use of phenolphtaleine as an indicator. Titration leads to a change of sample color from yellow to yellow - pink.

Phosphate:

Phosphorus in water may come from organic decomposition of vegetables and animals, from the fields where phoshate fertilizer was spread and pollution from indushy sewage.

Phosphorus compounds in the nature undergo similar conversions as nitric compounds and from phosphates which are the last stage of mineralisation. The phosphorus conversion is particulary intensive in surface waters where mikroorganisms assimilate phosphates and after hecrosis they sink to the bottom where they mineralizate. Therefore waters observe seasonal occurence of phosphates in surface waters in autumn, winter and spring and their disappearance in summer.

6. Conclusions.

In point 4 we have examined the water and on the grounds of studied indicators we have classified the water to the first purity class. Biological examining proved our classification.

We have compared our findings with standards for fresh surface water appropriate for fish life according to European Union regulations (Instruction 2000/60/WE).

Temperature, pH and other indicators classify water of Flow Oruński suitable for salmon fish while contents of N_{NO2} classify it to water suitable for carp fish.

Comparing our findings to examining led by State Inspectorate of Environmental Protection in 1982 and by our school in 1995 we have found that the state of water purity for Flow Oruński has improved.

For instance:

	1982 State Inspectorate of Environmental Protection	**1995 Technical School Environmental Protection**	**2003 our examining**	**Unit**
Phosphates	0,89	2,48	0,017	**mg/dm^3**
Nitrites	**0,06**	**0,015**	**0,003 ÷ 0,017**	**mg/dm^3**

Fire – year Globe searching of Radunia Canal considering contents of mineral and other chemical compounds essential for existence and development of vegetable and them animal life has shown that water quality has beek improving.

Specification of findings:
Radunia Canal

Investigative year	Content nitrites	Unit
1997 – 1998	0,0045 ÷ 0,021	**mg/dm^3**
1998 – 1999	0,0125 ÷ 0,026	**mg/dm^3**
1999 – 2000	0,008 ÷ 0,059	**mg/dm^3**
2000 - 2001	0,005 ÷ 0,050	**mg/dm^3**
2001 - 2002	**0,0037 ÷ 0,09**	**mg/dm^3**

Flow Oruński

Investigative year	Content nitrites	Unit
2002 - 2003	**0,003 ÷ 0,017**	**mg/dm^3**

Analysing contents of N_{No2} in Flow Oruński we have found that its influence on the state of pollution of Radunia Canal is small.

We should aim at further reducing the inflow of mineral and other chemical compounds essential for existence and development of vegetable and them animal life. Compounds as ever the small concentration of these compounds in a year's duration carries a big amount of these indirectly to Gdańsk Gulf.

N_{No2} – 0,2363904 Mg per year

N_{NO3} – 24,8832 Mg per year

PO_4 – 0,2115072 Mg per year

Nitrites should be taken into particular consideration because according to Instruction 2000/60/WE contents of N_{No2} should not exceed 0,003 mg/dm^3 in water for salmon fish and 0,009 mg/dm^3 for carp fish.

6.1 Cataloguing of the site.

- Leakage from “Szadółki” dumping ground
- Pollutial from surrounding fields and allotments
- rainyinflows

Influence the quality of Flow Oruński water it is reckoned that the main receiver of leakage from “Szadółki” dumping ground is Flow Oruński which flows from the net of drainage ditches of the following places: Kowale, Zakoniczyn and Łostowice Flow Oruński flows to Nowa Radunia at the level of Flow Oruński.

Diferent flows which supply water of Flow Oruński dilute leakage from dumping ground and help self – deanness of the flow. We intervied the owners of the fields and allotments and found out that mineral and organic fertilizers are used on their grounds.

Nitrogen fertilizer is particularly intensive washed away from the soil and makes threat for water.

Aqricurtural pollution is also canied by drainade olitches from Kowale, Zakoniczyn and Łostowice. Rainfall water carries pollution washed away from the surface of the ground and rinsing the soil. The remains of artificial fertilizers, manuze, chemical pesficides and air pollution such as dust, gas, smoke are among rainfall water polution as well as tiny mechnical pollution such as: street sweepings, vegetable parts, sand, insect eggs. Rainfall water washes away harmful subsances (heavy metals, toxic substances etc.) from “Szadółki” damping ground and canies them to Flow Oruński illegal dumping grounds are are the big problem for Flow Oruński water. They are located nearby “Szadółki” and allotment gardens and contain of :

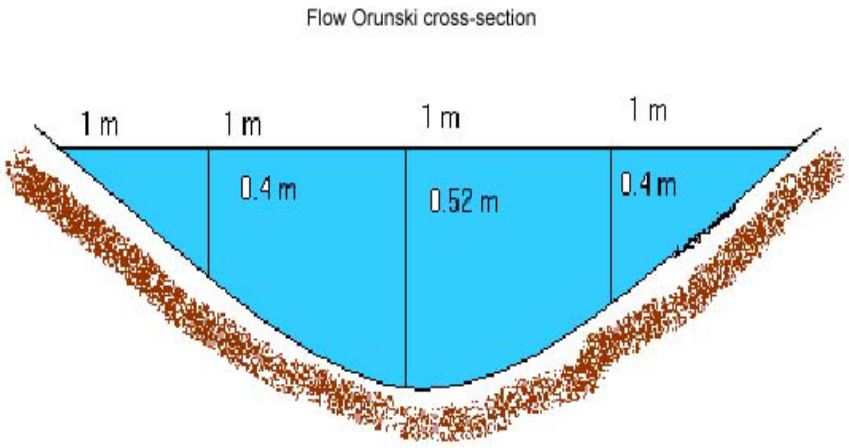
- metal elements – barrels, tins, parts of bodies of cars, childrens prams, enameled basins, buckets, pans steel rods, cookers, microwave ovens
- plastic – bottles, foil, tyres, rubber tubes
- building materials – bricks, concrete boards, glaze, terracotta
- glass containers – bottles, jars, broken glass
- others – paper, rags, wooden boxes, flower pots, pieces of clothing

6.2 Examining the capacity of flow by calculating the amount of pollution carried by Flow Oruński.

The capacity was calculated by formula:

$$W = P_{poprz.} \times V_{nurt.} \times 0,9$$

where: **W** - capacity in cubic meters per seconds m3 / s
$P_{poprz.}$ - transversal profile in sguare metrs m3
V_{nurt} - velocity of flow in metres per second m / s
0,9 - constans for sandy / muddy bottom



Calculating the transversal profile we divided Flow Oruński into 4 geometrical figures (two rectangular triangles and two rectangular trapeziums)

$$P_{poprz.} = 2(0,2m^3) + 2(0,45m^3) = 1,3\ m^3$$

To calculate the velocity of flow $V_{nurt.}$ we threw an object floating on the surface and we measured the time needed to flow along 52 m section.

$$V_{nurt.} = L \div T$$

$$V_{nurt.} = 52\ m \div 2{,}25\ s = 0{,}35\ m / s$$

where: **L** - length of measured section in m
T - time of flow in s

Having these were calculated the capacity:

$$W = P_{poprz.} \times V_{nurt.} \times 0,9$$
$$W = 1{,}3\ m\ 3 \times 0{,}35\ m/s \times 0{,}9 = 0{,}4\ m / s$$

We calculated the amount of pollution which is carried to Radunia Canal by Flow Oruński in a month and a year by means of formula :

$$Q = W \times C_{zan.}$$

where: W – capacity in m^3 / s
Q - amount of pollution [mass / time unit]

$$W = P_{poprz.} \times V_{nurt.} \times 0{,}9$$

where: W- capacity
$P_{poprz.}$- the total of geometrical figures forming transversal profile
(2 triangles + 2 trapeziums)
$V_{nurt.}$ - length of section
0,9 – constant for sandy bottom

$$W = 1{,}3\ m^3 \times 0{,}35 \times 0{,}9 = 0{,}4\ m^3 / s$$

QN_{NO2}^{-} = 0,4 m^3/s x 0,019 mg/$10^{-3}m^3$ = 0,0076 mg/s

1 month – 30 days = 30 days x 24 hour = 30days x 24 hour x 3600s

Q = 0,0076mg/dm^2 x 30 x 24 x 3600 = 19699,2 mg/month = **19,6992 kg/month**

Q = 19,6992kg/month x 12 m/year = 236,3904 kg/year = **0,2363904 Mg/year**

QN_{NO3}^{-} = 0,4 m^3/s x 2,0 mg/$10^{-3}m^3$ = 0,8mg/s

Q = 0,8 mg/s x 30 x 24 x 3600 s/month = 2073600 mg/month = **2073,6 kg/month**

Q = 2073,6 kg/month x 12 m/year = 24883,2 kg/year = **24,8832 Mg/year**

QPO_3 = 0,4m^3 x 0,017mg/$10^{-3}m^3$ = 0,0068 mg/s

Q = 0,0068 mg/s x 30 days x 24 hour x 3600s = 17625,6 mg/month = **17,6256 kg/month**

Q = 17,6256 kg/month x 12 month/year = 211,5072 kg/year = **0,2115072 Mg/year**

6.3 Water organisms of Oruńskiego Stream.

In track of physicochemical investigations of water from Oruńskiego Stream biological with utilization of video of microscope observation of were driven also. Correlation exist between quality water and occurrence in her of definite species. Neatnes organisms indicatory permits to confirm physical parameters on base of appointed species – chemical and class of investigate water. This method could be used in our investigations, because Oruński Stream is natural reservior of flowing waters, to which sewages do not swim form punctual sources of dirts. Neatnes organisms indicatory Kolkwitza and Marssona and present modification (Starmach) is easy way of marking the quality of flowing water.

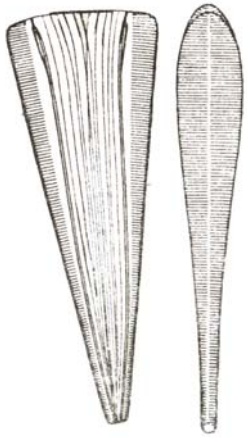
Observations showed that species characteristic for clean waters appear in water of investing families: Naviculaceae (picture 1) family Fragilariaceae – Fragilariowate (picture 2), family Amphiproraceae – Ampfiprorowate and family Coscinodiscaceae. Best quality of water was also confirmed by appearing these species of protozoam family such as: Protozoa belonging to infusoria – Ciliata np. Dileptus anser.

Organisms indicatory this org are clever to lives, multiplications oneself and biochemical in water environment activity. To organisms indicatory it classifies saprophytic bacteria, water mushrooms, algae and protozoan. Organisms indicatory absorb organic substances, stage spread them and they mineralise. Part of organic after mineralization substance become in environment and part becomes used by lively organisms.

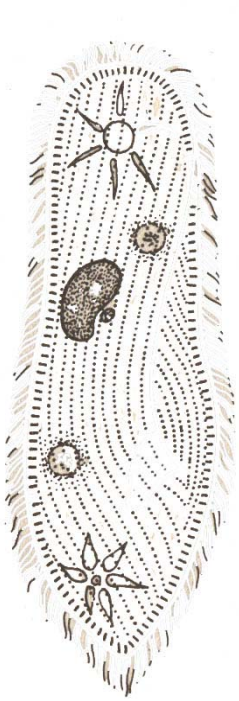
Neatnes ecological organisms indicatory of accord to Kolkwitza and Marssona – organisms is basedon affirming of changes in occurrence belonging to different systematic along this section of river groups in which self – deaning happens.It is this place of estuary of sewages down to places of entire mineralisation of organic componets. Self – deaning is continuous and dynamic process.

Navicula Bory

Cymbella Lancelolata



Likomorfa



Paramecium Caudatum

Pinuralia

7. Discussion.

We have presented in our raport the state of quality Flow Oruński. Our findings show that according to physicochemical and biological examining Flow Oruński water can be classify to the first purity class (Instruction 2000/60/WE).

We is not let the state of Flow Oruński water worsen that is why we should take care of its surroundings.

Examining which we done is very interesting and used useful. It allowes to present the nearest state purity and cataloguing possible dangers.

We hope that our control the state of environmental purity and will be proof that every body can have a little input in improvement of natural inviroment.