

development of diseases of a digestive tract. We have revealed deviations in intake of food fibers with a daily diet. So, men consumed $19,48 \pm 1,07$ g/days. food fibers, and the woman – $14,93 \pm 0,50$ g/days at norm of 20 g/days.

CONCLUSION

We revealed that the actual food of indigenous people of Yakutia is characterized by imbalance of a diet on macro - and to micronutrients. Increase in a share of fats and carbohydrates (for 10% and 12% respectively) in a daily diet testifies to a carbohydrate and lipidic orientation of modern food of indigenous country people of Yakutia.

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EVALUATION OF THE WATER QUALITY IN THE KOLYMA RIVER ON AN AQUATIC BIOTA

The article reports an analysis of hydro-chemical parameters of water in comparison to the MPC for fishery and drinking water use. Due to a comprehensive assessment in 2010 the water quality of river Kolyma was characterized as the 3rd class category «A» «polluted». Typical contaminants were phenols, copper and zinc compounds.

Keywords: salinity, cationic composition, gas mode, biogenic element, the maximum permissible concentration.

INTRODUCTION

The Kolyma River, that has a length of 2129 km, is formed by the confluence of Kullu and Ayan-Yuryakh, originating in Cherskiy mountain range and flows into the East Siberian Sea. Delta length is 110 km, an area - 3000 km². Mixed supply: snow (47%), rain (42%) and underground (11%). Flood: from mid-May to September. Swipe level fluctuations up to 14 m. The annual flow at the mouth - 123 km³ (3,900 m³ / s). The average annual sediment load - 5.5 mln tons. It freezes in mid-October, rarely - at the end of September. Before freezing – ice-drift and slush lasting from 2 days to a month, ice dams. In winter, frazil - river-bed and extensive ground. Ice reveals in the second half of May and early June. Debacle lasts from 2 to 18 days. Area of lake fisheries fund - 12716 km² [13, 9].

The purpose and objectives of the research: the study of the contemporary composition of the major chemical ele-

ments and their impact on aquatic biota structure in the formation of modern hydrochemical regime of the Kolyma River.

Research objectives included the determination of salinity, anionic and cationic composition, total hardness, pH, dissolved oxygen, carbon dioxide, nutrients and conclusions about the sanitary condition of the pond for drinking water and fishery use.

MATERIALS AND METHODS

Chemical analysis of the water was carried out according to generally accepted in hydrochemistry freshwater techniques [1].

RESULTS AND DISCUSSION

We investigated the Kolyma River area within Srednekolymsk and Nizhny Kolymsky areas. These areas are replete with lakes, interconnected river and canals, dominated by sand and mud and silt. The average flow rate - 0.4-0.5 m³ / s, in the delta - 0.2-0.3 m³ / sec, acquires the reverse direction at the time

of the tides.

The Kolyma River is ice-free from 125 to 157 days, the mode level of the Kolyma river is most dependent on the discharge of the Kolyma hydroelectric power station, located in the Magadan region, and therefore characterized by high spring and august floods. Most of the flow is noted from June to August. In general, during the warm season (May-October) is held up to 90-95% of annual runoff. A. Novikov [3] noted that the minimum winter water discharges, before the construction of HPP cascade Kolyma, in the middle and lower reaches could drop to 30-50 m³ / sec.

The temperature regime of the Kolyma River is quite hard. In Srednekolymsk surface water temperature in summer is above 10 ° C and keeps 2-2.5 months, and in some years the water temperature reaches 10 ° C.

According to Anadyr-Kolyma Water Association, in 1990 into the Kolyma

River basin and its main tributaries were dropped 32.93 million. m³ of runoff. The sources of water pollution, according to Severovostokupravleniye are mining, industrial, transport enterprises, towns and farms.

The chemical composition of water of the river Kolyma at the inspected site belongs to "very mild" and "soft" type [1]. Annual minimum salinity (according to our data for 2004-2006 and YAUGKS-data) falls on the spring flood, the maximum - on the winter.

The main source of river water supplies are being formed directly on the surface of the catchment. On the whole, over the period of mineralization value was close and ranged, in 2004 - 60,2-109,3 mg / dm³, 2005 - 61,2-102 mg / dm³, in 2006 - 62,7 -108 mg / dm³, while the average for the year - 84.2 - 91.6 mg / dm³. Average annual rate of mineralization - 87.5 mg / dm³. The most minimal mineralization observed in the summer of 2004 and was 60.2 mg / dm³, the maximum winter 2004 - 109.3 mg / dm³.

Bicarbonates in the ionic composition of the water in the subject area in 2004-2006 are predominant; on average - 31.1 years - 33.4% eq. Calcium ions also are the predominant ions and make up an average of 21.1 years - 24.2% eq.

Chloride content is relatively small, but fluctuations are significant (0.3 - 7.0 mg / dm³), it seems, it can be explained by tidal phenomena in the delta.

The total hardness of the water has changed from 0.50 to 1.15 mmol / dm³ and the average annual rate was 0.91 mmol / dm³. The lowest (0.5 mmol / dm³) was observed in 2006, and the maximum (1.15 mmol / dm³) in April 2004.

The great importance in the evaluation of the quality of natural water has a pH value. At a pH value of the surveyed area has fluctuated slightly, from 6.37 to 7.3, which is well within the maximum permissible limits (6.5-8.5). The lowest rates are slightly shifted to the acid side, were observed in the spring and summer of 2006 (6.4) and the highest (7.3) in the winter of 2004. This is due to the fact that while the spring tide, when there is a flush catchments wetland rich in humic substances, the water becomes acidic in nature, whereas it is neutral in the winter.

The oxygen content in the water of the river Kolyma at the period 2004-2006 varied within relatively narrow limits (from 7.6 to 10.3 mg / dm³), reaching 120% of saturation. Seasonal dynamics are well pronounced. The highest rates of dissolved oxygen were observed in autumn and winter (9,5-10,3 mg / dm³) and

minimal (7,6-8,2 mg / dm³) in the spring and summer.

In general, the gas mode of the river Kolyma in the open period is quite favorable for the development of biological life.

Elevated levels of ammonia nitrogen indicate the improvement of the sanitary condition of the water body. MACs for ammonium ion (fishery) is 0.39 mg / dm³, for drinking purposes - 2 mg / dm³. Increasing of the concentration of ammonium ions is observed during the extinction of aquatic organisms. A significant number of them fed by surface runoff and atmospheric deposition. A natural source of ammonia nitrogen are also lifetime allocation of aquatic organisms, particularly invertebrates [8]. In addition to ammonium nitrogen it is formed as a result of anaerobic processes reduction of nitrates and nitrites.

In the surveyed area of ammonia nitrogen content is ambiguous: from 0.08 to 0.66 mg N / dm³ and the average was 0.24 mg N / dm³.

The concentration of nitrite in the surveyed area of the river Kolyma changed from "not detected" to 0.012 mg N / dm³. And no more than any one season or MAC for drinking water (3 mg N / dm³), nor for the fishery (0.08 mg N / dm³) water. It is known that small amounts of nitrite can be present even in uncontaminated saturated oxygen reservoirs. In Sec. Males were stable during the years 2004-2006. and were <0.007 mg N / dm³.

Nitrate does not go beyond the admissible limits (9.0 mg N / dm³) and changed from 0.10 to 0.205 mg N / dm³. The highest rates were recorded in the winter period (March-April) of 2004 and the lowest - in the autumn of 2005. The low nitrate content indicators, apparently, can be explained by the fact that the samples were taken during the growing season, when the content of nitrate nitrogen is minimal.

Maximum values of total phosphorus were observed in the autumn-winter period in 2004. Note, however, that such laws were found in 2005-2006. When maximum rates were summer (0,202-0,208 mg P / dm³), and minimum values (0.041 mg P / dm³) in April 2004-2005. The average phosphorus content in 2006 was 0.1 mg P / dm³, t. E. Even minimal phosphates figures were about the same MAC (0.040 mg P / dm³).

The processes of weathering of rocks lead to the accumulation in the surface waters of iron compounds. In addition, admission is possible with underground, industrial and agricultural effluents. The

river waters are rarely iron content greater than 1 mg Fe / dm³. Elevated concentrations significantly impair the organoleptic properties of water. MPC of iron in drinking water is 0.3 mg Fe / dm³ for water fishery is much stricter - 0.1 mg Fe / dm³. In the surveyed areas p. Kolyma iron content varied from 0.67 to 1.24 mg Fe / dm³.

Maximum iron indices (1,02-1,24 mg Fe / dm³) were observed in all years of observations in the summer-autumn period, which is ten times higher than the MPC for drinking as well as for fishery water.

The concentration of silicon in the surveyed area of r. Kolyma varied from 0.1 to 4.0 mg Si / dm³ and did not exceed the accepted limit (10 mg Si / dm³).

The study of organic matter in the water associated with the solution of a number of practical issues in the field of water supply and fisheries. Its content in surface waters is determined by a set of processes occurring in the reservoir, and the posthumous life aquatic discharge, precipitation, surface, industrial and utility fluids. Organic substances are dissolved in water, and a colloidal suspension. They can move from one form to another under the influence of physical, chemical and biological conditions continuously.

The estimated total amount of organic matter produced as a result of dichromate oxidation (COD). It is known that the northern and southern taiga are increased oxidation zone [11]. COD water, certain dichromate method can be considered as an approximate measure. Surveys conducted in 2004-2006. in the lower reaches of the river Kolyma at p. Males showed that COD is not unique.

Quantitative indicators COD varied from 6.9 to 24.8 mg O / dm³ and averaged 16.3 mg O / dm³. The highest rates were observed in summer and autumn (21,0-24,8 mg O / dm³), and the lowest (6.9) in the winter, when the oxidative processes are slowed down due to low temperatures.

COD figures are in good agreement with the chrominance values. It varied from 22 to 203 and an average of 47.8 ° in 2004-2006. Exceeding the accepted limit.

Long-term observations of claim. Males showed a distinct seasonal trend. If the spring-summer period of 2005, the COD value is ranged from 90 ° to 152 °, then in the fall and winter - from 20 ° to 22 °, and the average for the year was 55 °, exceeding the permissible limits. A similar pattern was observed in 2004 - in the spring and summer - 80 ° -138 °,

in the autumn-winter period - 12° - 21° , and the average was 51° .

Biochemical Oxygen Demand (BOD) is determined according to the standard after five days of incubation, or complete. The results allow to assess water quality. The observations were made in the paragraph from p. End of the Line for 2004-2006., BOD value is ranged from 2.7 to 3.3 mg O / dm³. And the highest rates (about 3.3 mg / dm³) was in October, when there is a death of aquatic organisms, and consequently, a large consumption of oxygen affects the decomposition of organic substances.

On average, during the years of BOD observations was about 2.9 mg / dm³ and fit into the accepted limit (about 3 mg / dm³). In general, the water quality on this indicator can be considered quite satisfactory for drinking water and fisheries.

Maximum allowable concentration of oil in the fresh water is 0.1 mg / dm³ for drinking water, and 0.05 mg / dm³ for the fishery. Leaking water bodies in the processes of biochemical and chemical oxidation, reducing the concentration of oil in the water of the northern water sources are poorly understood.

It is believed that a high degree of intoxication oil is the cause of the pathology of the internal organs of fish, leading to deformity and destruction, disruption of the structure of the population and ultimately - depletion of the fish population [12, 10].

It is known that the main pollutant of oil products in the rivers are navigable transport [2]. Distribution of oil products is difficult and unstable, usually are the most polluted coastal zones. With this in mind, sampling for the study of water on the oil content in the surveyed area were carried out in the surface horizons.

The concentration of petroleum products, observed for a few years (2004-2006 gg.) In the lower reaches of the river Kolyma, has shown that it does not exceed the permissible norms (0.005 mg / dm³), ranging from 0.02 to 0.06 mg / dm³. Can any patterns not found in the seasonal dynamics of the concentration of oil. Maximum values were observed at all times of the year (0.06 mg / dm³).

In general, the concentration of oil products in the surveyed area does not exceed the MPC, but in practice and was not below the MRL. Thus, this site can be considered with caution to clean water and fishery is quite favorable for domestic and drinking purposes.

In low contaminated surface water surfactants concentration range usually within thousandths and hundredths

of mg / dm³. In areas of pollution, it increases up to several tenths of a milligram, and can reach close to sources of pollution a few milligrams.

The main factors reducing the concentration of water entering the surfactants are the processes of biochemical oxidation. Their speed is dependent on the water temperature, pH and suspended solids t. D.

The content of surfactants in the district Kolyma does not exceed the maximum permissible concentration for drinking purposes (0.01 mg / dm³) and exceeds for fishery water (0.5 mg / dm³). It detected in all seasons and ranges from 0.017 to 0.028 mg / dm³. The highest rates are found in winter (0.028 mg / dm³), t. E. Higher than the MPC for fish farming. The relatively high (0.02 mg / dm³) was the figure in spring flood by runoff from the catchments area.

Pollution of r. Kolyma at the level reached in 1992 the average annual Concentrations of phenols 3 MPC, copper compounds - 2 MAC, zinc - 1.6 MAC, oil products - at the level of the MPC. In the lower reaches of the river Kolyma water is dirty: in comparison with the 1992 level of phenols exceeded MPC 7, petroleum products - more than 3 MPC, copper - 2 MACs, iron - within 2 MPC [4].

In 2003, the characteristic was water pollution by phenols and iron compounds at 1.6 MAC, the highest concentration reached 10 at the MPC, the MPC Srednekolymsk and 7.5 at p. Cherskii respectively. Water pollution of light and difficult-substances (BOD₅ and COD) from zero to 9.9 MAC at the city Srednekolymsk. Average annual concentrations of other pollutants were below or at the level of the MPC. The oxygen regime - satisfactory [5].

Water Quality of r. Kolyma in 2006 decreased to discharge "a" Class 4 ("dirty"). According to a comprehensive assessment of water pollution in the river iron compounds defined as critical, the average concentration in comparison with the previous year increased to 1,3-3,4 MPC, the maximum determined in the range of 5-11 MAC. The average concentration of copper compounds decreased slightly compared to 2005, and changed from 4 to 6 MAC, the maximum values reached respectively 14 and 24 MPC MPC. In 2006, was typical level of water pollution with phenols to an average of 2-3 MAC, the maximum concentrations reached 6-8 MAC, as well as manganese compounds in 1.3 times. The maximum concentration of manganese was 15 MAC. A critical indicator of water pollution are mercury compounds,

respectively, the average concentration reached 1-3 MPC [6].

In 2010, a comprehensive assessment of the water quality of river. Kolyma in Srednekolymsk near testified that the water in all cross-sections of the river characterized by the 3rd class "A" category (as "polluted"), but below, the Srednekolymsk 1 km was a class of water quality change for the worse. The most typical contaminants of water throughout the river were phenols, average concentrations are almost unchanged compared to the previous year (an average of 1.8 MAC), and the maximum value reached 5-7 MAC. Contamination of the water connections of the river downstream of copper ranged from stable low level (2.4 MAC) to an unstable intermediate level (up to 9.3 MAC), and their average annual concentrations do not exceed the allowable criteria. The maximum concentration of zinc compounds in the control section has reached the level (12 MPC); average, in general, under the item does not exceed the permitted limit, the critical indicators of water pollution, as well as in 2009, were absent [7].

CONCLUSIONS

Development of mineral resources in the region and the development of fields in the north-east Yakutia led to intensive anthropogenic influence. These rivers are used for timber floating in the interests of Fisheries (Fisheries) and recreation. It is known that sewage plants processing alter the physico-chemical parameters of water bodies and create a new quality - the toxicity of the environment. Smoke emissions of tin ore enterprises, gold industries pollute the water catchment areas of the rivers organic and inorganic salts and heavy metals that enter the river with melt water and rainfall.

The results showed that the discharge of saline water from the temporary storage and drainage of polygons has a definite influence on the formation of the hydrochemical regime of reservoirs studied. Domestic sewage from the cities and towns, as well as farm animals (fox, fox, nutria, cattle and sheep, and others.) bring nutrients and contribute to the eutrophication of the north water bodies. The chemical composition of water is under the direct influence of highly discharges. As a result, the chemical composition of the water has changed from bicarbonate-calcium to sodium-chloride. Changing of abiotic parameter of sub-Arctic waters, with a different focus and degree of manifestation, resulted in a change of aquatic communities. In general, the structural changes in the com-

munities of aquatic invertebrates with anthropogenic pressure are reduced to the loss from the list of species previously existing typical fauna of northern waters, or their complete replacement, such as brackish organisms.

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