МАЛЫМ РЕКАМ- ПОЛНОВОДНОСТЬ И ЧИСТОТУ

Работу выполнил:
Руденко Ева Валерьевна, ученица 9 класса
МКОУ СОШ №7 с. Старомарьевка

Научные руководители: учитель географии
МКОУ СОШ №7 с. Старомарьевка
Колядова Светлана Владимировна,
учитель английского языка
МКОУ СОШ №7 с. Старомарьевка
Акобян Асмик Тельмановна

2019-2020 учебный год

Municipal Official Educational Institution "Secondary Comprehensive School #7"
Staromarevka Village, Grachovka Municipal District of Stavropol Region RF

Russian National Junior Water Contest - 2020

Full water and purity to small rivers

The work is done by:
Rudenko Eva Valerevna 9th grade student of
MOEI SCS #7 Staromarevka village
The research project supervisors: Akobyan Asmik Telmanovna: a teacher of English of the highest qualification category, MOEI SCS #7 Staromarevka village and Koliadova Svetlana Vladimirovna: a teacher of Geography, MOEI SCS #7 Staromarevka village.

2019-2020

Annotation

The objective of the work: to study the problem of the pollution of small rivers with wastewater, to research the condition of the river Chla, search for possible solutions to the problem of its pollution. The small rivers experience the most significant anthropogenic impact.

In the course of the work, an assessment was made of the pollution of the Chla in Staromaryevka vilage, which belongs to the basin of the river Kalaus. The river experiences significant influence from pollution sources, which affects negatively both its condition and the subsequent influence of its waters on the main surface water bodies of the Stavropol region. In this research work, hydromorphometric characteristics of the Chla are revealed. In the course of the work, the following hydrometric parameters of the river were measured: width, depth, flow velocity, water flow, water temperature, physical properties of water.

Conclusion: the main sources of pollution are the discharge of chemical and tannery waste, the flow of pesticides from agricultural land, the discharge of sewage from settlements, the dumping of household waste by the population and grazing in adjacent meadows. It was revealed that in recent years there has been no ice formation on the river due to the discharge of warm water from the Stavropol poultry farm.

It was revealed that in recent years there has been no ice formation on the river due to the discharge of warm water from the Stavropol poultry farm. The following ways to solve the problem are the creation of water protection zones, the ban on the discharge of contaminated sewage, landfill, parking and the use of anhydrous technological processes of air cooling, reverse water supply, as well as other techniques in industrial enterprises.

The objective of the work:

1. The studying of the problem of the pollution of small rivers by wastewater.
2. The research of the condition of the river Chla.

The issues of the work:

1. 1. Assess the extent of the problem of water pollution.
2. The identification of the cause of the pollution of the river Chla.
3. To find possible solutions to the "problem of pollution".

Research hypothesis:

I suppose that the increase in the number of the Earth’s population and human needs to improve the quality of life has led to the catastrophic pollution of small rivers with sewage.

But obviously, the development of modern science and technology has made it possible to introduce the most effective technologies for the purification of water resources.

Contents

Introduction

The hydrosphere - the water shell of the Earth - is a combination of oceans, seas, lakes, rivers, ice formations, groundwater and atmospheric waters. The total area of oceans and seas is two and a half times greater than the land area. The total water reserves on the Earth are about 1386 million km3. Most of them, approximately 97.5%, are salty or largely mineralized water. At the same time, 96.5% of the water mass falls on the oceans. The volume of fresh water is about 35 million km3, or 2.5% of the total water reserves on the Earth. Meanwhile, most of the fresh water (68.7%) is concentrated in glaciers and underlying snow cover, of which the main reserves are in Antarctica.

The use and the protection of water resources

Water is the basis for the development of agriculture, energy and fisheries; without it, human life and leisure are not conceivable. Most of the planet's natural resources, unfortunately, are not being restored. This applies, for example, to oil, coal, non-ferrous and precious metals, etc. Water resources have a remarkable feature - the ability to resume during the cycle in the system "ocean - atmosphere - earth - ocean." In nature, a gigantic "mechanism is operating that returns fresh water flowing from the continents to the oceans and seas, back to land. This mechanism "launched" the energy of the sun hundreds of millions of years ago. Water is a necessary condition for life on our planet. It is estimated that the water content in the tissues of living organisms is approximately 6 times higher than its content in all rivers of the globe. Water is the distributor of solar energy on Earth, the main creator of climate, a heat accumulator, a giant engine, but at the same time, water and a necessary component of all technological processes in industrial and agricultural production. Is it necessary to explain why the purity of the springs, respect for water is our constant concern?

The research of the condition of the small river Chla in the v. Staromaryevka

The degree of transformation of water systems is determined both by using anthropogenic influences and by taking into account various factors affecting water resources, hydrochemical and hydrological regime of a water body. The higher the body of water, the more difficult the climatic, geological and biological conditions of its aquifer and geographical location, the higher its ability to cleanse itself, restore hydrochemical and ecological balance. The most significant anthropogenic impact is experienced by small rivers. Drainage and extent are progressive negative changes due to or even one of the factors. For industrial areas, water resources, livestock complexes and collector drainage waters can be allocated. Small rivers have a more significant effect on the hydrochemical regime.

According to their hydromorphometric characteristics, the natural watercourses of the territory of the city of Stavropol belong to small rivers. They begin with springs on the western and eastern slopes of the Stavropol Upland. The impact of the city's industrial, communal and transport complexes on the pollution of watercourses is most direct, since the northwestern and southwestern industrial zones are located on the watershed part of the hill. The extensively developed network of technological, sewer and other water-bearing communications here, due to numerous leaks, contributes to the pollution of groundwater, which, when unloaded through

springs, pollute surface watercourses. In addition, watercourse pollution also occurs due to household wastewater from the residential part of the city, located mainly on the gentle eastern slope.

In the course of the work, an assessment was made of the pollution of the river Chla in the village of Staromarevka, which belongs to the Kalaus river basin. The river experiences significant influence from pollution sources, which negatively affects both its condition and the subsequent influence of its waters on the main surface water bodies of the Stavropol region.

The water characteristics of the Chla River are given as an example. The Chla flows eastward, originates from the Oktyabrsky stream in the area of the oncological center in the city of Stavropol, flows through the Chlinsky forest - this is the source, then flows into the village of Staromarevka of Grachovka district and flows into the river Kalaus - this is the estuary of the river, polluted by waste and chemicals of the tannery factory.

Grachka district occupies the central sections of the Stavropol Upland with absolute heights of 600 to 200 meters. Its territory corresponds to the outcrops of Middle Sarmatian sandy clays with interlayer of marls. In the south, the lower Sarmatian deposits are revealed. The leading place in the relief is occupied by an extensive erosion-denodation plateau. Groundwater has varying degrees of salinity and depth. Saline waters are confined to the thalwegs and the lower parts of the distance. They have a chloride-sulfate background with high salinity up to 20-30 г/л.The development of crypto-clay clays contributes to the swamping of the thalwegs and lowlands of the watersheds.

The climate is characterized by unsustainable moisture. Annual rainfall ranges from 400-500 mm. The humidification coefficient varies from 0.45 to 0.6. Growing season with temperatures above +10º Clasts up to 188 days with the sum of the temperatures up to 3500º C. Pre-Caucasian low-humus carbonate chernozems, powerful and moderately powerful, are developed. The most elevated areas are occupied by the Ciscaucasia chernozems and grass-mixed vegetation. On the outskirts of the plateau, in the upper reaches of the beams, small bayrech forests are widespread. Steppe landscapes dominate. A large number of sites favorable for irrigation in topographic and soil-reclamation terms are located on open land. Irrigation is possible on floodplain terraces, but due to the close occurrence of groundwater, one should be careful about salinization of soils.

During irrigation, a significant change in the structure of sown areas, the expansion of crops of industrial crops is possiblee. The Chla, according to the classification of rivers accepted in hydrology, refers to small rivers (lengths from 10 to 100 km.) The floodplain of the river is composed of alluvium and is covered by meadow vegetation. The river has mixed nutrition and spring floods. The winter period in the life of the river begins with the appearance of ice formations. When, with the onset of frost, the temperature of the water in the river drops to 0 º C, and then up to several hundredths of a degree below zero, tiny ice crystals appear in it.

In winter period in the life of the river begins with the appearance of ice formations. On the river Chla, autumn ice drift is a rare occurrence. As a percentage, an average of 80% of the entire series of observations showed no spring ice drift. In most cases, during several cold nights, the coasts are narrow bands of ice, on the river they merge into a continuous ice cover. It so happens that in some rapids of the river due to the rapid flow of ice is not established throughout the winter. According to the dates of ice formation, Stavropol region can be divided into three zones (drawing 1). In the first zone, where the Chla River enters, ice formation forms in the second decade of December, lasts 55-85 days, and the spring ice drift begins in the third decade of February - the first decade of March. On the river, the duration of freezing-up is longer than on

such more water-rich rivers, as the Kuban and the Kuma, is 52-86 days. In general, in Stavropol region, the process of ice formation is unstable.

Due to the frequent change of weather, ice appears and disappears 2-3 times during the winter or is not observed at all. Recently, ice phenomena were practically absent on the river Chla. Ice phenomena, as a rule, violate the normal course of operation of water bodies and can cause significant damage to organizations managing them. Damage can be avoided only with a deep knowledge of the winter regime of rivers and the timely implementation of measures aimed at reducing it.

The following hydrometric work is carried out by me:

1. The determination of the width of the river Chla.

The width of the river is determined by different methods: measurement using a line or measuring tape is common. The target is pre-installed - a straight line across the river. The gate is fixed by milestones on both banks. The gate can be a bridge. In this case, the width of the river is measured along the length of the bridge. I determined that the width of the river Chla is 6 m.

2. The determination of the depth of the river.

Measurements of depths along the cross section are carried out from a bridge or from a log thrown over a river. They are produced at equal distances using water gauge rails. Measurement points are pre-marked with marks on the railing or on the suspension bridge cable. I determined that the depth of the Chla River at the right bank is 50 cm, at the left bank 40 cm, in the middle of the river 30 cm.

3. Measuring the speed of a river, using surface floats.

On a straight section of the river, an alignment (upper and lower) is broken at a distance of 20 or 50 m. At the targets observers stand. 3-5 floats are thrown sequentially above the upper section. The third observer, standing between the alignments, detects by the stopwatch the moment the float passes through the upper and lower sections (signals are given to it by observers at the sections with a wave of the hand). The average duration of movement of the floats is calculated by dividing the total amount of seconds by the number of floats. Knowing the average time of movement of the float (t cf) and the distance between the sections (t), you can determine the average speed. υcp = l / t avg

Working process:

Length 30 m.

The surface velocity of the river is 0.26 m / s.

The movement of the first float - 1 min. 40 sec (10m: 100 s = 0.1 m / s)

The movement of the second float - 1 min. 55 sec (10m: 115 s. = 0.086 m / s)

The movement of the third float –1 min. 30 sec (10 m.: 130 s. = 0,076 m / s)

Total flow rate: υ_{cp}= 0,1+0,086+0,076/3=0,26m/s

The speed of the current decreases from the upper to the lower, the nature of the bottom soil depends on this: it changes from coarse (pebble, crushed stone) in the upper to shallow (sand). In the lower reaches there is vegetation both along the banks and in the channel, where the flow velocity is low.

4. Water consumption.

The average annual water discharge in the Chla River is approximately 0,5 $м^3$/s. (drawing 2).

Water temperature +10,5 ºC.Air temperature +15 ºC.

5. Physical properties of the river.

The water is cloudy, with the smell of clays from soil impurities.

Pollution water resources by wastewater.

The main reason for using water resources is the discharge of untreated wastewater from industrial enterprises, as well as utilities and agriculture. Water pollution also provides irrational farming: residues of fertilizers, pesticides, washed out of the soil, fall into water bodies and pollute them. All this was to be subjected to anthropogenic impact. Water enters a large amount of harmful chemicals. This should be hundreds of millions of tons of garbage. The check turned into a gutter. Colors, but after cooking they turn red. The main types of consumption are uncontrolled waste.

The protection of water resources from pollution.

In the main areas of economic and social development of Russia, tasks have been set to implement and strengthen measures of protecting rivers from pollution. All measures should ensure the most efficient use of water for the national economy by regulating the flow of water, taking measures to economically consume water and stop the discharge of untreated wastewater based on improved production technology and water supply schemes (the use of anhydrous technological processes of air cooling, recycled water supply) and others technical techniques. The “basics of water legislation” states that all waters, water bodies are subject to protection from pollution, clogging and depletion that affect the quality of water in such a way that they can cause harm to public health, entail a reduction in fish stocks, worsen water supply conditions and cause other adverse effects as a result of changes in the physical, chemical, biological properties of water, decreased ability to naturally cleanse, disruption of hydrological and hydrogeological regimes.

The definition of “water pollution” in legislation requires all water users to comply with the necessary requirements. The most important component of modern water-sanitary legislation is hygiene standards - maximum permissible concentrations (MPC)harmful substances in the water of reservoirs. Compliance with these MPCs creates safety for public health and favorable conditions for sanitary water use. To preserve small rivers, the creation of water protection zones is of great importance. In this territory, the use of fertilizers, pesticides, the discharge of contaminated sewage from industrial enterprises and livestock farms, and landfill are prohibited. Coastal strips should be occupied by wood-shrubbery vegetation, which is a kind of flow

regulator and a barrier to erosion processes and pollutants. This means that within the coastal strip it is impossible to plow land and grazing livestock. Thickets of alder and willow grow well along small rivers. They maintain the level of groundwater, fix the coast. The willow roots "uncork" the aquifer, as it were, and the springs that have received freedom bring the river back to life. In the overgrown ditches, water is always kept for drinking animals and birds. Caring for water purity opens up a wide field of activity for the public, members of the Nature Conservation Society. Caring for nature is rewarded with its generosity, a growing economy, and the joy of people.

One can believe that one, who, in his youth, joined the struggle for the protection of nature, will never become her enemy. One of the main tasks is to instill a sense of personal responsibility among the young generation for the fate of their native land - its forests, rivers, fields.

«Full water and purity to small rivers"

Conclusion

The objective of the work was to demonstrate that ecology became one of the main incentives for the development of modern science and technology. The latest human inventions are aimed at resolving the conflict between his economic activity and the environment. The mankind has come to understand that further development of technological progress is not possible without assessing the impact of new technologies on the environmental situation. New connections created by man must be closed to ensure that the basic parameters of the planet Earth system that affect its environmental stability are unchanged.

In this research work was identified the hydromorphometric characteristics of the river Chla. In the course of the work, the following hydrometric parameters of the river are measured: width, depth, flow velocity, water flow, water temperature, physical properties of the water. It was found that the main sources of pollution are the discharge of chemical and tannery waste, the flow of pesticides from agricultural land, the discharge of sewage from settlements, the dumping of household waste by the population and grazing in adjacent meadows. It was revealed that in recent years there has been no ice formation on the river due to the discharge of warm water from the Stavropol poultry farm.

I have outlined the following ways to reduce the pollution of the river Chla: the creation of water protection zones, the prohibition of the discharge of contaminated wastewater, landfills, parking lots and the use of anhydrous technological processes of air cooling, recycled water supply, as well as other technical techniques at industrial enterprises.

Knowledge of their duties and implementation of water legislation by all water users is necessary.

The list of information sources

1. Голубев И.Р., Новиков Ю.В. Окружающая среда и ее охрана : Просвещение,1985 - 191с.
2. Ивановский В.А. Занимательное природоведение, учебное пособие для общеобразовательных учебных заведений Ставропольского края – Ставрополь : РНО СФ МГОПУ, 2003, 280с.
3. Крипсунов Е.А., Пасечник В.В. Экология: 9 класс: Учебник для общеобразовательных учебных заведений, М : Дрофа, 1995 -240с.
4. Литвинова Л,С., Жиренко Б.Е. Нравственно- экологическое воспитание школьников, М : 5 за знания, 2005 -240с.
5. Под редакцией Коробкина В.И., Передельского Л.В., Экология, Ростов н/Д: Феникс, 2004 – 224с.
6. Под редакцией Прохорова А.М., Советский энциклопедический словарь, М : Советская энциклопедия, 1987.
7. Савельева В.В. Природа г.Ставрополя , Учебное пособие – Ставрополь : Сервисшкола, 2002 – 192с.
8. Савельева В.В., Румынина Н.С,, Гадзевич Б.Л., Шальнев В.А. Физическая география Ставропольского края; учебник для 6-7 классов общеобразовательных учреждений.
9. Фадеева Г.А., Попова В,А. Физика и экология, В. 2003
10. Шкловский И.С. Вселенная, жизнь, разум, М. 1980

Application

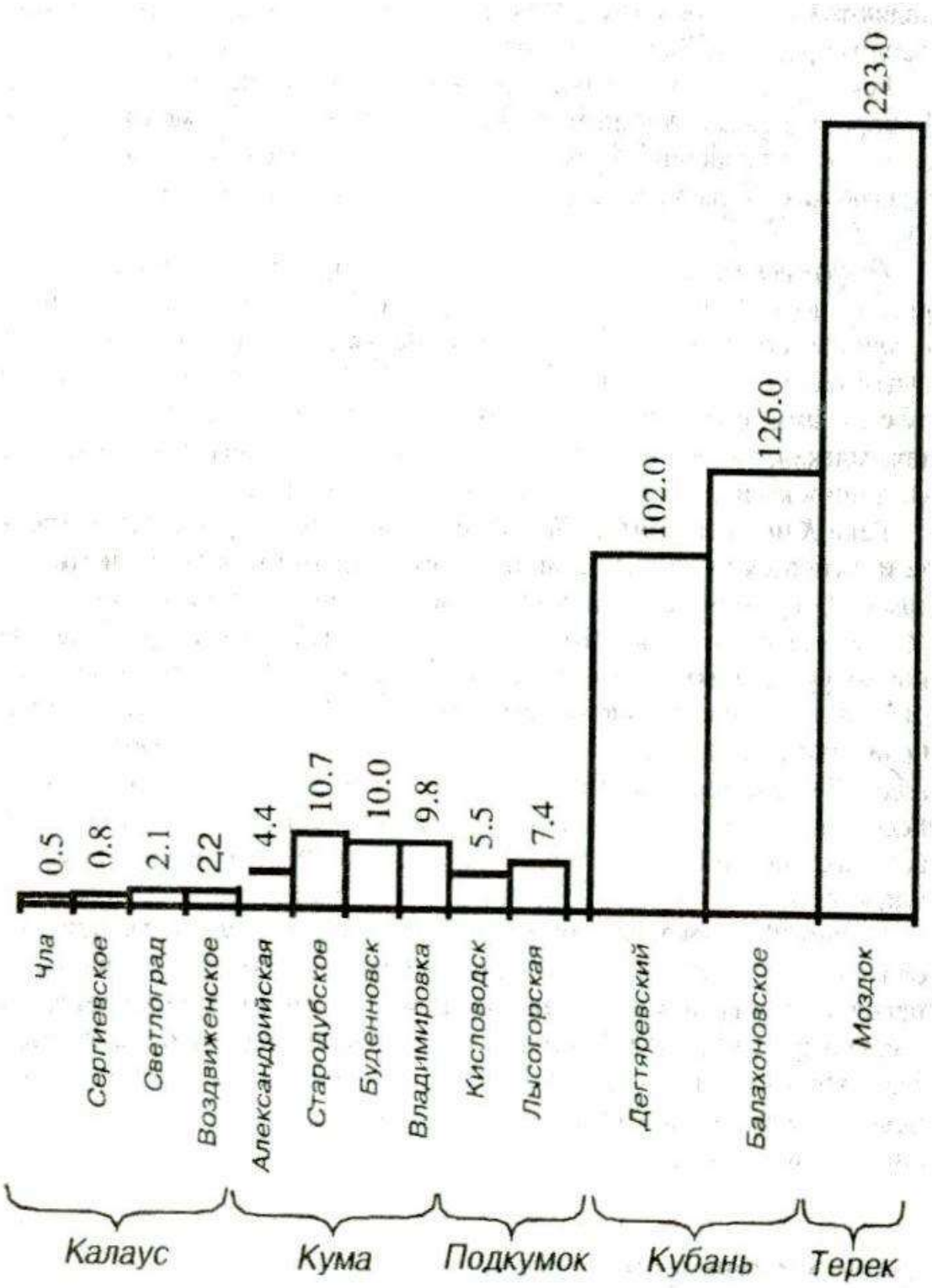

Рис.1 Средние годовые расходы воды в куб. м/сек.

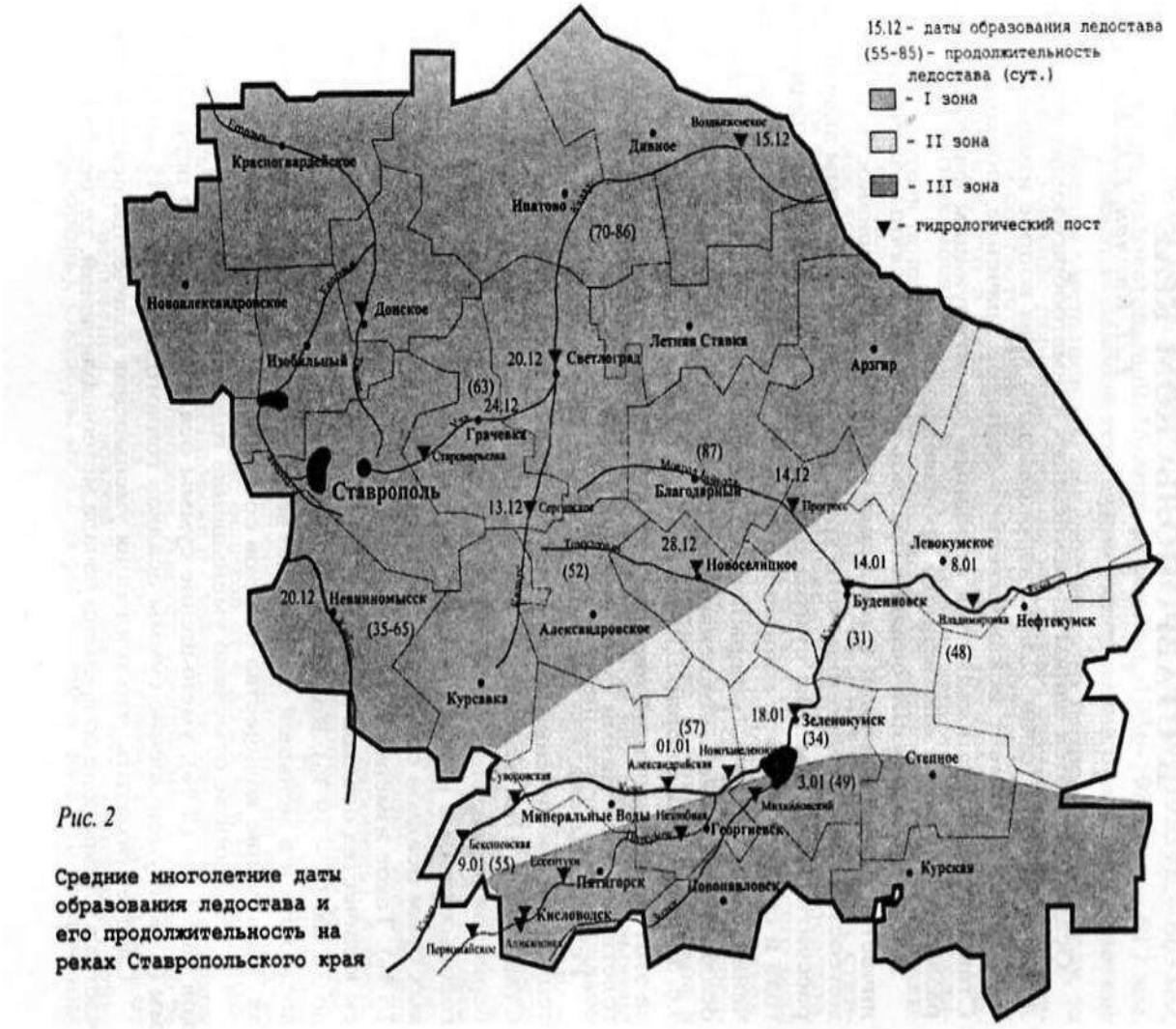

Рис. 2

Средние многолетние даты образования ледостава и его продолжительность на реках Ставропольского края