UGC543. 3: 628. 1

**STUDY OF FORMATION ANTHROPOGENIC FACTORS ON THE QUALITY OF WATER RESOURCES DECENTRALIZED WATER SUPPLY RURAL WITHIN BEREZHANY TERNOPIL REGION**

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*The main anthropogenic factors of chemical and toxicological pollution of decentralized water-supply sources in rural settlements are examined. Complex estimation of water pollution level is made and the dependence of subsoil waters quality from season changes is elicited on the example of countryside within Berezany district Ternopil region*

***Subsoil waters, well, chemical pollution index, toxicology pollution index, water hardness***

The targeted application of sustainable rural development for the period until 2020 [1] provides for the continuous monitoring of environmental quality in rural areas, including water sources and improvement of the health and rehabilitation of social and environmental situation in Ukraine. Water resources of any state is one of the most significant strategic factors in ensuring the functioning of the economy and public health.

In rural areas, the widespread use of decentralized water supply sources (wells and individual wells). They all have a regulatory sanitary protection zone (this is one of the main sanitary requirements) which prevents toxicological and chemical pollution of water in them. Regarding the placement of wells at the private home ownership, then, given the small area of ​​land, they can not create the necessary zone of sanitary protection. Therefore, along with the power supply and are often outbuildings for animals and toilets vyhrebamy and manure piles, which are sources of nitrates, which lead to soil contamination and accordingly soil water in it. [9] The most common is groundwater pollution sulfates, chlorides, nitrogen compounds (nitrates, ammonia, ammonite), oil products, phenols, iron compounds, heavy metals, making them unsuitable for use in drinking purposes [5]. More details in our research, we settled on studying the problem of global groundwater contamination in Ukraine inorganic nitrogen compounds, which are dominated by nitrates. The main sources of pollution are fertilizers, liquid runoff from livestock farms, natural sediments and organic waste [6, 7, 8]. Note that nitrate nitrogen is the most mobile forms of nitrogen compounds in the soil, they are easily washed out the necessary water flow down to the ground water, which is their constant accumulation, and as a result - nitrate pollution. However, their content in the soil is insignificant [5].

Berezhany district mainly agricultural, but because agricultural production has become one of the biggest polluters of water resources, including groundwater. Dangerous source of pollution of natural waters, especially during periods of spring flooding and torrential floods are diffuse runoff from agricultural land. Among them is made on average 3-4 times more nutrients and suspended solids than the natural land. [10] So, given the condition of groundwater sources, the issue of meeting the needs of the rural population in the drinking water of high quality is an extremely serious problem.

**Analysis of key studies and publications.** The relevance of this study is due to the fact that the known data, more than 80% of diseases transmitted through water sources [4]. In particular, numerous observations and studies found that among the problems of drinking water agricultural areas are of high hardness and total mineralization [4]. Last provoke adjournment of salts in the body (arthritis, delaying kidney stones and gall bladder). A special place among the known chronic poisoning belongs poisoning heavy metal salts. We know of more than forty elements, including the most common: copper, mercury, manganese, cobalt, chromium, nickel, gold, iron, cadmium, lead, antimony, thallium, bismuth and others [11]. One of the main sources of heavy metals into the environment is a natural process of evaporation from the earth's crust and revenues as a result of human activity. Established that anthropogenic of heavy metals on the order exceeds the natural flow [10]. These elements can be found in agricultural insecticides and herbicides, industrial joints organic or inorganic nature medicines. In excess of maximum permissible concentration of a substance emerging threat to health. But bad and more - the concentration of an item less than it is necessary for the normal functioning of the body. In the words of a famous scholar of the Middle Ages Paracelsus, everything is poison, everything is medicine - it all depends on the dose. Often, even a slight excess concentration of a substance causing illness and death [8]. It is therefore important to know the most common physiological properties of the compounds. If contact with such harmful substances is constant, there is definitely risk of poisoning the body grows too. This weakened immunity, increases the risk of chronic disease [3].

So nitrates - a salt of nitric acid (nitrate), which existed long before man and without which life itself. The problem is not available, and in quantity. Plants absorb from the soil, fertilizers rich in compounds several times more nitrogen than necessary for their development. As a result, only a percentage of nitrate is synthesized in vegetable protein we need, and the rest falls on the table in the "kind" of fruit, in roots, stems and leaves in. In living organisms, their fate depends on many factors, including the state of our health. Some nitrates freely displayed, others - are required to have chemical compounds, and others - are transformed into nitric acid salts - nitrates. They react with hemoglobin, eliminating the possibility of red blood cells provide oxygen to the cells of organisms. As a result, disturbed metabolism, significantly reduced immunity [2, 4, 9].

The results of human impact on natural resources should not be seen only in the light of technological progress and population growth, but also depending on the social context in which they appear. The relation to the environment is a measure of social and technological achievements of human society, characteristic of civilization. [9] Due to lack of funds in the rural councils, current repair work on rural water supply forced people to spend their money on their own, but the quality of sanitation may not always be carried out efficiently. [12]

**The aim is** to study the influence of anthropogenic factors on the formation of quality decentralized water supply for chemical indicators toxicological contamination and identify ways to improve the environmental situation in Ukraine. Such research is a promising area of ​​decision-making at the state level.

**Materials and methods of research.** The material for the research were average patterns of decentralized water sources, such as the foundation of water (wells) in areas subject to man-made impact in rural areas. The study of these sources of water held by officially established methods of subsoil waters GOST 26483-85, GOST 26490-85, GOST 24281-80, GOST 24849-81.

**Results and discussion.** Today, consumers of water faced with certain difficulties. Thus, the laboratory analysis of water treated with the following questions: why water has an unpleasant taste and smell, why water is muddy and yellow, why water-heating devices are covered with a thick scum, and other similar issues. Analysis of water samples for a number of chemical and toxicological indicators provides answers to some questions. Laboratory analysis of water from the centralized and decentralized water supply today clearly identify growth trends cases detection in water wells nitrates, phosphates, indicating that emissions aquifers mineral and organic fertilizers. The analysis evaluated the chemical composition of water and toxicological indicators and issued recommendations for the correction of the water, taking into account the concentration of components and cleaning technology.

For qualitative composition (content of cations and anions, mineralization) of groundwater Ternopil region used to supply substantially dominated by hydro-sulphate calcium-sodium water with mineralization 0,2-0,8 g / dm³. In particular, Berezhany district underground fresh water are bicarbonate-sulphate calcium-sodium composition by total mineralization of 0.5-0.7 g / dm³. In the 3432 there are artesian wells, including in rural areas - 2679 and 753 - in cities and towns and 74,296 mine pit.

Information about the content of the studied parameters shown in Table 1. It is established that the area marked by low concentrations of nitrite during the entire study period, except for rare cases of growth: the fall in with. Zhukov (up to 0.02 mg / dm3) and spring in the village. Drought (up to 0.04 mg / dm3), due to increased precipitation and, consequently, increasing runoff from agricultural land. Minor concentrations of nitrates in groundwater in the area (less than 0.01 mg / dm3) due to their extreme instability. They are oxidized, turning into the most stable inorganic nitrogen - nitrates. Stability nitrate forms leads to the accumulation of them in the groundwater by infiltration of the soil solution, the richest of these compounds, and further as a result of economic activity (making the surface soil nitrogen mineral and organic fertilizers) and pollution gaseous, solid and liquid nitrogen compounds [4 ]. As for nitrate, then set them high rates of gradual growth from spring to autumn. In the village. Zhukov this figure does not exceed the norm than the fall, when it is 52,35 mg / dm3. Significant increase in the concentration of nitrates in the territory of the studied areas autumn because when the rains fall in the ground water contaminants flowing from the fields, which made nitrogen fertilizers. Summer can be explained by increasing fertilizer.

Research z`yasovano the content of sulfate and chloride during the entire period of study of the problem is not higher than normal, but generally tends to improve these indicators in spring and autumn, which is associated with an increase in rainfall (as occurs in spring snow melt) and increasing runoff . Also, the main sources of sulphate and chloride to the ground water is wastewater.

Comprehensive evaluation of water contamination by sanitary-toxicological criteria indicated (Table. 2), for the study water contamination exceeds acceptable level. High levels of contamination found on the 3rd object - spring (4.3 units.) And autumn (3.4 units)., And the 4th object - spring (3.1 units.). High levels of pollution makes it impossible to use this water for drinking water supply, which indicates the need for special measures Water.

Overall analysis of the chemical composition of water in the territory of studies suggests the poor state drinking water quality decentralized water supply. According to our data, it is necessary to strengthen control of the toxicological and chemical indicators of water from decentralized sources of water in the spring and fall, when through the use of contaminated water increases the risk of infection.

**1. State water quality decentralized water with some chemical parameters in different seasons**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name of**  **settlement** | **Seasons** | | | |
| **winter** | **spring** | **summer** | **autumn** |
| **Нітрити**, *норма 0,00 мг/дм3* | | | | |
| Надрічне | 0,003 | 0,003 | 0,003 | 0,002 |
| Жуків | 0,004 | 0,004 | 0,004 | 0,004 |
| Куропатники | 0,004 | 0,004 | 0,004 | 0,003 |
| Посухів | 0,003 | 0,004 | 0,002 | 0,003 |
| **Нітрати**, *норма 50 мг/дм3* | | | | |
| Надрічне | 50,78 | 60,4 1 | 77,2 | 104,7 |
| Посухів | 96,65 | 58,59 | 137,9 | 181,6 |
| Жуків | 39,46 | 25,5 | 39,87 | 52,35 |
| Куропатники | 62,02 | 47,34 | 56,38 | 109,4 |
| **Хлориди**, *норма 250 мг/дм3* | | | | |
| Надрічне | 54 | 76,5 | 79,3 | 88 |
| Жуків | 32 | 56,3 | 57,2 | 78,1 |
| Куропатники | 48,3 | 68 | 42,9 | 84,7 |
| Посухів | 58 | 33 | 65,9 | 90,2 |
| **Сульфати**, *норма 250 мг/дм3* | | | | |
| Надрічне | 78,5 | 95,3 | 96,2 | 85,7 |
| Жуків | 38,09 | 63,5 | 75 | 113,3 |
| Куропатники | 70 | 84,32 | 60 | 102,3 |
| Посухів | 65,08 | 44,44 | 79,49 | 98,45 |

**2. The degree of water pollution on health and toxicological indicator**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **object number** | **Sanitary and toxicological indicator** | | | |
| **winter** | **spring** | **summer** | **autumn** |
| 1 (Надрічне) | 1,8 | 2,47 | 1,3 | 2,03 |
| 2 (Жуків) | 1,4 | 2,5 | 1,67 | 2,8 |
| 3 (Куропатники) | 2,96 | 4,3 | 2,68 | 3,4 |
| 4 (Посухів) | 2,3 | 3,1 | 1,3 | 1,5 |

**Conclusions.** The results say about the poor state of groundwater due to increased nitrate content in these sites. Z`yasovano that sewage and fertilizers that are made in the ground, the greatest impact on the quality of water from underground sources. Also set to increase the content of nitrites, nitrates, chlorides, sulfates during the spring snow melt and fall during the rainy season. Due to the excess of the norm of nitrates in groundwater, it is imperative to control of nitrogen fertilizers in the soil, conduct additional purification of drinking water before use. It is also necessary to place well at a distance of at least 20-25, and sometimes 100 meters from pollution sources subject areas of movement of groundwater.

Therefore, decentralized water supply security, especially in rural areas should be a priority for public policy for sustainable rural development regarding drinking water. It is clear that in areas with a high percentage of "non-standard" water increased risk of cancer. The effect of water with high content of nitrates increases against the backdrop of malnutrition that now is a particularly relevant.

As preventive measures to improve the quality of drinking water supply is recommended decentralized control of the sanitary and epidemiological services on the sources of decentralized water supply twice a year, especially in spring and autumn. In DerzhSanPiN recommended to conduct such studies 1 per year in the most unfavorable period. Life and tube wells should pledge given direction of movement and location of groundwater pollution sources (livestock facilities, latrines, garbage dumps). Local authorities recommend to inform the public about farm products and how to disinfect wells. To clean and disinfect wells upgrade should be done in the most unfavorable time of year - spring.

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*Рассмотрены основные антропогенные факторы химического и токсикологического загрязнения источников децентрализованного водоснабжения в сельских населенных пунктах. Проведена комплексная оценка уровня загрязненности воды и выявлена зависимость качества подземных вод от сезонных изменений на примере сельских местностей в пределах Бережанского района Тернопольской области.*

***Грунтовая вода, колодец, химический показатель загрязнения, токсикологический показатель загрязнения, твердость воды***

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