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THE PROBLEMS OF ANTHROPOTECHNOGENIC EFFECTS ON THE HYDROSPHERE IN THE CONTEXT OF ENVIRONMENTAL-ECONOMIC SECURITY OF WATER USE: FINANCIAL AND ECONOMIC ASPECTS

ABSTRACT

Within the article, the key factors of anthropotechnogenic effects on the hydrosphere are identified. Financial and credit instruments for regulating the impact on the hydrosphere are systematized. It is noted that the increased negative impact on water resources and irrational use of nature cause the depletion of drinking water resources, a decrease in the level of labor potential, a reduction in life expectancy, rapid demographic decline, intensification of migration processes, increases the relevance level of solving critical socio-economic problems of preserving the ecology and natural resources, the safety of water use to meet the needs of current and future generations. The authors systematized components and elements of ecological-economic safety of water use. It is noted that threats to the safety of water use are pollution of water bodies by cattle burials, production waste, storm-water and melt water, deforestation, land plowing, construction of residential and industrial facilities in coastal areas, activities of housing and utility enterprises, violation of water intake operation regimes, and etc. The research was carried out according to the data of the Chernihiv region. In particular, the hydrographic network of the region, the main water-using enterprises, as well as water-polluting enterprises, are studied; total water intake and factors influencing the ecological state of surface waters of the region are analyzed; the main problems in the treatment of return waters are substantiated. A set of measures is proposed aiming at the rational water use in the Chernihiv region, within the framework of the Environmental Protection Program of Chernihiv region for 2021-2027 directed at neutralizing negative ecological and socioeconomic consequences of anthropotechnogenic effects, in particular, certification of water objects in the region, reconstruction of water treatment facilities, hydro-technical facilities, and reservoirs, construction of local treatment/mini-treatment facilities, elements of sewage systems (collectors, pumping stations, networks), arrangement of sources and wells.

Keywords: water resources, water use, anthropotechnogenic impact, hydrosphere, instruments of financial and credit regulation, ecological and economic security, water supply

JEL Classification: Q20, Q25

INTRODUCTION

Economically efficient and rational water use is a necessary condition for the socioeconomic progress of the state, and it is a decisive factor in ensuring its ecological and food security. The lack of financial capacity in the state to ensure the development and implementation of a set of measures aimed at the modernization of the country's hydro-system and water-use technologies to reduce negative anthropotechnogenic effects on its conditions is complicated by the threats that arose because of the military aggression on part of the Russian Federation. Destruction of the water supply infrastructure as a result of military operations in Ukraine leads to the contamination of water resources with harmful emissions, industrial and municipal effluents, which, in turn, will have a

destructive effect on the self-recovery ability of the country's water systems and cause their further degradation.

It is clear that under such conditions, the search for effective solutions to the problems of restoration, protection, and creation of the conditions for rational water use is impossible without an appropriate analysis of the state of Ukraine's water resources and their structural changes. This analytical assessment will allow proposing the improvement of forms and methods of the management of water use relations, protection of water resources of Ukraine from degradation and depletion in modern conditions.

Under these circumstances, it is especially important to search for effective solutions of financial support, restoration, protection and creation of conditions for water use in Ukraine.

LITERATURE REVIEW

Problems of anthropogenic load on the hydrosphere in the context of the ecologic-economic security of Ukraine are the subject of scientific interest of a number of scientists. Namely, R. Ponomarenko, L. Pliatsuk, O. Tretiakov, I. Ablejeva, Yu. Buts, V. Barbashyn prove that the water ecosystem of rivers, being under the constant technogenic impact, has a tendency towards a permanent deterioration of the ecological state, which requires an urgent solution to the problem of ecological improvement of the basin of the largest water arteries of the country.

Yu. Olvinska emphasizes the need for ecological monitoring of the environment. In turn, O. Klymchyk, T. Pinkina, L. Danylyuk proposed a scheme for integrated water resources management according to the basin principle, characterized its components and the required implementation [8]. L. Levkovska, V. Mandzyk developed a model of its implementation in the field of water use and proved its importance by carrying out the policy of sustainable water supply, and also identified financial and credit instruments for regulating rational water use [12].

Fernando Antonio Leal Pacheco and Luis Filipe Sanchez Fernandez investigated the impact of anthropogenic activities on water resources through changes in land use, including urbanization [18].

Ali Mehran, Amir Agha Kouchak, Navid Nakhiri, Michael J. Stewardson, Murray K. Peale, Thomas J. Phillips, Yoshihide Wada and Yakin K. Ravaliko conducted an assessment of the complex anthropogenic effects on water resources, climate change on water availability [15].

E. Brockwella, K. Elofonab, D. Marbouakd, and S. Nordmakd claim that economic activity, population growth and unsustainable agricultural practices increase the pressure on reservoirs, which poses risks to the health of the population, as well as the development of tourism. They note that this pressure can be countered by limiting polluting activities and improving wastewater management [3].

M. Khademab, Sh. Ruzhak, J. Haruad prove the economic value of water storage and emphasize the importance of evaluating the effectiveness of water resource management [7].

However, paying tribute to the conducted research, a number of issues, in particular, related to the study of the problems on financial and economic support of rational water use in view of their dynamism due to the appearance of new threats and challenges require further research. Since it is impossible to rationally manage the country's water resources without a comprehensive understanding of their condition and knowing the factors of influence and the availability of financing tools for the restoration and modernization of the state's hydro system.

AIMS AND OBJECTIVES

The purpose and objective of the research are to study the problems of anthropogenic impact on the hydrosphere in the context of compliance with the environmental and economic security of water use, as well as the use of financial and credit instruments to regulate the impact on the hydrosphere, protection and conservation of water resources at the state and regional levels.

METHODS

The methodological basis of scientific research on water use security problems is general and special methods of scientific knowledge. When writing the article, the system and structural-functional methods were also used in the study of the

current state of water use in the Chernihiv region. Structural-logical and comparative methods - in the study of the financing of state budget programs of water resources conservation. The complex method was applied in the formulation of proposals for improving the levers and tools of ecological and economic security of water use.

RESULTS

Availability and high quality of water, primarily drinking water, is an integral attribute of countries with developed economies. The reduction of water reserves in the world objectively causes it to acquire the characteristics of a strategic recourse for the socioeconomic development of the country, and therefore, ensuring the conditions for its rational use becomes a priority task of any modern society. Unfortunately, until today, in terms of the water management policy of Ukraine, water was considered, first of all, as an economic resource for production, obtaining electricity, discharging wastewater, etc. That is, there are reasons to claim that this policy has led to a high level of pollution of the country's wastewater system, a violation of the natural balance of ecosystems, and a reduced ability of water resources to self-renew. Thus, important starting points for the implementation of principles, mechanisms and tools of ecological and economic security into the practice of water use are scientific justification and implementation of the measures set, the target of which is the modernization of the country's water infrastructure and water use technologies to improve the water quality, restoring reserves and establishing a natural balance of the country's natural ecosystem. The solution to this issue is possible due to the comprehensive use of such tools as fiscal regulation, rent regulation, risk insurance, etc. This will contribute to the creation of necessary prerequisites for the economical use of water, reduction of the water capacity of GDP, and formation of closed cycles of water use under the condition of minimal water pollution.

The choice of a set of financial and credit instruments and incentives to reduce anthropotechnological pressure on the country's hydro resources and restore its hydro system should be made according to a certain algorithm for making financial and managerial decisions. In our opinion, this process should include the following steps: 1) determination of the main goals; 2) monitoring; 3) development of programs and projects to achieve the defined goals; 4) calculation of financial resources needed for the implementation of selected programs and projects; 5) justification of the structure of the portfolio of financial and credit instruments to meet certain needs; 6) management of a portfolio of financial and credit instruments; 7) evaluation of the effectiveness of financing selected projects.

It should be noted that the substantiation of the prospects for financing the implementation of project programs aimed at reducing the anthropotechnological pressure on the country's hydro resources and introducing the principles of environmental safety of water use in the industrial, agricultural and domestic sectors of the economy requires an appropriate analysis of the current state of water resources and their structural changes. Such an analytical assessment will allow us to propose the most effective combination of financial instruments and incentives.

The development of a regulatory framework that regulates the financial aspects of the relationship between water use and water safety, taking into account environmental requirements, is important in this context. At the same time, the achievement of ecological and economic security of the state's water use must be harmoniously combined with meeting the real economic needs of the state, increasing labor productivity in all spheres of the society's life, reducing the informal sector of the economy, etc. [10, 11].

Three main components of ecological-economic security of water use can be pointed out (Figure 1).

Ecological-economic safety of water use provides for:

- identification of safety risks and factors that may affect the deterioration of the water resources quality;
- organization of monitoring research of the water resources state;
- creation of the social economic policy on ecological priorities of water use.

In Ukraine, the use of water resources is accompanied by a significant anthropogenic load, which negatively affects the ability of these resources to self-reproduce. Both human activity and climate changes and conditions of natural moisture supply have a destructive effect. The main threats to the safety of water use facilities are pollution of water objects (dumps of ores and mineralized rocks of mining enterprises, cattle cemeteries, production waste, storm and melt water, deforestation, land plowing, development of residential and industrial facilities, wastewater of housing and public utilities (HPU), non-farm hydro-geological facilities; depletion of water objects (wasteful water use, outdated water-intensive production technologies, large losses of water during its transportation and use for industrial and HPU needs, violation of operation modes of water intakes) [9]. Due to these factors, there is a rapid increase in the water deficit in all regions of Ukraine. On average, for 1991-2019 the water balance deficit in the north of the country is 77-80 mm, in the center –

159-222 mm, in the south – more than 460 mm. There are six main typical zones in Ukraine namely: extreme humid – takes 4,5% of the territory; humid (30,0%); insufficient humid (16,0%); arid (20,0%); dry (22,0%); very dry (7,5%). In the period from 1991 to 2015, compared to 1961–1990, territories with a significant deficit of natural moisture supply (dry and very dry zones) increased by 7% and cover a total of more than 29,5% of the surfaces of Ukraine or 11,6 million hectares (37%) of arable lands of the country. The territory of the country with excessive and sufficient atmospheric moisture, on the contrary, decreased by 10% and occupies only 22,5%, including 7,6 million hectares of arable land [1].

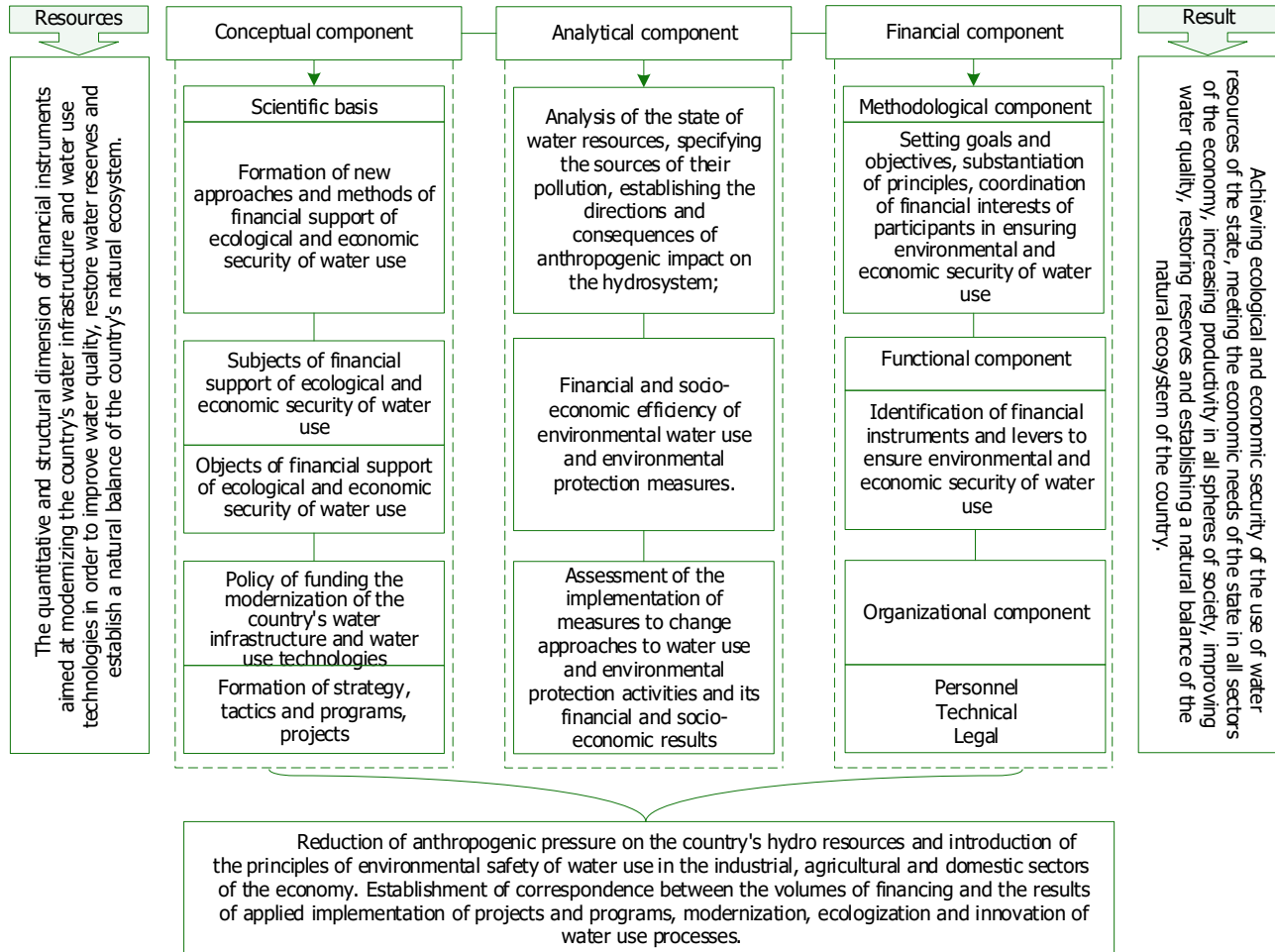


Figure 1. Structural and logical model of financial support of ecologic-economic security of water use.

Chernihiv region, compared to the other regions of Ukraine, is one of the most well-stocked water resources. Surface water resources consist of local runoff, which is formed on its own territory in the river network, transit, which comes from neighboring countries along Dnipro and Desna and its tributaries, a runoff coming from the neighboring Sumy region through Seim, groundwater and water reserves concentrated in reservoirs, lakes and swamps of the region.

The Desna and Dnipro basins form the hydro-graphic network of the Chernihiv region, which, according to the State Water Cadastre, is divided into water management areas within the region (the Dnipro River basin – 7 sections, the Desna River basin – 6 sections).

In total 1570 rivers with a total length of 8369 km flow on the territory of the region. According to the classification of the rivers of Ukraine, all rivers of the Chernihiv region are divided into 2 large rivers – Dnipro (124 km) and Desna (505 km), 8 middle ones – Sozh, Trubizh, Supii, Udai, Sudost, Seim, Snov, Oster (total length - 723 km), 1560 small rivers (total length - 7017 km), among which 160 have the length more than 10 km. The main water artery of the region is the Desna River.

According to the State Geological Service of Ukraine, estimated underground water resources in the Chernihiv region amount to 3039 million cubic meters (8 cubic meter/day per capita). Operational underground water reserves amount to 204 million cubic meters (0,5 cubic meter/day per capita). River water flow resources (average local flow) amount to 3450 million cubic meters (9,4 cubic meter/day per capita).

Water resources are a necessary component for conducting economic activities, especially in water-extensive parts, in particular, industry, agriculture, and also significant consumption is noted in the utility economy because its subjects provide the population's needs for drinking water. Today's military actions on the territory of Ukraine create risks in achieving the 6th Goal of sustainable development - "Clean water and proper sanitary conditions", and taking into account the fact that 40% of the world's population suffers from a lack of drinking water, the study of the water sources and their condition is actualized. Thus, in the Chernihiv region water for consumption comes from the upper and lower Cretaceous aquifers at Quaternary sediments. According to the adopted program "Drinking water for Chernihiv region for 2022-2026", it is planned to provide the population of territorial communities with high-quality water from the Kaniv-Bucha aquifer. Achieving this goal requires an analysis and assessment of the state of water resource use and the identification of major pollutants, which will serve as a basis for the development of water conservation measures and rational consumption of quality water without exhausting effects on the environment.

According to the data of the State Statistics Service and the Desna Basin Water Resources Administration, in the territory of Chernihiv region as of January 1, 2021, 713 water-user enterprises were registered.

In the sphere of the DBWRA operation, there are 544 users in the Desna River sub-basin, 147 – in the sub-basin of the middle Dnipro River, and 22 – in the sub-basin of the upper Dnipro River.

Accounting for water use is carried out in accordance with state documents and shows that in recent years there has been a tendency to reduce water consumption by 38% (in 2020 compared to the "peak" consumption in 2012) due to the decrease in the pace of economic activity (Figure 2).

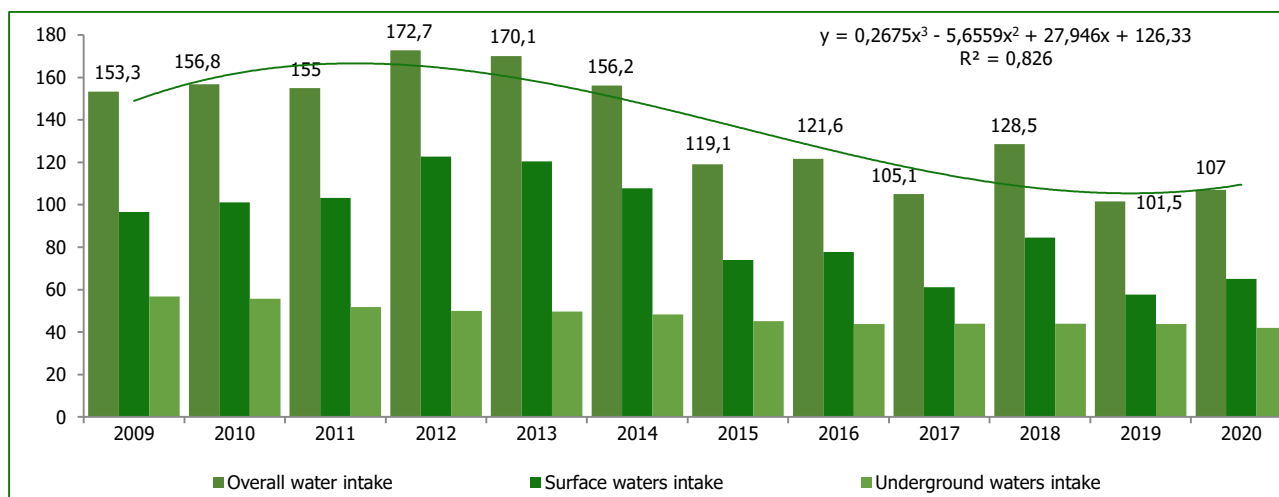


Figure 2. Dynamics of water intake in Chernihiv region in 2009-2020, million cubic meters. (Source: developed by the authors based on [19])

Based on the 2020 example, it can be argued that households and the economic complex of the region were provided with a sufficient amount of water for daily production and consumption needs. Thus, the total intake volume was 107 million cubic meters, of which 40%, or 42 million cubic meters - underground water intake, and 60%, or 65 million cubic meters – surface water intake.

The years of the greatest economic activity for the region, namely 2010-2013, are also the period of the greatest water consumption and, accordingly, the load on water resources of the region, which is shown on the graph. The illustrated dynamics of water intake in the Chernihiv region is described by a polynomial of the third degree with a high level of reliability.

The study of water intake by sources shows that the dynamics of the groundwater intake is decreasing, this is illustrated by a linear function with a determination coefficient of 0,9113 (Figure 3). For the period from 2009 to 2020, a decrease in water intake from underground sources by 15,35% is noted. Accordingly, the increase in total water intake occurs at the expense of surface water. The total intake of water for use by the population and the economy complex includes intake from the surface and underground water.

In the structure of the economic complex of the region, the largest consumer of surface water is Chernihiv CHP Public utility company. Water consumption by the enterprise shows an upward trend, which is associated with an increase in electricity production, for example, in 2020 compared to 2019, surface water intake from the Desna River for industrial needs increased by 24%.

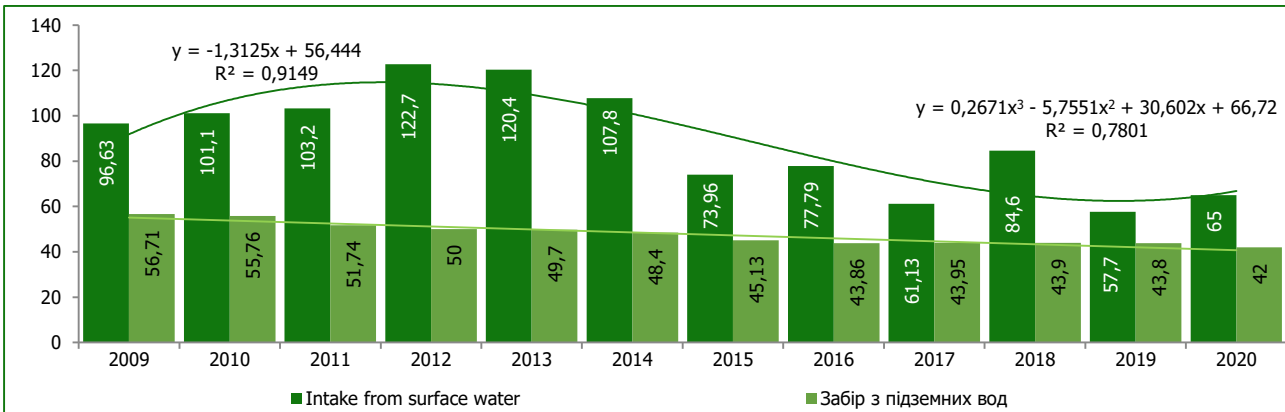


Figure 3. Dynamics of water intake from the surface and underground waters, millions of cubic meters. (Source: developed by the authors based on [19])

Water supply for household and drinking needs is carried out by Chernihivvodokanal Public utility company (Chernihiv), which is the largest user of underground water in the Chernihiv region. The study of water intake by sources shows that the dynamics of groundwater intake is decreasing, this is illustrated by a linear function with a determination coefficient of 0,9113 (Figure 3). For the period from 2009 to 2020, a 26% decrease in water intake from underground sources is noted. Accordingly, the increase in total water intake occurs at the expense of surface water, with a general tendency to decrease it.

The structure of the water resources consumption in the region defines industry as the largest consumer – up to 65%, utility services, which provides the population with drinking water supplies - up to 20% of water, and based on the specifics of the activity and the need for constant water use, agriculture is a significant consumer of water - up to 15%.

Water use in production and residential buildings involves the disposal of surface and sewage wastewater. The dynamics of return water discharge is presented in Figure 4.

As of January 1, 2021, 27 pollution sources were accounted for in the Chernihiv region, from which wastewater in the amount of 67,6 million cubic meters was received. The correlation between the volumes of water consumption and drainage is monitored, the largest consumers generate the largest wastewater volumes. Thus, in the industrial sector in 2020, the amount of water discharged made 49,09 million cubic meters, utility services – 18,19 million cubic meters, agriculture – 0,099 million cubic meters.

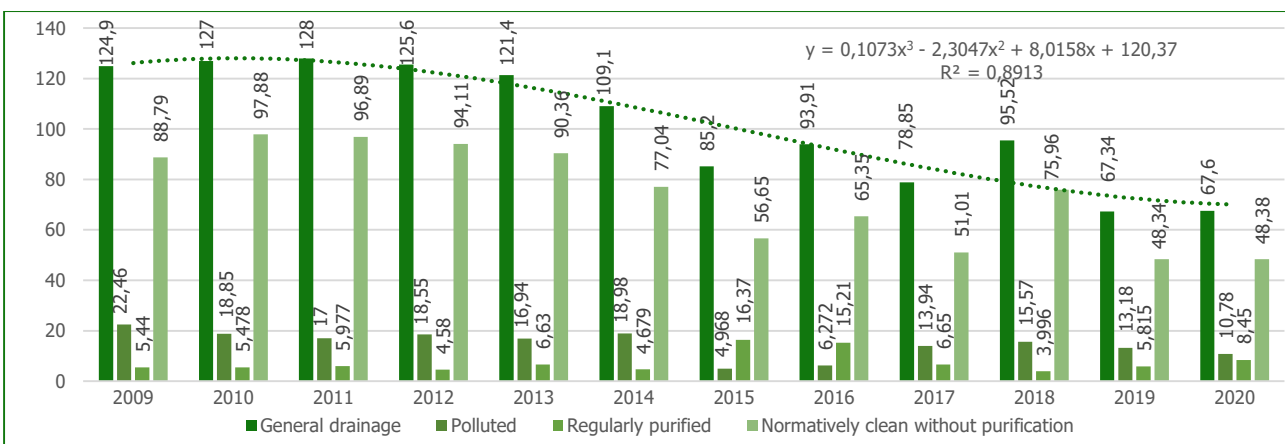


Figure 4. Dynamics of return water discharge in water bodies of the region, millions cubic meters. (Source: developed by the authors based on [19])

The graph shows the structure of wastewater, namely polluted, normative purified, and normative clean without purification. During the studied period, the trend of drainage according to the quality of discharged water is such that the largest specific weight of discharged water is normative clean water, the volume of polluted water is less, and the smallest specific weight in the structure belongs to normative purified water. Thus, in 2020, by volume, the largest amount of clean water without treatment was received by surface discharge – 72%, or 48,38 million cubic meters, 16% or 10,78 million cubic meters of wastewater is polluted, and normative purified waters made 8,45 million cubic meters or 12%.

The main polluters of surface water are utilities, which are also the largest consumers of water. The growing volume of household and production use of various groups of detergents, cleaners, and powders containing surfactants and phosphates leads to an increase in the discharge of water polluted by such components, a decrease in water quality, and a change in biodiversity in water bodies. Treatment facilities that have not been modernized for a long time do not allow deep purification of wastewater and effect environmental pollution and changes in the hydro-chemical state of the region's rivers. The greatest anthropogenic load occurs in the basins of Bilous, Oster, Ichenka, and Borzenka. The main pollutants that enter water bodies with sewage are organic substances, common iron, manganese, ammonium ions, and phosphate ions.

Within the water use rationalization in the Chernihiv region, a number of state planning documents are adopted in which the issues of sustainable water use are fixed. Thus, in the Sustainable Development Strategy of Chernihiv region until 2027, Comfortable and safe living conditions are defined as one of the strategic goals, which ensures the provision of the population with high-quality drinking water; restoration, protection and rational use of sources of drinking water supply; reconstruction of emergency water supply networks and structures on them; development of water supply and sewage management.

Moreover, within the framework of the Environment Protection Program of the Chernihiv region for 2021-2027, a set of measures aimed at neutralizing negative ecological and socioeconomic consequences of anthropotechnogenic impact is proposed (Figure 5).

Currently, in Ukraine, there are numerous grant programs aimed at stimulating rational water use, namely: the USAID Agricultural and Rural Development Program (AGRO) offers grant support for enterprises engaged in agriculture for the introduction of new technologies and automation of irrigation processes, purchase and installation of energy and water-saving equipment to reduce unproductive water losses, reduce energy consumption and preserve soil fertility [2]; grant for eco-technologies from the EU [4]; grant support for human development in terms of improving the ecological state of natural resources under the human security projects of the "KUSANONE" program [6].

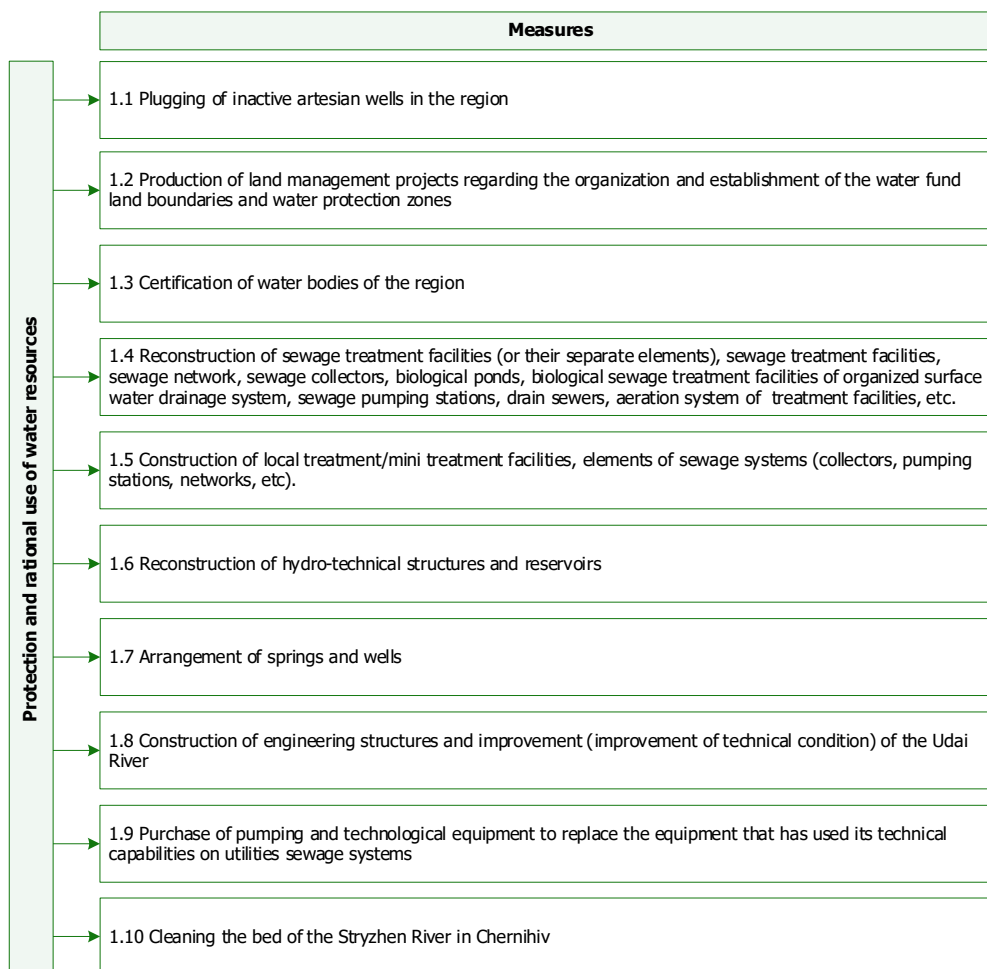


Figure 5. Directions and measures of the Environment Protection Program in Chernihiv region for 2021-2027.

The state actively uses financial and credit levers and instruments of rational water use. Thus, according to the Strategy for the Development of Water Policy of Ukraine, it is expedient to use the following tools to support rational water use: preferential taxation and lending for projects to modernize hydraulic structures; expanding the range of sources of financial support for the implementation of water infrastructure modernization projects through the more active attraction of funds from international financial organizations and the introduction of public-private partnerships; review of benefits and preferences in determining rates for special water use, etc. [20].

According to the Public Report of the State Agency of Ukraine for Water Resources, in 2021, in terms of protection against the harmful effects of water, the State Budget Program CPCV 2707070 for 2021 provides 122.8 million UAH, of which 102.5 million UAH has been used. In addition, the National Target Program for the Development of Water Management and Environmental Rehabilitation of the Dnipro River Basin was extended until 2024.

Financing of budget programs in 2020-2022 was carried out in the following areas:

- "Operation of the State Water Management Complex and Water Resources Management" (2020 - 4106.2 million UAH, 2021 - 5284.7 million UAH, 2022 - 5793.3 million UAH);
- "Protection from the harmful effects of waters of rural settlements and agricultural land, including in the Tysa river basin in the Transcarpathian region" (2020 - 66.8 million UAH, 2021 - 122.8 million UAH, 2022 - 147.6 million UAH);
- "Priority provision of rural settlements with centralized water supply" (2020 - 48.4 million UAH, 2021 - 139.9 million UAH, 2022 - 45.0 million UAH) [19].

The prospects and dynamics of the greening and rationalization of Ukraine's water resources are determined by the availability and practice of implementing a set of financial tools and levers aimed at creating the conditions for saving such resources, reducing the pollution level, observing the principles of environmental safety and economic efficiency. The main guidelines and financial levers of providing ecological and economic security for water use are presented in Figure 6.

Main guidelines and levers of ecological and economic safety of the safe water use		
System of economic and tax regulation	Integrated water resources management according to the basin principle	Providing the population with high-quality drinking water
<ul style="list-style-type: none"> ▪ mechanism for calculating and paying taxes related to water use; ▪ timely financing of measures to protect and restore water resources; ▪ transparent establishment of tax benefits for entrepreneurs that carry out restoration and protection of water resources; ▪ conditions revision for granting preferential loans for the preservation of water resources, as well as timely prevention of harmful effects of water resources on the ecosystem; ▪ ensuring a transparent distribution of the funds coming to the budget for water protection measures, in the form of fees for special water use; ▪ fines stricter for water pollution; ▪ formation and development of the insurance services market regarding the insurance of hydro-technical structures and risks of civil liability for damage caused to the environment 	<ul style="list-style-type: none"> ▪ development of modern approaches to the production of river basin management plans and schemes for integrated use and protection of water bodies within the limits of water management load standards; ▪ strengthening the role of basin councils in making management decisions in the field of the state water policy within the boundaries of designated water basins; ▪ transfer of separate powers to self-government bodies in the field of water resources; ▪ involvement of water users of all levers in making management decisions; ▪ amendment of normative legal acts regulating the implementation of integrated water resources management according to the basin principle; ▪ strengthening control over discharges of polluted wastewater into water bodies; ▪ creation of the basin geoinformation systems 	<ul style="list-style-type: none"> ▪ improvement of water legislation taking into account best European practices; ▪ development and implementation of targeted programs aimed at preserving water resources; ▪ implementation of measures contributing to the reduction of negative consequences of anthropogenic impact on sources of the drinking water supply; ▪ ensuring constant monitoring of the drinking water quality in terms of water supply sources; ▪ creation of the condition for water bodies restoration; ▪ introduction of the latest technologies for the preparation of drinking water and its disinfection; ▪ increasing the quality of drinking water

Figure 6. Main guidelines and levers of ecological and economic safety of safe water use.

Practical implementation of the proposed measures will contribute to the comprehensive rationalization of water use in the Chernihiv region and will contribute to the principle's observance of ecological and economic safety of such use, and bring it closer to the fulfillment of the tasks of sustainable development, taking into account territorial features and approaches to water resources management.

DISCUSSION

In contrast to previous studies, the article details the instruments of financial and credit influence on rational water use. Thus, these tools can reduce the amount of technogenic sediments formed during the operation of industrial and economic facilities (industrial and domestic waste, waste dumps from mines and quarries, etc.) The ratio of the degree of use of financial instruments to stimulate the safety of water use by the state and economic entities remains a debatable issue.

CONCLUSIONS

Therefore, based on the given data, the following main problems and destructive factors of ecologically safe and rational water use in the Chernihiv region can be singled out, which can objectively be scaled within the borders of Ukraine:

- lack of effective tools for stimulating rational water use in the field of industrial, agricultural and consumer needs;
- lack of innovative technologies on water use across all groups of water use;
- lack of a culture of frugal water use by all;
- 1 groups of consumers;
- outdated technical equipment of water-bearing spheres of economic activity;
- lack of effective incentives for wide implementation of effective accounting and information provision of water use.

Therefore, target orientations of the rational water use should be the following: improvement of regulatory and legal regulations of the relations in the field of water use; improvement of regulatory and legal regulation of the relations in the field of water use; reforming water resources management institutions in the direction of the consolidation of state and business actions to achieve the goals of sustainable water use; development and investment support of water projects; technical and technological renewal of engineering water facilities; financing of industry-wide water protection projects based on public-private partnership; development of economic tools for the formation of ecological discipline for all groups of water resource users; broad involvement by developing programs for the modernization of technical and technological parameters of water use.

The instruments of financial and credit stimulation of rational water use are accelerated amortization, provision of guarantees and subsidies, preferential insurance, and state subsidies when investing in water protection measures. These tools can be used to stimulate wastewater treatment technologies (mechanical, physical, chemical, and physicochemical). Increasing the level of domestic wastewater treatment will reduce the load on sewerage networks, and reduce flooding and groundwater pollution. State subsidies for the construction of settling tanks, tailing ponds, and ash dumps will increase the level of filtration of wastewater from storage tanks, and reduce the formation of anomalies in groundwater, in particular mixing of melt water with groundwater and the formation of aggressive waters.

State participation in financial incentives for investors to make decisions on investing in water protection measures may include such methods as budgetary, venture financing, subsidies, financial support of state programs, grants, and property leases on preferential terms. The use of such a tool as a grant will help to reduce technogenic sediments by thermal power facilities.

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ПРОБЛЕМИ АНТРОПОТЕХНОГЕННОГО ВПЛИВУ НА ГІДРОСФЕРУ В КОНТЕКСТІ ЕКОЛОГО-ЕКОНОМІЧНОЇ БЕЗПЕКИ ВОДОКОРИСТУВАННЯ: ФІНАНСОВО-ЕКОНОМІЧНІ АСПЕКТИ

У статті визначені ключові фактори антропогенного впливу на гідросферу. Систематизовано фінансово-кредитні інструменти регулювання впливу на гідросферу. Зазначається, що посилений негативний вплив на водні ресурси та нераціональне природокористування спричиняють виснаження запасів питної води, зниження рівня тривалого потенціалу, скорочення тривалості життя, стрімкий демографічний спад, інтенсифікацію міграційних процесів; підвищують рівень актуальності вирішення критичних соціально-економічних проблем збереження навколишнього середовища та природних ресурсів, безпеки водокористування з метою задоволення потреб сучасного та наступних поколінь. Авторами систематизовані компоненти та складові еколого-економічної безпеки водокористування. Зазначається, що загрозами безпеці водокористування є забруднення водних об'єктів скотомогильниками, відходами виробництва, зливовими та талими водами, вирубування лісів, розорювання земель, забудова житловими та промисловими об'єктами прибережних територій, діяльність підприємств житлово-комунального господарства, порушення режимів експлуатації водозаборів тощо. Дослідження проведені за даними Чернігівської області. Зокрема, вивчена гідрографічна мережа області, основні підприємства-водокористувачі, а також підприємства-забруднювачі водних ресурсів, проаналізовано загальний забір води, фактори впливу на екологічний стан поверхневих вод області, обґрунтовані основні проблеми при очищенні зворотних вод. Запропоновано з метою раціоналізації водокористування в Чернігівській області (у межах Програми охорони навколишнього природного середовища Чернігівської області на 2021-2027 роки) сукупність заходів, спрямованих на нейтралізацію негативних екологічних та соціально-економічних наслідків антропогенного впливу, зокрема проведення паспортизації водних об'єктів області, реконструкції очисних споруд, гідротехнічних споруд та водойм; будівництво локальних очисних/мініючиських споруд, елементів каналізаційних систем (колекторів, насосних станцій, мереж), облаштування джерел та криниць.

Ключові слова: водні ресурси, водокористування, антропогенний вплив, гідросфера, інструменти фінансово-кредитного регулювання, еколого-економічна безпека, водозабезпечення

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