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ECOLOGICAL ISSUES OF WATER RESOURCES OF UKRAINE AND THE WAYS OF THEIR SOLUTION

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At the current stage, one of the consequences of deterioration of ecological situation in hydroecosystems of natural and artificial origin is growing anthropogenic load, in particular, qualitative and quantitative changes in the ecological state of these ecosystems, impoverishment of their species composition, and decrease in biological productivity.

The issue of conservation and rational use of water resources is becoming particularly acute for Ukraine and other countries of the world that have chosen a path of sustainable development. Provision of proper ecological state of the water resource potential is relevant for all regions of the country, where water management and hydroecological issues are deepened by a natural shortage of water resources and their uneven distribution.

Pursuant to the hygienic classification of water bodies according to their degree of pollution, the most river basins can be classified as polluted and highly polluted, which do not meet the requirements of sanitary legislation for sources of drinking water. Control over the water quality of surface reservoirs shows that their ecological state is practically not improving. Improper agricultural practices, municipal, industrial and agricultural pollution of water bodies against the background of negative climate changes cause a disappearance of thousands of small rivers from the map of Ukraine, as well as loss of water content of the main water arteries of Ukraine and the degradation and destruction of water and surrounding water ecosystems. The quality of underground water also does not always meet the regulatory requirements of the State Sanitary Standards and Rules.

The issue of rational water use, conservation and protection of water resources shall fall within a direct competence of local self-government bodies, publicity, who has a reliable objective information, which should be a basis for building-up a water management, concurrently with solution of issues of conservation and protection of water resources, as well as implementation of measures to explain the importance of water resources to students, youth and local population.

Keywords: water resources, pollution, water quality, anthropogenic load.

Problem statement. Water resources are strategic, vital natural resource of special importance. They are the national wealth of every country, one of the natural grounds for its economic development; they make possible all the spheres of human life and economic activity, determine opportunities for the development of industry and agriculture, placement of settlements, arrangement and establishment of recreation and health improvement centers [1, p. 2].

At the current stage, one of the consequences of deterioration of ecological situation in hydroecosystems of natural and artificial origin is growing anthropogenic load, in particular, qualitative and quantitative changes in the ecological state of these ecosystems, impoverishment of their species composition, and decrease in biological productivity [11, p. 22].

The issue of conservation and rational use of water resources is becoming particularly acute for Ukraine and other countries of the world that have chosen a path of sustainable development. Provision of a proper ecological state of the water resource potential is relevant for all regions of the country, where water management and hydroecological issues are deepened by a natural shortage of water resources and their uneven distribution. Depletion, anthropogenic and technogenic pollution of almost all surface water bodies and significant part of groundwater are caused by a complex impact of urbanization processes, which extends far beyond the borders of residential areas [7, p. 42–43].

Analysis of the latest studies and publications. Ya. Hryb, A. Yatsyk, M. Klymenko, V. Romanenko, V. Khilchevskyi and others made a significant contribution to the methodology of holistic integral assessment of the ecological state of rivers [4, p. 19].

The analysis of numerous studies carried out by the domestic and foreign scientists shows that an unbiased assessment of the ecological state of water bodies is possible only with the use of hydrochemical and hydrobiological data. The application of hydrobiological methods allows assessing the ecological state of water bodies, quality of surface water as a living environment of hydrobionts, cumulative effect of the combined effect of pollutants, and establishing the occurrence of secondary water pollution [10, p. 127].

A tendency to assess the condition of water bodies not from the point of view of the needs of a specific water consumer, but from the point of view of preserving the structure and functioning of the features of entire ecosystem, becomes quite prominent in the development of modern hydroecology. The main principle in water protection activities in relation to the different types of reservoirs is a preservation of water ecosystem as an integral ecological unit of organization and functioning [11, p. 22, 25].

The variety of types of water resources management carried out in the basin of the same water source causes competition for water resources both at the local and national levels. Hydropower, for example, has a great impact on the hydrological regime of rivers. Irrigation, industrial and municipal water needs are associated with its water intake from a water source, which causes a decrease in the river flow and change in its hydrological properties. It is also important to note the increasing pollution of water courses, which are also used as receivers of various wastewater (purified and untreated) from agriculture, industry, cities and towns [12, p. 445].

Presentation of main material. Water is one of the substances that makes life on Earth possible. However, as confirmed by the results of scientific research, often humanity does not understand the importance and significance of water resources. This especially applies to freshwater resources, which are decreasing every year. According to the researchers' calculations, freshwater resources on the Earth are limited: only up to 3%, and only 1% of fresh water on the planet is in a liquid state suitable for use [4, p. 109]. The existing territorial distribution of water resources does not meet the needs of water-intensive industries [5, p. 189; 14, p. 83–84].

Water resources of Ukraine are formed at the account of the inflow of transit river waters from foreign countries, on-site runoff and groundwater [1, p. 5].

The large rivers are the following: the Danube, the Dnipro, the Dniester, the Tisza, the Southern Bug, the Prypyat, the Desna, the Seversky Donets, and the Western Bug. Most of the rivers are in the basins of the Black and Azov Seas, and only 4,4% are in the Baltic Sea basin. The largest number of rivers is in the Dnipro basin – 27,7%, the Danube – 26,3%, the Dniester – 23,7% and the Southern Bug – 9,3%. The highest density of the river network is in the Carpathians, where it reaches 2,0 km/km^2. The lowest density of rivers is in Kherson region, where large areas are endorheic [23, p. 5].

The uneven distribution of precipitation, hydrographic pattern, significant differentiation of river water content cause uneven territorial distribution of water resources [1, p. 5].

The inferred groundwater resources are unevenly distributed by the regions due to the difference in the geological, structural, physical and geographical conditions of different regions of Ukraine. The majority of inferred resources are concentrated in the northern and western regions of Ukraine, and the resources in the southern region are limited [24, p. 9]. Groundwater is equal to 13,8% of the state's total water consumption. They determine the provision of drinking quality water to the population of cities, towns and villages in Luhansk, Lviv, Volyn, Zakarpattia, Zhytomyr, Kirovohrad, Rivne, Poltava, Sumy, Ternopil, Kherson, Khmelnytskyi, Chernivtsi, and Chernihiv regions, where the use of groundwater for these needs reaches 30–70% [2, p. 10–11].

Ukraine is one of the European countries experiencing the water scarcity conditions: one inhabitant needs approximately 1,000 m^3 of water per year. There is a discrepancy between the water demand and the possibilities of its satisfaction, both in terms of quantity and quality. The issue of water use in the country has acquired national significance. Water resources are increasingly becoming the main limiting factor in the development and location of production [21, p. 51]. The minimum level of water supply determined by the UN is equal to 1,7 thousand m^3 per person per year [2, p. 9].

Considering different natural and climatic conditions of the regions of Ukraine, the issue of their water supply is solved by the State Water Agency of Ukraine at the account of territorial and seasonal redistribution of water resources. The large state multi-purpose canals play a significant role in the provision of regions with water stress and scarcity with water resources. To eliminate the territorial and temporal uneven distribution of water supply in Ukraine, water supply is carried out with the help of 1103 reservoirs with a total volume of more than 55 billion m^3 and about 49000 ponds, 7 large canals with a length of 1021 km and 10 large-diameter water duct, supplying water to the regions with water stress and scarcity of Ukraine [2, p. 9–10; 18, p. 123].

Water losses during water use are most often associated with the imperfection of industrial and agricultural production technology and public utility services. Thus, water losses from aquifers in some cities of Ukraine amount to 15−30%.

In agriculture, in case of furrow irrigation, water losses are from 40 to 70% or more, when watering with the use of irrigation sprinkler plants − about 20%, and in case of subterranean irrigation − no more than 10%.

Depletion of water resources is largely related to insufficient knowledge of environmental conditions. For example, the building-up of reservoirs does not always consider the increased filtration of water into subsurface horizons, growth of evaporation with the increase in water surface, as well as other factors. Swamp drainage leads to decrease in groundwater resources, dislocation of centuries-old moisture balance, and its circulation [1, p. 4]. The largest number of reservoirs and ponds are built on the small rivers, due to which their flow is regulated by 30−70%, and on some rivers of the steppe zone, the volume of reservoirs exceeds their water resources. Such reservoirs are partially or completely filled-in at the account of transfer of water from other river basins. The least regulated flow is in the basins of the following rivers: the Vistula, the Pripyat, and the Desna (1–17%). Reservoirs and ponds are mainly used comprehensively, but their main purpose is formed depending on water content and economic specialization of the regions. In the south and in the central areas experiencing the water scarcity conditions, artificial reservoirs are used mainly for water supply, irrigation and fish breeding; in the northern part, in the zone of excessive humidification, they are catch-water of drainage systems, sources of water supply and humidification for fishing industry and recreation; in Prykarpattia, they are mainly used for water supply, hydropower, fish farming and flood protection [8, p. 88].

Annually, a significant amount of water is redistributed across the territory of Ukraine with the help of main canals and aqueducts. The volume of water loss during transportation is estimated at 2,0 km^3 per year. More than third of the water supplied to the irrigation systems is lost due to the low technical level and worn-out state of hydraulic structures [24, p. 13].

Most of the fresh water in Ukraine is used for industrial purposes (fig. 1).

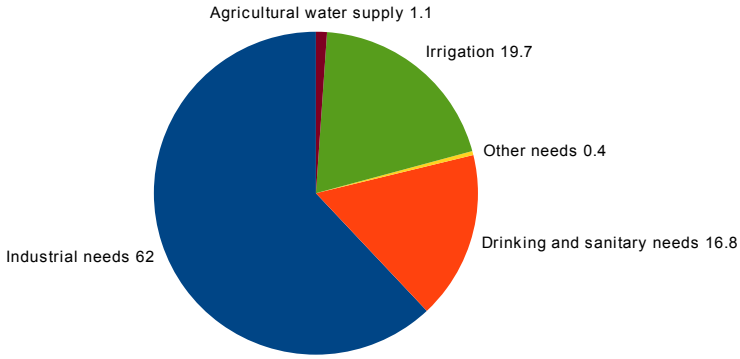

Fig. 1. **Pattern of Fresh Water Use in 2020,% [15, p. 59]**

The most water-intensive sectors of the economy are energy, ferrous metallurgy, chemical and petrochemical industries, which use about 86% of all water supplied for the industry [2, p. 21].

The sources of xenobiotics entering water courses, possessing carcinogenic and mutagenic properties, are diffuse surface runoff from the urbanized areas, agricultural lands, emergency outbreak of sewage and water supply networks, low efficiency of sewage treatment facilities, violation of hydrodynamic conditions of water bearing stratums. The volume of toxicogenic discharge in hydroecosystems changes depending on the climatic conditions, geomorphology, relief, depth of water retaining structures, groundwater and social and economic structure of the region [9, p. 137].

The issue of contamination of water ecosystems with waste water of anthropogenic origin is especially relevant for the southern urban areas, where there is a low level of water resources. The most intensive factor of urban impact on the quality of the Dnipro's hydroecosystem is sewage discharges and surface water runoff from the residential areas and agricultural lands. The unsatisfactory technical condition of treatment facilities, application of inefficient obsolete technologies and outdated methods of waste water treatment, bring to the annual influx of about 637 million m^3 of polluted waste water into the water area of the Dnipro river. As a result, the qualitative indexes of hydroecosystem deteriorate, its water management and recreational value decreases, and the ecological balance of water resources is disturbed [3, p. 252].

The main factors of groundwater pollution in most part of the territory of Ukraine are municipal drainage, waste water from animal husbandry complexes, mineral fertilizers, agrochemical products, lead, manganese and oil products [20, p. 13].

Pollution of interlayer groundwater is of a local nature and depends on a man-made load on the geological environment and degree of groundwater protection. The areas of contamination of interlayer groundwater are located, predominantly, in the zone of influence of the waste water management complex of mining operations, unorganized warehouses for storage of industrial waste, mineral fertilizers and toxic chemicals, livestock complexes, oil refineries and other local objects affecting the state of groundwater. Besides, the use of mineral, organic fertilizers and pesticides in the process of lands reclamation in the southern regions of Ukraine leads to the deterioration in the quality of groundwater, but this process is less intensive and is of a regional character. A significant man-made load on the territory led to the formation of persistent centers of groundwater pollution. As of September 01st, 2021 in the territory of Ukraine the number of recorded planar centers of groundwater pollution was 191, local – 262. Groundwater in the area affected by the main centers was contaminated with chlorides, sulphates, nitrates, ammonia, rhodanides, phenols, petroleum products, manganese, lead, and strontium in quantities that in some cases exceeded the maximum permissible concentration by several times [20, p. 16].

Quality is one of the limiting factors in the consumption of water resources. The volume of waste water entering the surface water bodies of Ukraine exceeds 5 km^3, which is 10,7% of the resources of the surface water run-off formed in the territory of Ukraine [24, p. 13].

The quantity of water resources is a prerequisite for ensuring its quality. Water quality cannot be maintained without a certain flow rate, which must provide such basic functions as maintaining the stability of water ecosystems, stability of hydrological cycles and providing a sufficient amount of water to maintain the quality determined by the needs of different water consumers (population, industry, agriculture, transport, energy, etc.) at the account of preserving the natural hydrochemical balance and diluting of waste water [7, p. 44].

Water quality is a characteristic of its content and properties as a component of aquatic ecosystem and living environment of hydrobionts, as well as from the point of view of its suitability for specific purposes of application [2, p. 15].

In recent years, Ukraine has undergone a number of changes related to both water control and water quality assessment standards for environmental purposes, caused by its course towards the European integration, which got a significant boost upon the signing of the Association Agreement between Ukraine and the EU (2014). In the field of environmental aspects of water relations, most of the changes are based on the provisions of the Water Framework Directive (WFD) of the EU [16]. Normative methods (rules) for assessing water quality are the documents approved in a statutory manner and are based on water quality standards. The application of normative methods is a mandatory requirement

for developing projects for the use of water bodies (economic and drinking, cultural and domestic or recreational water use), drawing-up official certificates on water quality [6, p. 42]. According to the Water Framework Directive of the European Union (WFD), the ecological state of a reservoir is assessed based on three main groups of parameters: hydrobiological, hydrochemical, and hydromorphological. Within the framework of the state environmental monitoring system of Ukraine, the assessment of surface water quality shall be carried out separately under hydrochemical and hydrobiological factors. The main principle to assess quality of water environment, which has been used for a long time in the water protection practice in our country, is to determine the chemical composition, physical properties and bacteriological indexes of water at different points of the water body and to compare results with the normative values of the corresponding indexes [10, p. 128].

The assessment of water quality in Ukraine is based on sanitary and hygienic principles, and its target indexes are the following: maximum permissible concentration of substances (MPC drinking) in rivers which water is used to meet drinking, household, and other needs of the population (State Sanitary Regulations and Standards 2.2.4-171-10). MPC fishing of substances in water bodies which water is used for the needs of the fish industry are used too. In accordance with the norms for drinking water use (MPC drinking) the predominant nature of pollution (50−100% of cases of MPC drinking exceed) is observed for highly mineralized tributaries of the Dnipro (the Vovcha, Samara, Solon rivers, etc.). By biogenic elements for 14 water bodies of the basin, there is an unstable pollution (10−30% of samples), for 9 water bodies − persistent contamination (30−50%), for 18 rivers of the monitored basin − the predominant pollution (>50%). As for the toxic effects, for the vast majority of the water bodies in the Dnipro, there is a single contamination (≤10%) with the exception of phenols − the content above the standards of MPC drinking was observed in 40−100% of the selected samples. Sufficiently similar is the nature of contamination with salt composition indexes for surface waters of the Dnipro in accordance with the requirements of fishery management (MPC fishing). The dominant nature of pollution (60−100% of samples) is typical for the rivers with mineralization of >1,200 mg/dm^3. By biogenic elements, the vast majority of rivers in the studied basin have persistent pollution, and the indexes of toxic effects are the worst. For heavy metals, in 60−100% of the selected samples for virtually all rivers, the exceedance of statutory limits are observed; individual pollution is typical for petroleum products (except for the Ustia river) and synthetic surface-active substance (SAS). The analysis of surface water quality in the Dnipro basin by sanitary-hygienic principle and environmental assessment according to the relevant categories indicates that the biogenic elements, organic substances, and trace elements of toxic effects have the greatest impact on water quality [19, p. 17].

In 2021, in accordance with the intergovernmental agreements, control over the state of surface water was carried out at 558 control points on surface water bodies on transboundary sections of watercourses used to meet the drinking and economic-drinking needs of the population, and on surface water bodies, exposed to a risk of non-achievement of environmental goals. In accordance with the Policy, the State Water Agency monitored the quality of surface water bodies at the indicated points under the physical and chemical (monthly), priority (monthly) and basin-specific (monthly) indexes. In 2021, according to the Order, control over water bodies used to meet drinking and economic-drinking needs of the population, was carried out at 95 points [17, p. 11].

The main causes of surface water pollution are discharge of polluted municipal and industrial wastewater directly into the water bodies and through the municipal sewage system, as well as the entry of pollutants into water bodies in the process of surface runoff from the built-up areas and agricultural land (Tabl. 1) [17, p. 21; 13].

Table 1. **Comparative characteristics of return (waste) water discharges for 2020 and 2021 [17, p. 21]**

Volumes of discharged return water, mln m^3	2020	2021
Total	5159	4684.6
Polluted	518	541,5
Untreated	100	119,3
Insuficient treated	418	422,2
Regulatory treated	1425	1430,2
Regulatory clear without treatment	3216	2712,9
Without category	-	-
Capacity of treatment facilities	5142	5520,8

In the territorial section, the most polluted wastewater is discharged in Dnipro sity (120,3 million m^3, which is equal to 20% of the total volume of discharges in the region), Lviv (119,8 million m^3, which is equal to 80% of the total volume of discharges in the region), Donetsk (90 million m^3, which is equal to 10,1% of the total volume of discharges in the region), Odesa (31,5 million m^3, which is equal to 21,7% of the total volume of discharges in the region), Poltava (24,8 million m^3, which is equal to 34,1% of the total volume of discharges in the region) regions. In 2021, the biggest polluters are the following branches: «Water supply; sewerage, waste management according to the types of economic activity», which discharged 381 million m^3 of polluted wastewater, «Mining Industry and Quarry Development», discharged 100,2 million m^3 of polluted wastewater, «Processing Industry» discharged 16,5 million m^3 of polluted wastewater, and 33,7 million m^3 of polluted wastewater was discharged into the «Agriculture, Forestry and Fisheries» [17, p. 21–22].

The issue of the quality of drinking water was and remains to be extremely relevant and acute for Ukraine. Almost 80 percent of Ukraine's drinking water is provided by the surface sources and 20 percent − by the underground sources. In accordance with the hygienic classification of water bodies under degree of pollution, the majority of river basins can be classified as polluted and highly polluted, which do not meet the requirements of sanitary legislation for the sources of drinking water. At the same time, the existing treatment facilities, technologies for treatment and disinfection of drinking water in some cases are not able to treat and clean it to the level of regulatory indexes. Control over the water quality of surface reservoirs shows that their ecological condition is practically not improving. Improper agricultural practices, municipal, industrial and agricultural pollution of water bodies against the background of negative climate changes led to the disappearance of thousands of small rivers from the map of Ukraine, loss of water content of the main water arteries of Ukraine, and to the degradation and destruction of water and surrounding water ecosystems. Besides, the quality of underground water does not always meet the regulatory requirements of the State Sanitary Regulations and Standards «Hygienic Requirements for Drinking Water intended for Human Consumption» (State Sanitary Regulations and Standards 2.24-171-10), in particular in terms of dry residue, hardness and iron content. It should be noted that during the autumn-winter period in 2020–2021, there was an unfavourable hydrometeorological situation causing spring flooding in the basins of all rivers of Ukraine, which had an extremely unsatisfactory impact on the sources of drinking water supply. Besides, there is deterioration in the quality of drinking water from agricultural centralized water supply systems. Many agricultural water supply systems are not equipped with treatment facilities and disinfection units, and there is no laboratory control of the quality of drinking water. The issue of providing the population with drinking water is acute in certain regions, not only in terms of quality, but also in terms of quantity. Water supply according to schedules and lack of water in supply networks for a long period of time cause bacterial contamination of drinking water [17, p. 56–57].

Another urgent issue of the Dnipro reservoirs cascade and especially for the Lower Dnipro is deterioration of water properties as a result of eutrophication of reservoirs («water blooming»): sharp increase in the biological productivity of blue-green algae (most often caused by the anthropogenic activity), which leads to the biological pollution of reservoirs due to the accumulation biogenic substances in water, namely compounds of phosphorus and nitrogen, causing a sharp decrease in the oxygen content in the water and increase in pH, precipitation of calcium carbonate, magnesium hydroxide, causing adverse implications for the entire ecosystem of a reservoir. After the period of «blooming» in shallow water zones, destruction of dead biomass of blue-green algae causes penetration

of their silt deposits in the water bottom layer: about 17,1 thousand tons of mineral nitrogen and 0,6 thousand tons of mineral phosphorus. Shallow water areas with eutrophic state are formed in water stagnation zones with elevated temperature conditions and occupy up to 40% of the area of the Dnipro reservoirs cascade. The long-term increase in eutrophication of the Dnipro reservoirs cascade contributes to increase in the concentration of biogenic elements, dominance of blue-green algae in the phytoplankton, decrease in transparency, increase in the content of organic matter, significant deterioration of water ecosystem and decrease in the biological productivity of the Dnipro [22, p. 177–178].

Thus, taking all the aforesaid into consideration, the main issues of the current state of the water management complex of Ukraine are the following: acceleration of wearing of the main assets of water management complex contacting with polluted water; additional costs for compensation of water deficiency as a result of its pollution in a certain area; lack of effective stimulation of investment in water-saving or water-free technologies at the water-intensive enterprises; eutrophication of water bodies; chemical, thermal, radiation, bacteriological pollution of water bodies; change in species composition and decrease in biodiversity of aquatic ecosystems; change in the hydrological regime of rivers as a result of their regulation, creation of reservoirs and draining of swamps; morbidity of the population caused by the consumption of contaminated drinking water; decrease in the territories of rest and recreational areas due to the increase in anthropogenic load; control over updating the list of harmful substances-pollutants of water resources; lack of clear strategy for financial support for innovative and technological modernization of water management complex in Ukraine; lack of effective legislative innovation and investment policy in the field of water resources management [12, p. 446–447; 13].

New principles of water consumption and water management must be determined in accordance with the requirements of sustainable development using the experience of highly-developed European countries. The organization of work on the regulation of water resources should be started on the district, region, and settlement level. The public should be involved in this process. The first step on the way to preserve and protect water resources should be the inventory of water sources: rivers, ponds, lakes, canals, reservoirs and streams. At the same time, suitability for its use is of prime importance. Each water source shall have its datasheet containing the most complete and up-to-date data regarding the quantitative and qualitative composition of water. During the inventory, special attention should be paid to the water purity and the territory adjacent to the water source. Clogging and pollution of many water sources is caused by the destructive actions of population and are associated with the lack of controlled garbage dumps [14, p. 85].

In order to improve the ecological, water management and sanitary state of water resources, it is necessary to implement a set of measures aimed at the restoration and protection of water bodies, including measures to stop the discharge of untreated sewage, water exchange, ecologically regenerating discharges from reservoirs, establishment of optimal regimes operation of water management systems, renaturalization of drained floodplains, compliance with the regime of limited management in coastal protective strips, reclamation of disturbed lands.

Conclusions. Pursuant to the hygienic classification of water bodies according to their degree of pollution, the most river basins can be classified as polluted and highly polluted, which do not meet the requirements of sanitary legislation for sources of drinking water. Control over the water quality of surface reservoirs shows that their ecological state is practically not improving. Improper agricultural practices, municipal, industrial and agricultural pollution of water bodies against the background of negative climate changes cause a disappearance of thousands of small rivers from the map of Ukraine, as well as loss of water content of the main water arteries of Ukraine and the degradation and destruction of water and surrounding water ecosystems. The quality of underground water also does not always meet the regulatory requirements of the State Sanitary Standards and Rules «Hygienic Requirements for Drinking Water intended for Human Consumption» (State Sanitary Regulations and Standards 2.24-171-10), in particular in terms of dry residue, hardness and iron content.

The issue of rational water use, conservation and protection of water resources shall fall within a direct competence of local self-government bodies, publicity, who has a reliable objective information, which should be a basis for building-up a water management, concurrently with solution of issues of conservation and protection of water resources, as well as implementation of measures to explain the importance of water resources to students, youth and local population.

ЕКОЛОГІЧНІ ПРОБЛЕМИ ВОДНИХ РЕСУРСІВ УКРАЇНИ ТА ШЛЯХИ ЇХ ВИРІШЕННЯ

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На сучасному етапі одним із наслідків погіршення екологічної ситуації у гідроекосистемах природного та штучного походження є зростаюче антропогенне навантаження, зокрема якісні та кількісні зміни екологічного стану цих екосистем, збіднення їхнього видового складу та зниження біопродуктивності.

Проблема збереження та раціонального використання водних ресурсів стає все гострішою для України та інших країн світу, що обрали шлях сталого розвитку. Забезпечення належного екологічного стану водно-ресурсного потенціалу є актуальним для всіх регіонів країни, в яких водогосподарські та гідроекологічні проблеми поглиблюються природним дефіцитом водних ресурсів, їх нерівномірним розподілом.

Більшість басейнів річок згідно з гігієнічною класифікацією водних об'єктів за ступенем забруднення можна віднести до забруднених та дуже забруднених, які не відповідають вимогам санітарного законодавства на джерела питного водопостачання. Моніторинг якості води поверхневих водойм свідчить про те, що їх екологічний стан практично не покращується. Неналежна сільськогосподарська практика, комунальне, промислове та сільськогосподарське забруднення водних об'єктів на фоні негативних змін клімату призвели до зникнення з карти України тисяч малих річок, втрати водності головних водних артерій України та деградації, знищення водних та навколоводних екосистем. Якість підземних вод також не завжди відповідає нормативним вимогам Державних санітарних норм та правил.

Питання раціонального водокористування, збереження та охорони водних ресурсів повинні входити безпосередньо до компетенції місцевих органів самоврядування, громадськості, що володіють достовірною об'єктивною інформацією, яка має бути основою для побудови водного господарства при одночасному вирішенні проблем збереження та охорони водних ресурсів, а також проводити заходи значущості водних ресурсів серед учнів, молоді та місцевого населення.

Ключові слова: водні ресурси, забруднення, якість води, антропогенне навантаження.

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