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Monitoring the Quality of Drinking Water in Ukraine during Martial Law

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ABSTRACT

The article analyzes the state of drinking water quality monitoring in Ukraine under martial law, taking into account environmental, sanitary-hygienic, regulatory, legal, and administrative factors. It has been established that military actions have caused a significant deterioration in the sanitary and epidemiological situation due to the destruction of critical infrastructure, environmental pollution, and instability of water supply systems. It has been established that control over the quality of drinking water in the current conditions is becoming a sanitary, hygienic, and strategic instrument of state security. It was emphasized that in 2025, the State Service of Ukraine for Food Safety and Consumer Protection carried out a large-scale monitoring program, the results of which revealed violations of sanitary requirements at more than 69% of water supply facilities. It was determined that the systematic deterioration of water quality requires the modernization of purification processes and stricter control over compliance with standards. It was noted that improving the effectiveness of control is only possible with interagency coordination and the implementation of a unified information and analytical monitoring system. A positive trend in reducing the level of microbiological contamination in centralized systems was established, which indicates the effectiveness of the modernization of treatment facilities. It was noted that the situation in the field of decentralized water supply remains critical due to limited technical resources and difficult control conditions. It was emphasized that sanitary-chemical and radiation indicators show a trend towards gradual stabilization. The importance of regulatory and legal regulation is revealed, in particular, in Resolution of the Cabinet of Ministers of Ukraine No. 61 of January 21, 2025, which defines the procedure for state monitoring of water supply. It is emphasized that the implementation of these documents provides the legal basis for the transition to a modern model of water security management. It is determined that bringing the quality of drinking water into line with EU standards remains an important task in the context of Ukraine's European integration. It is emphasized that achieving the target indicators requires a combination of technical, digital, and regulatory solutions aimed at ensuring a stable supply of safe water to the population even in crisis conditions.

KEYWORDS

drinking water quality monitoring, martial law, water supply, regulatory and legal regulation.

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СОЦІАЛЬНИЙ РОЗВИТОК: економіко-правові проблеми

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Моніторинг якості питної води в Україні під час воєнного стану

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СТАТТЯ

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АНОТАЦІЯ

У статті проаналізовано стан моніторингу якості питної води в Україні в умовах воєнного стану з урахуванням екологічних, санітарно-гігієнічних, нормативно-правових і управлінських чинників. Встановлено, що воєнні дії спричинили істотне погіршення санітарно-епідемічної ситуації, зумовлене руйнуванням об'єктів критичної інфраструктури, забрудненням довкілля та нестабільністю систем водопостачання. З'ясовано, що контроль за якістю питної води в сучасних умовах набуває статусу санітарно-гігієнічного та стратегічного інструмента безпеки держави. Наголошено, що у 2025 році Держпродспоживслужбою здійснено масштабну програму моніторингу, результати якої засвідчили порушення санітарних вимог на понад 69 % об'єктів водопостачання. Визначено, що системне погіршення якості води потребує модернізації технологічних процесів очищення та посилення контролю за дотриманням нормативів. Зауважено, що підвищення ефективності контролю можливе лише за умови міжвідомчої координації та впровадження єдиної інформаційно-аналітичної системи моніторингу. Встановлено позитивну динаміку зниження рівня мікробіологічного забруднення у централізованих системах, що свідчить про результативність модернізації очисних споруд. Констатовано, що ситуація у сфері нецентралізованого водопостачання залишається критичною через обмеженість технічних ресурсів і складні умови контролю. Підкреслено, що санітарно-хімічні та радіаційні показники демонструють тенденцію до поступової стабілізації. Розкрито значення нормативно-правового врегулювання, зокрема Постанови Кабінету Міністрів України № 61 від 21 січня 2025 року, яка визначає порядок державного моніторингу водопостачання. Наголошено, що реалізація зазначених документів забезпечує правову основу переходу до сучасної моделі управління водною безпекою. Визначено, що відповідність якості питної води стандартам ЄС залишається важливим завданням у контексті євроінтеграції України. Підкреслено, що досягнення цільових показників потребує поєднання технічних, цифрових і нормативних рішень, спрямованих на забезпечення стабільного постачання безпечної води населенню навіть у кризових умовах.

КЛЮЧОВІ СЛОВА

моніторинг якості питної води, воєнний стан, водопостачання, нормативно-правове регулювання.

1. Introduction

Under martial law in Ukraine, providing the population with high-quality drinking water is one of the defining tasks in the field of environmental and sanitary safety of the state. The destruction of elements of water supply infrastructure, an increase in the likelihood of contamination of water supply sources and the complication of monitoring their condition create critical challenges that require an integrated approach to overcoming them. That is why it is of particular importance to create and operate an effective monitoring system capable of ensuring continuous monitoring of drinking water quality indicators, timely detection of deviations from established norms and making effective management decisions. Therefore, the relevance of this issue is due to the need to guarantee the water security of the population as a component of the national resilience of the state in the face of military threats.

2. Literature Review

The analysis of recent studies and publications shows that the issue of monitoring the quality of drinking water in Ukraine during martial law has become especially relevant due to the increased risks to water resources, water supply systems and public health. In particular, I. Taraimovych, S.Sovhira and N. Dushechkina study the impact of hostilities on the state of aquatic ecosystems and the quality of drinking water [19]. On the other hand, U. Lototska-Dudyk and V. Laboiko analyze the state of water supply to the population of Ukraine, emphasizing the need to improve the system of control over sanitary and hygienic indicators of water under martial law [10]. At the same time, I. Andrusyshyna and O. Lampeka draw attention to the regulatory and legal aspects of ensuring the safety of drinking water, comparing Ukrainian control standards with European approaches and highlighting gaps in the current legislation [2]. Scientific developments under the leadership of O. V. Shestopalova reveal modern aspects of the analysis of water quality indicators, in particular, the use of the latest monitoring methods and the need to adapt them to crisis conditions [17]. At the same time, O. Hafurova, T. Novak and S. Holub focus on the right of citizens to access information on the quality of drinking water, emphasizing that the transparency of environmental data is an important factor in effective water resources management [5].

3. Problem Statement

The article is aimed at analyzing the monitoring of drinking water quality in Ukraine under martial law, taking into account environmental, sanitary, hygienic, regulatory and managerial aspects.

4. Methods and Materials

The study of the state of monitoring the quality of drinking water in Ukraine under martial law is based on a comprehensive scientific and methodological approach that combines general scientific and special methods of analysis. The object of study is the system for monitoring the quality of drinking water as an element of sanitary and epidemiological safety, and the subject is its functioning in the conditions of hostilities. To collect primary data, the method of system analysis was used, which made it possible to assess the relationships between the destruction of infrastructure, pollution of water sources and epidemic risks. The comparative method was used to compare pre- and post-war indicators of water quality. Logical and semantic analysis helped to clarify the concept of “water quality monitoring” as a tool for the strategic security of the state. The study is based on empirical data from 2020–2024, providing practical guidance for the authorities.

5. Results and Discussion

Military operations significantly change the sanitary and epidemiological situation in Ukraine, which leads to an increase in risks for the population’s life support systems. Destruction of critical infrastructure facilities, environmental pollution, disruption of water supply stability and restriction of

access to safe water sources form the prerequisites for systemic changes in the field of public health. strategic security of the state, especially under martial law [1].

Taking into account these challenges, in the first half of 2025, specialists of the State Food and Consumer Service implemented a large-scale program to monitor the safety and quality of drinking water. It covered centralized water supply systems and local sources, which made it possible to get an objective picture of the state of water supply in different regions of the country. The studies were carried out as part of interdepartmental commissions, as well as during scheduled and unscheduled inspections. As a result of this activity, 7715 water supply facilities were examined, of which 5,328 (69%) were found to violate the requirements of sanitary legislation. The largest number of such cases was recorded at non-centralized sources – 3,195 facilities, among which wells, catchments and wells predominate, which remain the main source of water for the rural population [3].

Laboratory observations confirm the presence of abnormalities in chemical and microbiological indicators. Within the framework of centralized water supply, 682,884 laboratory tests were carried out, among which 22,611 samples demonstrated non-compliance with sanitary and chemical standards. In non-centralized sources, more than 800 cases of exceeding the permissible indicators were recorded. These data reflect a trend towards deterioration of water quality, which emphasizes the need to update the technological processes of water intake and strengthen control over compliance with regulatory requirements. Additional evidence of the aggravation of the problem are the results regarding the microbiological state of the water. Of the 163 samples examined, 15 showed microbiological abnormalities, which signal an increased epidemic danger, especially in the frontline and affected regions. In Poltava and Kyiv regions, two cases of nitrate poisoning of children were recorded, and methemoglobinemia was diagnosed – a pathological condition caused by drinking water with an excessive content of nitrates [3]. These examples confirm the need to improve the monitoring system at the level of laboratory tests, as well as within the framework of preventive measures of territorial communities aimed at preventing risks to public health.

It is important to note that increasing the efficiency of water quality control is impossible without a well-established interaction between various public administration structures. Within the framework of the state water security policy, interagency cooperation is being intensified to ensure coordination of actions and a comprehensive response to identified threats. In particular, the State Food and Consumer Service conducted more than 690 thousand laboratory tests of water samples, prepared more than 3000 recommendations to the authorities and organized 255 meetings of commissions on technogenic and environmental safety and emergencies. In addition, the programs of production control of water quality have been checked and agreed, which testifies to the strengthening of the systematization of public administration in this area [3; 9].

In this context, these results demonstrate an increase in the level of coordination between public administration bodies, which makes it possible to ensure coordination of actions in the field of control over the quality of drinking water during martial law. The strengthening of the coordination role of the state is confirmed by the expansion of administrative, technological and analytical management tools aimed at increasing the effectiveness of response to identified threats [20].

In order to clearly reflect the current state of drinking water quality monitoring, it is advisable to refer to statistical data illustrating the compliance of water samples with state sanitary standards (Table 1).

Comparison of indicators in time perspective indicates a gradual decrease in the level of microbiological contamination in centralized systems. In particular, in urban water supply systems, the share of non-standard samples decreased from 4.7% in 2020 to 2.3% in 2024, and in rural water supply systems, from 13.8% to 10.2%. Such results indicate an increase in the efficiency of water disinfection and modernization of treatment facilities, especially in communities supported by state and international programs.

At the same time, the situation in the field of non-centralized water supply remains problematic. More than 25% of samples taken in 2024 did not meet sanitary standards for microbiological indicators. The main reasons for this are the lack of constant monitoring, the use of individual wells and wells, as well as difficult conditions for ensuring sanitary requirements in areas close to hostilities. Improving monitoring in this sector involves the introduction of bioindication and remote-control systems for water parameters, which will allow for the rapid detection of potential deviations.

Table 1. Drinking water that meets state sanitary norms and rules by types of indicators, percentages of non-standard samples

Indicators	2020	2021	2022	2023	2024
Drinking water that meets state sanitary norms and rules by types of indicators, percentages of non-standard samples:					
For microbiological indicators:					
City water pipes	4.7	5.1	2.1	2.7	2.3
Rural water pipes	13.8	11.9	11.4	11.0	10.2
Non-centralized water supply	22.6	22.9	28.3	25.1	25.4
For sanitary-chemical indicators:					
City water pipes	16.8	18.2	12.1	11.3	11.7
Rural water pipes	26.9	28.9	25.4	28.9	27.7
Non-centralized water supply	32.6	33.5	39.9	35.0	32.9
For radiation indicators:					
City water pipes	0.8	2.0	0.5	0.6	1.0
Rural water pipes	6.5	2.8	12.2	2.9	1.7
Non-centralized water supply	8.8	7.1	4.9	6.3	2.7
Drinking water that meets state sanitary norms and rules by types of indicators, percentages of non-standard samples:					
For microbiological indicators:					
By type of water supply					
Rural water pipes	4.7	5.1	2.1	2.7	2.3
City water pipes	13.8	11.9	11.4	11.0	10.2
By type of water supply source					
Centralized	7.6	7.5	3.5	4.3	3.8
Non-centralized	22.6	22.9	28.3	25.1	25.4
For sanitary-chemical indicators:					
By type of water supply					
Rural water pipes	16.8	18.2	12.1	11.3	11.7
City water pipes	26.9	28.9	25.4	28.9	27.7
By type of water supply source					
Centralized	21.7	21.2	14.3	14.3	15.0
Non-centralized	32.6	33.5	39.9	35.0	32.9
For radiation indicators:					
By type of water supply					
Rural water pipes	0.8	2.0	0.5	0.6	1.0
City water pipes	6.5	2.8	12.2	2.9	1.7
By type of water supply source					
Centralized	4.7	1.9	1.2	0.8	1.1
non-centralized	8.8	7.1	4.9	6.3	2.7

Note: Target values of the indicator for 2030: for microbiological indicators: urban water pipelines – 1.5, rural water pipelines – 2.5, non-centralized water supply – 15.5; for sanitary-chemical indicators: urban water pipelines – 6.5, rural water pipelines – 14.5, non-centralized water supply – 29.5; for radiation indicators: urban water pipelines – 0.5, rural water pipelines – 1.5, non-centralized water supply – 3

Source: Compiled based on [18].

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Sanitary-chemical indicators show a certain stability with a tendency to gradually improve. In urban water supply systems, the share of non-standard samples decreased from 16.8% in 2020 to 11.7% in 2024, while in rural water supply systems, from 26.9% to 27.7%, which indicates the preservation of a relatively high level of chemical load. The worst results are observed in non-centralized systems, where 32.9% of non-standard samples were recorded in 2024. This is due to the low quality of sources, a lack of reagents for treatment, and limited technical capabilities at the local level [7].

Considering the state of radiation indicators, it is worth noting that they demonstrate the most favorable trend. In urban water supply systems, the level of non-standard samples decreased to 1.0%, in rural water supply systems, to 1.7%, and in non-centralized water supply systems, to 2.7% in 2024. Positive changes are explained by the stable functioning of regional control laboratories, preventive measures and proper compliance with the requirements to prevent radionuclides from entering water supply sources.

The correlation of the results obtained with the targets for 2030 shows that urban systems are already approaching the established standards (1.5% for microbiological, 6.5% for sanitary-chemical, and 0.5% for radiation indicators). For rural areas, there is a moderate lag, while in the non-centralized sector, it is necessary to achieve a reduction in the deviation rate of at least 10–15% in the coming years. This requires comprehensive technical, organizational and financial solutions aimed at improving the efficiency of the water control system [8].

Summing up the results, it is worth emphasizing a clear relationship between the level of organization of water resources management and the quality of drinking water. Centralized systems demonstrate stable parameters – 3.8% of non-standard samples for microbiological indicators in 2024, compared to 25.4% for non-centralized ones. This indicates the important role of institutional management in ensuring water security and forming a sustainable infrastructure for water quality control under martial law. In this context, it is advisable to emphasize the need to integrate the state monitoring system with local laboratories and digital platforms, which will ensure the continuity of control even in areas with limited access. Such an improvement will contribute to the timely detection of deviations, as well as create a database for predicting potential risks, which is especially important in wartime [6].

At the same time, it should be borne in mind that during the war, the structure of water supply sources has changed significantly: some centralized systems were damaged or destroyed, which led to an increase in the share of non-centralized consumption. This increases the importance of introducing simplified field-testing methods and mobile laboratories that will provide monitoring even in temporarily uncontrolled areas.

Summing up the above results, it can be stated that the drinking water quality monitoring system in Ukraine demonstrates gradual stabilization, but remains uneven by type of sources. This indicates the need to strengthen controls, especially in rural and non-centralized water supply systems, where the level of non-standard samples remains the highest. Achieving the targets until 2030 requires concerted actions of state institutions, local governments and business entities in the field of water supply. To do this, it is important to ensure a combination of infrastructure investments, digital control technologies, information and education programs for the population and strengthening regulatory responsibility for compliance with water quality standards [11].

In the context of the fulfillment of international obligations, this issue becomes even more important because Ukraine, within the framework of the European integration process, must bring its legislation in line with the European Union standards on the safety of water intended for human consumption. In this regard, Directive (EU) 2020/2184 [4] defines the basic standards and principles that states must adhere to to guarantee high-quality drinking water. Its provisions are aimed at forming a water resources management system based on risk assessment and providing for control at all stages – from the source of water intake to the end consumer.

Under martial law, compliance with such requirements becomes critical, as the risks of damage to water infrastructure, surface water pollution and limited laboratory monitoring capabilities increase. The situation is complicated by the fact that Ukraine's water supply has historically been focused mainly on the use of surface sources. This provides a significant potential for water resources, but at the same time increases the vulnerability of the system to environmental, man-made and military threats. Therefore, there is now a need to update national standards for water quality control, taking into account wartime conditions and practices of the European Union.

According to the provisions of the Directive [4], ensuring the safety of drinking water requires compliance with certain bacteriological, chemical and microbiological parameters, as well as the introduction of effective risk management at all stages of the water supply system. This involves identifying potential threats, assessing their level of danger, establishing control points, and implementing preventive measures to minimize negative consequences. In this process, a special place is occupied by the control of materials in contact with water, since their unsatisfactory technical condition can become a source of secondary contamination even if standard cleaning procedures are followed.

In this regard, the need to create a holistic control system that combines laboratory, analytical and management components is increasing. This is the basis of the modern model of state monitoring of drinking water quality, which is gradually being formed in Ukraine. An important stage of its development was the adoption of the Resolution of the Cabinet of Ministers of Ukraine dated January 21, 2025, No. 61 "On Approval of the Procedure for State Monitoring in the Fields of Drinking Water and Drinking Water Supply, Sanitation" [16]. The document outlines the main tasks of the monitoring system – from assessing the state of water bodies in places of water intake by chemical, bacteriological, microbiological and radiological indicators to monitoring the technical condition of centralized water supply systems and wastewater reuse processes.

Such a regulatory framework creates preconditions for the transition to a more structured model of water security management. The Resolution forms a legal framework that is consistent with European requirements and contributes to the introduction of modern information and analytical monitoring mechanisms. Its implementation provides for increasing the efficiency of response to detected deviations and ensuring constant updating of data on the quality of drinking water in different regions of the country.

As part of the practical implementation of the requirements of these regulatory documents, tap drinking water, as well as water from bottling points, must comply with state sanitary standards and rules that guarantee epidemic and radiation safety. State sanitary norms and rules "Hygienic Requirements for Drinking Water Intended for Human Consumption", approved by the Order of the Ministry of Health of Ukraine dated May 12, 2010 No. 400 [15], determine the maximum permissible concentrations of chemical, microbiological, parasitological and radiological indicators. In order to comply with these requirements, water is disinfected and residual concentrations of reagents used during purification are controlled.

Given the modern challenges of the war period, ensuring that drinking water meets sanitary standards is of particular importance. Damage to infrastructure, limited access to laboratory facilities and disruption of technological processes can cause a significant deterioration in water quality. This increases the risk of pathogenic microorganisms, heavy metals, radionuclides and other toxic compounds entering the water supply network. Therefore, systematic control of compliance with sanitary standards is considered a component of the state security policy aimed at preventing threats to public health.

In addition, increasing the efficiency of water quality monitoring under martial law provides for the expansion of methodological monitoring tools, which should include the technical and organizational dimensions of control. In this context, it is important to ensure the improvement of laboratory diagnostics, the increase in the accuracy of the determination of residual reagents and the introduction of adaptive evaluation protocols. Such protocols should take into account the variability of the state of water supply sources, seasonal fluctuations in the level of pollution and the specifics of individual territories. The use of these approaches contributes to obtaining reliable results and ensures a stable supply of high-quality drinking water to the population, even in the case of resource shortage and increased risks.

Further attention should be focused on ensuring the balance of disinfection processes, since the sanitary safety of the water supply directly depends on this. Effective disinfection requires constant monitoring of the ratio of the concentration of reagents and the level of their residual effect. Insufficient dosage creates prerequisites for microbial contamination, while excess reagents can cause chemical overload of water. Therefore, control of residual concentrations of disinfectants is a necessary component of the monitoring system, which guarantees environmental safety and prevents secondary pollution.

Taking into account the existing risks, the development of a drinking water quality control system should be based on the digitalization of monitoring and automation of reporting detected deviations. The combination of remote data collection technologies, analytical platforms and forecasting modules will allow for rapid response to violations, improve decision-making mechanisms and form a sustainable model of water security that can function even in crisis conditions.

At the same time, strengthening the technical component of control requires a regulatory framework that will determine the permissible limits for the content of hazardous substances in drinking water. In this aspect, an important document is the State Sanitary Norms and Rules "Safety Indicators and Certain Indicators of Drinking Water Quality under Martial Law and Other Emergencies", approved by the Order of the Ministry of Health of Ukraine dated May 25, 2022, No. 564/37900 [14]. The document specifies the list of sanitary and toxicological parameters by which the safety of water for consumption is determined, which makes it possible to provide uniform standards for assessing its quality in conditions of increased risks.

The parameters determined by the standards [14] cover a wide range of inorganic and organic compounds that can enter the water due to natural processes or man-made influence. Inorganic components include aluminum, boron, cadmium, arsenic, sodium, nickel, nitrates, nitrites, mercury, lead, selenium, antimony, fluorides, chlorates, chlorites, chromium and cyanides, the concentrations of which must remain within the established standards. Compliance with these indicators is an important condition for preventing toxic effects on the human body and maintaining the stability of the water supply system.

In addition to inorganic elements, within the monitoring system, considerable attention is paid to organic components that pose a potential danger due to their ability to accumulate in the body and cause long-term health effects. In this context, benzo(a)pyrene, benzene, 1,2-dichloroethane, pesticides, trihalomethanes, trichloroethylene and tetrachloroethylene are considered especially dangerous. For each of these compounds, maximum permissible concentrations have been established, the excess of which signals a threat to human health and requires an immediate response from regulatory authorities.

Considering individual categories of pollutants, the regulation of the content of pesticides in water is especially indicative. The regulatory framework provides not only for specific values for individual substances, but also for limiting their total content. This makes it possible to assess the combined impact of several components, which is extremely important for areas with developed agricultural production. It is in such regions that the risk of agrochemical residues entering water supply sources remains elevated, so the control system must ensure constant monitoring of their fluctuations in the aquatic environment.

Under martial law, the problem of controlling the content of hazardous substances is complicated by objective circumstances, in particular, limited access to reagents, technical means and laboratory equipment. In this regard, the current regulations allow for temporary deviations from standard requirements, for example, regarding concentrations of trihalomethanes, when it is impossible to ensure their complete removal. This regulatory flexibility allows maintaining the minimum required safety standards even in unstable infrastructure conditions, while creating preconditions for a gradual return to normal controls.

Of additional importance is the organization of systemic monitoring, which should cover chemical, microbiological and toxicological indicators. The integration of these areas with the use of geographic information technologies contributes to the timely identification of sources of pollution, the determination of ways of their spread and the increase in the efficiency of managerial decisions. Due to this complexity, water supply systems are more resistant to environmental, man-made and military threats, which is especially important for the affected areas.

It is worth noting that in 2024, important government decisions were made aimed at strengthening the water policy of the state, among which an important place is occupied by the State Target Program for Integrated Water Supply of Territories Affected by Hostilities for the Period up to 2030 [13]. Its implementation is aimed at stabilizing water supply systems and ensuring the proper quality of drinking water during martial law and during the recovery period. Particular attention is paid to the modernization of water intake facilities, in particular those based on underground sources, as well as the introduction of the latest technologies for water purification and disinfection, which ensure compliance with sanitary and hygienic standards.

A separate task of the Program is to create a system for continuous monitoring of water quality using digital tools for data collection and analysis. The implementation of this direction is designed to increase the efficiency of response to changes in the state of water resources and to timely identify potential deviations from the established standards. The use of digital technologies makes it possible to ensure continuity of control even in crisis conditions, which is especially important during hostilities, when the risk of contamination of drinking water sources due to damage to infrastructure or restrictions on laboratory tests increases. The use of remote monitoring systems creates the basis for the formation of a model of preventive water resources management, focused on reducing environmental risks and increasing the level of public safety.

At the same time, the improvement of technological control mechanisms requires proper legal support, which determines the procedure for access to information on the state of water supply. According to Article 9 of the Law of Ukraine "On Drinking Water and Drinking Water Supply" dated 10.01.2002, No. 2918-III [12], every consumer has the right guaranteed by the state to receive reliable data on the quality of drinking water. To exercise this right, the central executive body responsible for housing and communal policy annually forms and publishes the National Report on the quality of drinking water and the state of drinking water supply in Ukraine. This contributes to the formation of an open system of environmental management, within the framework of which citizens can exercise public control over compliance with safety standards.

An important component of this mechanism is the activities of local self-government bodies, which are obliged to timely inform citizens through the media about cases of non-compliance of water indicators with established standards. Ensuring the publicity of such data increases the transparency of the monitoring system, as well as forms public confidence in the actions of state and municipal structures in the field of water supply. The openness of the information space creates favorable conditions for the development of environmentally responsible consumer behavior, which in turn strengthens the principles of sustainable water resources management even in emergency circumstances of martial law.

6. Conclusions

The summarized results of the study show that the system for monitoring the quality of drinking water in Ukraine under martial law is at the stage of gradual stabilization, but is still characterized by significant unevenness between centralized and non-centralized water supply systems. One of the determining factors for the effectiveness of control is the level of institutional organization of water resources management, the quality of interagency coordination and the degree of technological support for laboratory analysis. A feature of the current situation is that centralized systems demonstrate positive dynamics in reducing microbiological and sanitary-chemical pollution, while non-centralized sources remain problematic due to insufficient control, deterioration of infrastructure and limited response capabilities in frontline regions.

An important direction of state policy in this area is the implementation of regulatory legal acts, in particular, the Resolution of the Cabinet of Ministers of Ukraine No. 61 and updated state sanitary rules, which create the basis for a gradual transition to European standards for water security management. In this context, the integration of state, regional and local levels of control, as well as the use of digital monitoring technologies and automated surveillance systems, without which the achievement of water quality targets by 2030 is unlikely, is of particular importance.

Further effectiveness of the monitoring system should be based on the principles of risk-based management, modernization of the laboratory base, control of residual reagents and strengthening the regulatory responsibility of water supply entities. In view of the above, the systematic renewal of mechanisms for controlling the quality of drinking water is an important prerequisite for the formation of a sustainable model of water security of the state, capable of functioning in the face of military challenges and meeting European environmental standards.

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