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**QUALITY ASSESSMENT OF WATER AND ENSURING CONSUMER SAFETY  
IN WATER SUPPLY AND DRAINAGE SYSTEMS: ANALYSIS OF PARAMETERS  
AND DEVELOPMENT OF IMPROVEMENT STRATEGIES**

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*The problem statement* involves assessing water quality and ensuring consumer safety in water supply and wastewater systems. This includes analyzing water parameters and developing strategies to improve water quality and ensure consumer safety.

*Research Findings.* Water is a fundamental resource for sustaining life, and ensuring its quality is paramount for both human health and ecosystem preservation. Through extensive research and development efforts, safety measures have been devised to uphold stable and safe water quality for consumers. This paper delves into the results of such research and the implementation of safety measures, highlighting their role in mitigating health risks and safeguarding ecosystems.

Water supply and drainage systems play a crucial role in providing the population with water of appropriate quality. The quality of water and its safety for consumption are top priorities that require systematic analysis and improvement of system parameters.

The first stage of the research involved analyzing the key parameters of water quality, including physical, chemical, and bacteriological indicators. The investigation of pollutant concentrations and determination of drinking water levels formed the basis for understanding the state of water resources [1].

To ensure the safety of water consumption, requirements for quality were defined by both national and international organizations. The analysis of compliance with these parameters became the foundation for assessing the level of risk and the need for the development of improvement strategies.

Research on water pollution risks revealed potential hazards to consumer health. Safety measures were developed to prevent contamination and ensure the sustainable quality of water.

Detailed analysis of pollution sources that could potentially affect water quality in water supply and drainage systems was conducted. This included industrial emissions, agricultural sources of pollution, and other potential sources such as infrastructure breakdowns.

Assessment of concentrations of chemical substances and microbiological indicators in water was carried out. Determination of health-threatening characteristics, such as the presence of toxins, chemicals, or pathogenic bacteria, was a crucial aspect [2].

The possible paths of pollution spread within the water supply system were analyzed, including water intakes, pipeline networks, pump stations, and consumers. Identifying vulnerable points where risks were the highest was essential.

The implementation of a monitoring system that allows for timely detection and tracking of changes in water parameters was emphasized. This involved the use of modern sensors and IoT technologies for real-time data acquisition.

Identification and implementation of technologies and engineering solutions to prevent water pollution, such as barrier systems, filters, and other technical innovations, were crucial.

Alignment of obtained results with established national and international water quality standards was conducted. Determining whether current water quality meets existing standards and identifying the need for improvement were essential aspects.

The development and implementation of pollution prevention strategies, including planning and evacuation measures, emergency warning systems, and educating the population about safety rules, were emphasized [3].

The results of the research and the development of safety measures allow for the provision of stable and safe water quality for consumers, reducing potential health risks and averting possible negative consequences for ecosystems.

Considering the obtained results, strategies for improving water quality were developed. These strategies include the implementation of new water purification technologies, enhancement of monitoring and management systems, as well as regular updates and maintenance of water supply infrastructure.

Regulatory frameworks play a pivotal role in setting standards for water quality and enforcing compliance with these standards. Agencies such as the Environmental Protection Agency (EPA) in the United States and the European Environment Agency (EEA) in Europe have established guidelines and regulations governing the permissible levels of contaminants in drinking water. These regulations serve as benchmarks for water treatment facilities and other stakeholders involved in water management.

**Conclusion.** Research on water quality and ensuring consumer safety in water supply and drainage systems has become an integral part of ensuring the sustainable and efficient functioning of these systems. The obtained results serve as a basis for further actions aimed at improving water quality and ensuring its safety for consumers [1–3].

The research conducted in the domain of water quality encompasses various aspects, including the identification of contaminants, understanding their sources, and evaluating their impacts on human health and the environment. Studies have identified a plethora of contaminants present in water sources, ranging from pathogens and heavy metals to chemical pollutants and pharmaceutical residues. Furthermore, research has elucidated the pathways through which these contaminants enter water bodies, such as industrial discharge, agricultural runoff, and improper waste disposal.

## References

1. Bigas H. Water Security and the Global Water Agenda: a UN-water Analytical Brief United Nations University, Institute for Water, E. and H. United Nations University – Institute for Water, *Environment and Health*, Hamilton, Ont (2013).
2. Yeboah S.I.I.K., Antwi-Agyei P., Domfeh M.K. Drinking water quality and health risk assessment of intake and point-of-use water sources in Tano North Municipality, Ghana J. Water, Sanit. Hyg. Dev., 12 (2022), pp. 157-167, [10.2166/washdev.2022.152](https://doi.org/10.2166/washdev.2022.152)
3. World Health Organization WaterAid WASHmatters – the Water Gap – the State of the World's Water (2018) [WWW Document]. URL: <https://washmatters.wateraid.org/publications/the-water-gap-state-of-the-worlds-water>