

## CHALLENGES IN BIOLOGICAL DRINKING WATER TREATMENT (ПРОБЛЕМИ БІОЛОГІЧНОГО ОЧИЩЕННЯ ПИТНОЇ ВОДИ)

*Дзюба С. І. – здобувачка вищої освіти групи БТ 2/1*

*Науковий керівник: Саламатіна О.О., доцент кафедри іноземних мов МНАУ*

*У публікації порушено питання проблеми біологічного очищення питної води. Проблеми природного та антропогенного забруднення води. Обговорення систем і методів очищення питної води.*

**Ключові слова:** *питна вода, очистка води, вода, здоров'я.*

*The publication raises the issue of biological treatment of drinking water. Problems of natural and anthropogenic water pollution. Discussion of systems and methods of drinking water treatment.*

**Key words:** *drinking water, water treatment, water, health.*

Drinking water remains inaccessible to 1.1 million people globally. Safe and readily available drinking water is important for public health. Drinking water can be used for many purposes including cooking, drinking, washing, personal hygiene, irrigation, recreational and industrial use. Improved water supply, sanitation and better management of water resources can boost countries' economic growth and can contribute greatly to poverty reduction. The sources of drinking water in developing countries can range from surface water, groundwater, spring water, saline water, bottled water and harvested rainwater.

Water quality issues due to anthropogenic and natural pollution can affect the amount of water available for use. Both surface and groundwater can be contaminated by both anthropogenic and natural contaminations. Microbiology and chemical contaminants in drinking water can cause acute and chronic health effects. Contamination can also affect the aesthetic properties of water systems.

The contaminants include:

- Pathogens disease-causing organisms that include bacteria, amoebas, viruses and eggs and larvae of parasitic worms.
- Harmful chemicals from human activities and industrial wastes such as pesticides and fertilisers.
- Chemicals and minerals from the natural environment, such as arsenic, common salts and fluorides.
- Some non-harmful contaminants may influence the taste, smell, colour and turbidity of water and make it unacceptable to the consumer; its examples include zinc, iron, particulate matter and humic material.

The physiochemical properties of contaminants of water that can impact its toxicology in water include size, density compared to water, charge, solubility, volatility, polarity, hydrophobic, hydrophilic, boiling point, chemical reactivity and biodegradability.

Challenges to the drinking water supply in developing countries include the natural scarcity of water source in certain areas. Floods can create more siltation problems in river systems as well as the contamination of rivers and large dams giving rise to source-receptor issues. Climate change and water scarcity are also some of the concerns.

To maintain clean drinking water, an integrated approach is needed in developing countries. Proper management of solid waste and waste water can enhance the quality of our drinking waters.

At different times of the year, the water source availability varies for examples rivers are used during the wet season and bore well water sources are used during the dry season.

Human health largely depends on the quality of the water we consume. According to the WHO, Ukraine ranks 95th among 122 countries in terms of drinking water quality and, according to UNESCO, 146th in terms of life expectancy in the world. It is no surprise that in Ukraine, unlike in

developed countries, life expectancy is to some extent related to the quality of water consumed by the population and is a significant factor affecting the health of the entire population.

Due to the deterioration of the environmental situation, it is becoming increasingly difficult for municipal wastewater treatment plants to ensure high quality drinking water in accordance with the indicators stipulated by sanitary rules and regulations, including pathogenic microorganisms, viruses, heavy metals and other toxic compounds.

To ensure the quality of drinking water, it is necessary to continuously improve drinking water treatment methods and ensure periodic measurement and assessment of its quality.

Disinfection as a method of water treatment. Water disinfection is carried out to destroy pathogenic bacteria and viruses. Such disinfection is carried out by adding chlorine, ozone or potassium permanganate to the water. Chlorination is one of the most common methods of water disinfection both in Ukraine and abroad. It is carried out by adding gaseous chlorine or substances containing active chlorine to water, such as bleach, chlorine dioxides, etc.

Chlorination of drinking water is a process in which water is exposed to chlorine. This process purifies the water, but also produces a number of by-products that are very harmful to humans.

In addition to the main function of disinfection, chlorine serves other purposes due to its unique oxidizing properties: controlling taste and odor, preventing algae growth, keeping filters clean, removing iron and manganese, destroying hydrogen sulfide, discoloration, etc. In this sense, none of the alternative means to chlorine can be compared with it in terms of versatility and ease of use.

Chlorination has a wide range of antimicrobial effects, is quite economical, and is simple in technological design.

One of the most effective and efficient measures is the method of water disinfection using ultraviolet irradiation. Scientists from different countries have recently been paying attention to such water disinfection, improving the technology and process equipment.

This treatment ensures the complete destruction of bacteria in the treated water.

Thus, the main goal of modern drinking water treatment technologies is to produce biologically stable water with very low levels of organic compounds and ammonia to prevent problems associated with an increase in the number of microorganisms in the water supply network.

#### **Literature:**

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