

## WATER RESOURCES PROTECTION AND CLEANING TECHNOLOGIES

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**Abstract:** This article analyzes the main principles, modern methods and innovative solutions related to water resources protection and water treatment technologies. The issues of protecting water resources from pollution, improving the quality of drinking water, and ensuring environmental stability are highlighted. The article also discusses the effectiveness of chemical and physical cleaning methods.

**Key words:** water resources, urbanization, waste, nanofiltration, reagent, bacteria

### INTRODUCTION

Water resources are one of the most important natural resources for mankind. As a result of economic, industrial and agricultural activities, water resources are polluted and environmental problems arise. Therefore, technologies for protecting and purifying water resources are of global importance and are necessary for healthy life and sustainable development. In the years of our country's independence, the system of land and water resources use was radically reformed, the appropriate legal basis for purposeful and rational use of water resources and improvement of irrigated land reclamation conditions was created and put into practice.

### LITERATURE ANALYSIS AND METHODOLOGY

95% of the water consumed in Uzbekistan comes from rivers and streams. In order to deliver water to consumers in a timely manner and in the required amount, many channels and ditches, permanent pumping stations have been built. The agricultural land of our republic is based on irrigated agriculture. There are 75 large canals with a total water consumption of more than 2500 cubic meters per second, 53 water and 32.4 thousand kilometers of inter-farm canals, 4889 pumping units, 1479 permanent pumping stations, 10180 vertical drains and water exit wells, 30.4 thousand kilometers of inter-farm collectors in the water industry.

The year-by-year increase in the world's population is creating new, never-before-seen problems. Another such urgent problem is drinking water. The acute shortage and pollution of water resources, including surface and underground water, is a big concern for Uzbekistan. Rivers, canals, reservoirs and even underground water in our region are affected by human activity. The depletion of water resources and the worsening of the quality of water in the basins in our region since the 1960s have been negatively affected by the large-scale development of new lands, the development of industrial and livestock complexes, the construction of collector ditch systems, and the increase in urbanization.

All kinds of harmful substances accumulate in water, changing the physical properties and chemical composition of water. The amount of organic and mineral additives increases. Toxic compounds appear. Oxygen in the water is reduced. The types and amount of bacteria change, and bacteria that spread infectious diseases appear. Water is again polluted with waste water, oil,

radioactive substances, etc. from industrial and municipal farms. Water resources are polluted from various sources, including:

1. Industrial waste: metal, chemical and oil products.
2. Agricultural waste: pesticides, fertilizers, organic matter.
3. City and household waste: sewage, plastic waste, detergents.
4. Atmospheric pollution: harmful substances that fall into water through rain and snow.

The clean water used in the industry of developed countries is several times more than the water used in communal households. Waste water is considered unsuitable for human drinking water supply. Because water saturated with toxic substances has a negative effect on human health. It causes various infectious diseases. Later, doctors discovered that the germs of poliomyelitis, yellow fever and tuberculosis spread through water. In the chemical industry, synthetically produced paint, explosives, and various medicines, rubber, artificial fiber, etc., require a large amount of clean water. As a result, harmful substances that are not found in nature can be found in the dirty water from such production sources. Water is also used in mining coal. Depending on the composition of the rocks between the coal seams, the water is saturated with different substances. Sometimes mines are filled with groundwater. As a result, it greatly damages the work process. In such cases, the dirty water from the mines is discharged into different water bodies with the help of powerful pumps. Surface waters are being polluted due to ferrous and non-ferrous metallurgy, chemistry, paper, oil refining, mining waste, and agriculture.

Extraction of oil from the oil industry is one of the main causes of transportation and processing and pollution of water bodies. Regrettable incidents occur when extracting oil from underwater. For example, the first oil well in Santo Barbara lost 900 tons of oil in 10 days. Several oil tankers crashed and spilled thousands of tons of oil into the ocean. As a result, several thousand tons of water surface is covered with a thin film of oil. One liter of oil pollutes 200 liters of water. Or one drop of oil covers the surface of 1-1.5 square meters of water with a thin film. As a result, the lives of fish and other sea animals, water birds are endangered. Hot waste water discharged around the industrial facilities has a harmful effect on the life of fauna and flora in this place.

## DISCUSSION AND RESULT

In the course of the development of human society, the composition of natural water has changed and is rapidly changing. Therefore, it is necessary to further improve the engineering methods of water protection and wastewater treatment. Water can be purified again by solar radiation and fresh water being introduced into dirty water. Various bacteria, fungi and algae are active agents in water purification. But if the water is excessively saturated with various impurities, then it is necessary to use different technological methods to clean it. Recently, equipment for cleaning waste water is being built in workshops and factories where water-consuming industries are located. Several basic technologies are used to protect and purify water from pollution:

Filtration: water purification through sand, slate or special filters.

Sedimentation: removal of heavy particles from water.

Aeration: introducing oxygen into the water and oxidizing waste materials.

Nanofiltration and membrane technologies: high-precision separation of unwanted ions and microbes from water.

Artificial wetlands: biological treatment of water using natural ecosystems.

Electrochemical and ultraviolet technologies: rapid purification of water from microorganisms.

Different reagents are used in the chemical treatment of dirty water. Reagents react with some compounds and neutralize others. Polluted waters can be cleaned biologically in artificial conditions, besides, cleaning in microbiological and biochemical processes is very important. In nature, river channels and flat areas are used for biological water purification. Because when dirty water passes through the soil, harmful substances remain in the soil layer. Small water reservoirs are also used for soil water treatment. In this case, several thousand water bodies should be connected to each other. Because the stagnant dirty water becomes dusty when it passes from one basin to another. Special devices will be built on the sites for the biological treatment of polluted water under artificial conditions. On large and medium-sized materials, a biological film with aerobic microorganisms is covered with different thicknesses, and dirty water is passed through these materials. As a result, the biofilter removes various harmful substances from the water and releases the water cleanly. In the mechanical method of wastewater treatment, undissolved mineral and organic compounds in the wastewater are separated. In the mechanical treatment of industrial wastewater, one of the physico-chemical, chemical, biological and thermal methods is used to achieve a high level of water purification.

Purification by mechanical methods provides up to 90-95% separation of suspended substances in wastewater and 20-25% reduction of organic pollution (total KBBE). In wastewater treatment, processes such as filtration, filtering, clarification, filtration and centrifugation are used using grids of different diameters. The volume size of water treatment facilities, their type mainly depends on the amount, composition and properties of wastewater, as well as the processes of further treatment of water. Mesh drum filters or microfilters, as well as high-pressure filters, polyurethane foam or foam plastic floating filters are used for complete filtration of wastewater. In this case, wastewater is cleaned without using chemicals. The choice of the method of cleaning wastewater from suspended particles is carried out taking into account the kinetics of the process. The size of suspended particles in industrial wastewater can be in very large limits (particle diameter from  $5 \times 10^{-9}$  to  $5 \times 10^{-4}$  m). For particles up to 10  $\mu\text{m}$  in size, the final settling speed is less than 10'2 cm/s. If the particles are large (diameter 30-50  $\mu\text{m}$  and larger), then according to Stokes' law they settle (voluntary settling - under the influence of gravitational forces) or float. It should be noted that if the concentration of impurities in water is high, it will settle, if the concentration is low, it will be filtered.

Along with water purification, it is important to protect its natural resources:

- Reduction and processing of industrial waste;
- Use of organic and ecological fertilizers in agriculture;
- Systematic collection and processing of waste in urban and rural areas;

- Strengthen environmental laws and policies.

### **CONCLUSION**

In conclusion, water resources protection and treatment technologies are essential for environmental sustainability and human health. The combined use of mechanical, chemical, biological and innovative methods improves water quality and prevents pollution. In the future, the development of water saving and effective cleaning technologies will become a global problem.

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