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Problem of polluted drinking water and how to prevent it ?

Water is a very pure natural resource and comes from within the Earth with a state that is still clean. Contaminated water is water that is no longer pure because it is mixed with various kinds of processed waste or waste materials, as well as other chemicals. Throughout history, humanity dumped polluted sewage into open reservoirs e.g, seas, rivers, lakes. But it should be noted that until the beginning of the twentieth century, the volume of pollution was relatively small, so the fight against water pollution was not required since nature managed to cope with it on its own. And only after the rapid development of cities, infrastructure, an increase in the number of industrial production (respectively, and waste), the extraction of minerals (leading oil), water pollution began to become a universal disaster.

At the very beginning of this disaster, people paid little attention to pollution control. And only after the largest rivers of the world ceased to cope with self-purification, people threw away the illusions that the water resources of our planet are inexhaustible. Moreover, today, there is already pollution of not only open water bodies but also groundwater. Consequently, it is necessary to spend a lot of effort to combat it by creating water treatment and water treatment systems (Abimbola3).

The leading cause of water pollution is the "stormy" human activity, namely, waste from industrial enterprises, which are often discharged directly into rivers, moreover, without any treatment, as well as wastewater from urban housing and communal services. Agriculture also makes a significant "contribution" to pollution: as a result of the use of fertilizers and various chemicals to control agricultural pests, they are washed off with water and fall not only into lakes and rivers but also seep through the soil and into underground sources. In groundwater, the self-cleaning ability is not too high (Harrison17). Thus, the fight against water pollution is to prohibit the discharge of untreated wastewater into open water bodies, to promote natural self-purification processes, to create clean water protection zones, etc.

Back in the fifties of the last century, lakes and rivers could independently cope with pollution, thanks to the ability to self-clean. But today, self-cleaning is already becoming impossible; therefore, much attention is paid to the fight against contamination of drinking water in the central water supply system. It is decontaminated, more effective, and advanced methods of water treatment are designed and implemented. There is a fight against violators who dump untreated waste into lakes and rivers. It mainly concerns the industrial enterprises of the petrochemical, mining, and pulp and paper industries. Well and, of course, housing and communal services.

How to prevent water pollution?

The system of sequential treatment of wastewater, which is being introduced today at many modern enterprises, consists of two main stages. Primary machining, during which floating, and rapidly precipitating substances are removed from the water. Secondary biological treatment, during which the fight against biologically degradable biologically active materials. During this treatment, coagulation occurs (that is, the deposition of colloidal substances and suspensions, phosphorus), as well as adsorption (the fight against dissolved organic elements). In addition to these actions, electrolysis is used to reduce the content of natural and mineral substances. Antibacterial treatment of pollution in wastewater is carried out through ozonation and chlorination. Sometimes at the final stage of water treatment, a distillation of water is possible. At the moment, the primary way to combat pollution is to treat wastewater. But the fact is that all the same, up to 20 percent of the most persistent pollution remains in it.

Water cleaning process

In many developing countries, sewage water is most often not treated. Polluted water is discharged into rivers and reservoirs. In most developed countries, wastewater from industrial enterprises and residential buildings, together with rainwater, is discharged through sewage pipes to treatment plants. Depending on the requirements for purified water, the cleaning process can include up to three stages - primary, secondary, and deep-rooted. Upon reaching the required level of treatment, the water is disinfected and discharged into rivers, seas, or reservoirs. (Pal, M., et al.2).

During the initial cleaning with the help of grids, large debris is caught by wood and plastic waste. Then, the wastewater passes through a system of chambers where, after settling, the pollutants precipitate, which is collected and subsequently processed or buried. After disinfection with chlorination, which destroys bacteria, the water drains into the water.

The secondary stage of wastewater treatment involves the biological process of the decomposition of organic waste by bacteria. In some treatment plants, to accelerate such a process, the purified water is mixed with activated sludge inhabited by bacteria, and the air is passed through the agitated mixture. Then the water enters the deposition chamber, where the sediment is collected, which after special treatment is either burned, discharged into the ocean, or laid in underground storage, or after sorting it is used as fertilizer. Purified water is usually released into natural bodies of water.

In some developed countries, wastewater is subjected to combined treatment, including the primary and secondary stages of treatment. Nevertheless, after such treatment, up to 3% of suspended solids containing nitrates, phosphates, toxic compounds of heavy metals, and synthetic substances remain in purified water. However, destroyed and radioactive isotopes with a long half-life, and chemically stable organic substances like pesticides. The concentration of such pollutants can be reduced by further deep-water treatment based on complex physical and chemical processes (Directive5). The construction of treatment plants with deep cleaning and their operation is expensive. Therefore, in many countries, most often, they are limited to primary and secondary types of treatment. The exceptions are Sweden, Denmark, Norway, and other countries.

Any method of water purification includes the last stage disinfection, in which pathogenic bacteria and viruses are destroyed. The most common method of disinfection is chlorination. However, this method may be accompanied by negative consequences. The interaction of chlorine with organic substances produces chlorinated hydrocarbons. Some of which, for example, chloroform, have carcinogenic properties, when they enter the human body, the blood cholesterol level increases and, consequently, the likelihood of cardiovascular disease increases. At some treatment plants, ozonation and ultraviolet treatment are used for disinfection.

Higher requirements are imposed on the purification of water used for drinking. Such water is most often taken from natural surface sources (rivers and lakes) and reservoirs. The complex process of its cleaning includes successive stages of sedimentation, filtration (when water is passed first through sand and then through activated carbon) and disinfection.

Wastewater treatment can reduce the discharge of pollutants into water bodies. However, many rivers, lakes, and seas are still heavily polluted. For example, anthropogenic pollution did not pass by Lake Baikal, near which a pulp and paper mill was built in the 1960s. Baikal has the most abundant supply of fresh water. This unique lake is home to over 550 species of animals and about 800 species of plants (Inyinbor33). However, such a rich natural diversity can be significantly impoverished, even though the plant has a closed technological cycle of water consumption. The plant emits polluting exhaust gases into the atmosphere, and it needs not only clean water but also raw materials like wood, the mass harvesting of which can harm the unique land and water ecosystems.

In most developed countries, environmental laws are enacted to enforce national water quality standards, depending on the purpose of their consumption. The adoption of such laws helps protect water bodies from mass pollution. It is more difficult to control the distributed sources of infection associated with agricultural production and urban landfills of industrial and household waste, from which many types of harmful substances are formed, polluting not only surface but also groundwater (Sharma and Rashmi 12). Contaminated groundwater, unlike surface water, is almost not self-cleaning and self-healing due to a lack of oxygen in a closed underground space. Therefore, it is easier to prevent pollution than to clean.

Concludingly, in many lakes and reservoirs located near cities and settlements, nitrates and phosphates accumulate, and some of them are also subject to thermal pollution when dumping warm and hot water. Untreated waters discharged into the seas and oceans clog estuaries. A significant part of the precipitation falls into the beaches, the water of which, besides, is polluted by oil products and oil, especially in the event of an accident on tankers and drilling platforms. All this causes considerable damage to aquatic ecosystems and above all, pollutes drinking water. It is easier and cheaper to prevent the pollution of consumed water for various purposes. Any water purification, no matter how efficient and the perfect way is performed, requires substantial expenditures of financial, energy, and natural resources. At the same time, additional damage is caused to nature: fossil resources are depleted, the environment is polluted, including water sources, soil, and the atmosphere. The simplest and most affordable way to conserve water resources is to take care of them and save water in all technological processes of material production. Some industrial enterprises have already switched to a closed cycle of water consumption, and modern models of plumbing equipment and washing machines can significantly reduce water consumption for domestic purposes. Every enlightened person knows: clean water is the key to health, but not everyone thinks that clean water is necessary not only for people but for all living things.

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Abimbola stated that there is already pollution of not only open water bodies but also groundwater. Consequently, it is necessary to spend a lot of effort to combat it by creating water treatment and water treatment system. Although various wastewater cleaning methods are being discovered but still there are polluted water discharged in to drinking water sources.

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