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**ECOLOGICAL STATE OF THE UKRAINIAN PART
OF THE DANUBE RIVER**

ЕКОЛОГІЧНИЙ СТАН УКРАЇНСЬКОЇ ЧАСТИНИ Р. ДУНАЙ

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The Danube is one of the largest rivers in Europe. This river flows through the territory of Ukraine before its flowing into the Black Sea. At the same time, the Danube water, which are within the territory of Ukraine, contains a significant amount of pollutants [1, p. 64].

The Danube is the muddiest river in Europe. The turbidity of the Danube water within the area of Vylkove is at the level of 850–880 and even 1300 g of sediment per m³. For humans water resources are the most valuable natural resource determining the success of the economic and social development of the countries in the whole world. In the conditions of climate changes, both global and regional, the task of assessing their consequences, particularly from the point of view of redistributing water resources both in time and in space, especially arises [2, p. 112].

The priority pollutants (P) of sea and river waters include: petroleum hydrocarbons (PH), organochlorine compounds (OCC), heavy metals, synthetic

surface-active substances (SSAS). To assess the level of water pollution in the researched area, the fishery MPC (the most "hard" ones) were used. It allows to assess the ecological and toxicological situation and the consequences of the pollution in accordance with the minimum risk strategy. From a wide class of petroleum hydrocarbons only lower aromatic hydrocarbons and paraffins are dissolved in natural water. Therefore, the content of dissolved and emulsified hydrocarbons is usually low. According to the data of the Danube GMO, the level of PH content exceeded the MPC in no case (Table 1).

Table 1

Individual statistical indicators of the surface water pollution with the toxic substances in the Ukrainian part of the Danube River

| Pollution indicator | Number, n | Arithmetic mean value, X_{average} . | Concentration range, $X_{\text{min-max}}$ | Mean-square deviation, $\pm \sigma$ | MPC for river waters, mg/dm^3 |
|---|-----------|---|---|-------------------------------------|--|
| PH, mg/dm^3 | 43 | 0,001 | 0–0,020 | 0,0006 | 0,050 |
| Phenols, mg/dm^3 | 43 | 0,001 | 0–0,004 | 0,0001 | 0,001 |
| SSAS, mg/dm^3 | 43 | 0,008 | 0–0,030 | 0,0039 | 0,100 |
| Copper (Cu), mg/dm^3 | 7 | 0,003 | 0,001–0,006 | 0,0001 | 0,005 |
| Zinc (Zn), mg/dm^3 | 7 | 0,010 | 0,007–0,014 | 0,0001 | 0,050 |
| Chrome (Cr^{+6}), mg/dm^3 | 43 | 0,009 | 0,001–0,020 | 0,0008 | 0,020 |
| Manganese (Mn), mg/dm^3 | 7 | 0,017 | 0,004–0,027 | 0,0001 | 0,010 |
| Iron (Fe), mg/dm^3 | 7 | 0,317 | 0,10–0,057 | 0,1577 | 0,050 |

The total level of SSAS content was also insignificant (from analytical zero to 0.030 mg/dm^3) and did not exceed the MPC. The total content of phenols varied from analytical zero to 0.004 mg/dm^3 , their content in the water during the observation period exceeded the MPC in 32–42 (%) cases.

The toxicity of these substances is very high, therefore, according to the fisheries standards of the MPC, their complete absence (on probation – 0.00001 mg/l) is accepted as a norm.

A wide spectrum of heavy metals was also found in the waters of the Danube Delta. The content of some of them significantly exceeds the MPC. At the same time, the concentrations of cobalt, chromium and

iron were beyond the sensitivity of the analytical method (the content of metals in the water was determined by the atomic absorption method).

Taking into account the fact that the presence of the pollutants in the water is random and their concentrations in the same area can vary significantly, assessing the state of the marine environment pollution based on the content of the pollutants in the bottom sediments (BC) should be considered as more representative.

The total level of BC pollution with toxic substances is quite high. Exceeding the MPC norms, defined for a significant number of pollutants in bold in the table, indicates a significant degree of ecosystem pollution as a whole.

The development of scientific and technical progress is accompanied by growing anthropogenic influence. This trend does not bypass the Danube Delta region and its water environment state is unsatisfactory.

And this, in turn, can lead to violating the equilibrium balanced state of the environment. The unpredictable interaction of the flora and fauna aquatic environment on the one hand and human activity on the other can cause an irreparable harm to both a human health and the very material and technical production. That is why monitoring the environment and forecasting the trends of its transformation is an urgent problem today [3, p. 19].

As you know, according to physical and geographical conditions, the Danube is divided into three parts: Upper, Middle and Lower. Our country is located at the mouth of the Danube, so all chemically dangerous substances that are dumped by more than ten European countries are carried by the water throughout the territory of Ukraine. Protecting and rational using the Danube River waters are regulated by the general and special legal acts at the state level [4, p. 38].

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