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S. A. Kovalenko, PhD Student
R. V. Ponomarenko, D.Sc
National University of Civil Defence of Ukraine, Kharkiv

DETERMINATION OF WATER QUALITY FOR SURFACE WATER BODIES BASED ON THE HYDROCHEMICAL INDEX OF WATER POLLUTION

Water pollution depends on various factors. This can be assessed using several indicators and indices. To calculate the complex index of water pollution, physical, chemical and biological parameters are used, such as pH, temperature, turbidity, biochemical oxygen demand, chemical oxygen demand, dissolved oxygen, nitrates and nitrites, phosphates and others. Determination of the complex index of water pollution is necessary for monitoring and management of water resources, determination of sources of pollution. For planning water protection activities, developing water protection measures, carrying out ecological and ecological-economic zoning, ecological mapping, it is expedient to use a combined ecological assessment of surface water quality, which is the arithmetic mean of the salinity index, tropho-saprobiological (ecological-sanitary) indices and the index of specific indicators of toxic action. To assess the quality of water bodies in the world, in particular, in Ukraine, the pollution index of surface water bodies (hydrochemical water pollution index) is used [1]. The calculation of the water pollution index is carried out on the basis of the value of the maximum permissible concentration. The essence of the methodology is to calculate the water pollution index based on hydrochemical parameters and assign it to the appropriate class and category of water quality according to the degree of purity (pollution). For the rivers that are part of the Dnipro basin, namely Psel, Vorskla, Desna, Seim, Sula, Samara, water pollution indices were calculated for seven indicators (BOD, dissolved oxygen, concentration of ammonium ions, nitrates and nitrites, sulfates and phosphates). The simplicity of the calculation of this method allows you to quickly and effectively assess the level of pollution of water bodies and monitor changes in water quality over time and identify dangerous trends in pollution.

Table 1

Pollution indices of surface water bodies and water quality classes for 2019

The name of the surface water body	The value of the water pollution index	Water quality class	Water quality
Vorskla	1,25	III	Moderately polluted
Desna	1.095	III	Moderately polluted
Psel	1.171	III	Moderately polluted

Samara	1.472	III	Moderately polluted
Seim	1.175	III	Moderately polluted

The investigated surface water bodies belong to the third class, which are under significant anthropogenic influence, the level of which is close to the limit of sustainability of ecosystems.

To assess the quality of water in various bodies of water, such as rivers, lakes, and ponds, the entropy index of water quality is used. Its application makes it possible to compare different reservoirs with each other and assess the ecological stability of aquatic ecosystems. The value of the entropy index of water quality shows what and to what extent prevails in the system. For example, if the value obtained during the calculations is less than one, then order prevails in the structure of the system, otherwise, and when it is the opposite, that is, greater than one, chaos prevails. At a value equal to one, chaos and order balance each other and the structural organization of the system is balanced [2]. A water quality index has been proposed by the Canadian Council of Ministers of the Environment (CMC) to assess surface waters for further protection of aquatic organisms. Different parameters with different measurement units can be used to calculate this index.

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