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Environmental runoff as indicators of social resilience of South of Ukraine
to global climate change

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Due to global climate change, urbanization, and economic activity, primarily runoff regulation (dams, shore fortifications, hydroelectric power plants, etc.), the number of rivers with the radically changed regime in Ukraine is increasing from year to year. All this leads to significant environmental damage and hurts living conditions and social resilience of areas to change. On the other hand, in recent years the most acute problem, in particular in the South of Ukraine, is the hydrological situation of a natural nature - low water or hydrological drought.

In the period of modern climate change, this part of Ukraine is in a zone of significant risk due to the shortage of water resources, which according to the forecast climate trends will increase in the next 30-50 years. Under such conditions, the rational use of water resources becomes increasingly important, in particular, the definition of ecological runoff, which determines the characteristics of river runoff needed to support the functioning of freshwater ecosystems and provide conditions for prosperous living and social sustainability.

The Ukrainian Hydrometeorological Center has developed a normative document "Regulations on the procedure for assessment and information on low water (hydrological drought) on water bodies of the land of Ukraine." This Regulation establishes and regulates the activities of hydrometeorological organizations, including the observation network, during the period of the threat of occurrence and formation of low water (hydrological drought) on water bodies of the land of Ukraine. An auxiliary criterion for assessing the onset of low water is the ecological flow of water, which is a critical indicator for the functioning of the river ecosystem.

The authors of the study analyzed modern approaches to quantifying the estimated environmental flow. It is shown that different authors, both in Ukraine and abroad, have proposed different methods, some of which determine the environmentally acceptable final runoff, as some share of river runoff (annual, minimum) that remains in the river after water intake.

For the rivers of the southern part of Ukraine, the calculation of environmental flow and comparison with the lowest observed discharges of the summer-autumn limit from the beginning of observations to 2018 inclusive was performed.

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Analyzing the obtained results, we can conclude that the rivers of the South of Ukraine during the study period in some years there were water discharges, which were less than ecological, i.e. in this period on the rivers were observing significantly decreased of water content and stopped the functioning of the ecosystem.