

CHANGES IN CLIMATE AND RIVER WATER CONTENT IN THE UPPER DNIESTER BASIN AT THE BEGINNING OF THE 21ST CENTURY

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The Dniester River is a transboundary river whose water resources, according to Goal 6 of the UN General Assembly Resolution of 25 March 2015 on the Global Sustainable Development Goals by 2030, should provide the population of Moldova and southwestern Ukraine with safe and affordable drinking water of adequate quality.

Climate services for the Dniester water users (hydropower, agriculture, industrial and municipal enterprises, fish farming, water transport, etc.) are intended to effectively implement integrated water management of the Dniester River in the context of climate change and anthropogenic pressure. The Dniester River basin is characterised by uneven distribution of the river's water resources, which makes the economies of the middle and lower Dniester dependent on the Upper Dniester's water supply. The water regime of the Dniester is characterised by the fact that the runoff formation zone is concentrated in the upper part of the Dniester basin, namely in the Carpathian Mountains.

The paper uses data on average monthly values of air temperature, precipitation and water discharge in the Dniester basin provided by the Boris Sreznevsky Central Geophysical Observatory (CGO).

The analysis of the impact of the Dniester Reservoir on the nature of the Dniester runoff fluctuations showed that the cyclic nature of the annual runoff fluctuations in the upstream and downstream sections of the reservoir has not been disturbed, and the position on the time axis of the main characteristic points (dates of transition from one water availability phase to another) of the mass residual curves (1964, 1981, 1995, 2010) also remained almost the same. In the lower reaches (Dniester - Bendery), the patterns of intra-annual runoff distribution inherent in the upper reaches have been preserved. The effects of flow regulation are manifested in April and July for dry years, and in March-April for wet years [1].

The results of the study revealed that the nature of fluctuations in the main Dniester river is determined mainly by fluctuations in the flow of the Carpathian tributaries (Carpathian region), for which the number of water availability cycles and the boundaries of water availability phases coincide with the corresponding indicators of the main river [2]. It was found that for the tributaries of this group there is a close correlation between the ordinates of the mass residual curves of fluctuations in annual and rainfall runoff, which indicates a significant contribution of rainfall to river water content. In the External Carpathian region,

snowfall plays a significant role in the formation of fluctuations in annual runoff. It was found that since the late 1990s, the contribution of spring floods to the formation of annual runoff has been gradually decreasing and the role of rainfall floods has been increasing.

It is shown that air temperature fluctuations occur synchronously at all meteorological stations located in the catchment area of the entire Dniester and adjacent territories (Ukraine). The existence of statistically significant positive trends (trends) in fluctuations of average annual air temperatures, average monthly air temperatures of warm and cold periods through 1989-2021 was established [3]. It should be noted that in terms of the effects of climate change, 1989 is considered a turning point for the territory of Ukraine (Hrebin V.V., 2010). No general trends have been identified in the fluctuations of precipitation characteristics since 1989. It is established that for most of the meteorological stations of the Upper Dniester, the patterns of fluctuations in annual precipitation amounts correspond to the patterns of fluctuations in annual runoff to a greater or lesser extent. It has been shown that since the mid-1990s, negative trends have been formed in the fluctuations of rainfall amounts in the rainy period (VI-XI), which are statistically significant for most of the basin's meteorological stations [4].

Thus, the transition to a dry phase, which has been observed in the fluctuations of the Dniester's annual runoff since 2010, is mainly due to the intensive increase in air temperature since 1989 and the emergence of negative trends in rainfall fluctuations (VI-XI) starting from 1990s.

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