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Estimation of aridity in the territory of the South of Ukraine using agro-climatic and hydrological drought indices

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"According to experts of the Ukrainian Hydrometeorological Center, already in modern conditions, more than 30% of the best-sown lands experience a shortage of moisture every year. During the years of severe droughts, the loss of grain crops in Ukraine as a whole reaches 5 centners per hectare, and in the steppe regions - up to 10-15 centners per hectare.

There are now about 150 drought indices. A number of drought indicators are recommended by the WMO Comprehensive Drought Control Program. In Ukraine, zoning and assessment of agro-climatic aridity of the territory are carried out according to the Hydro-thermal Coefficient of Selyaninov (HTC).

To estimate the hydrological indices of droughts, a DrinC drought calculator was used to calculate the river runoff drought index (SDI), standardized precipitation index (SPI), and agricultural standardized precipitation index (aSPI), drought research index (RDI), and effective eRDI drought index.

The period 2004-2018 was used to study agrometeorological droughts. The results of calculations showed that the long-term average value of HTC for Velyka Oleksandrivka station (Kherson region) is 0.83, which is characterized by medium arid conditions. However, 8 of the 15 study years in terms of HTC were with severe drought (53% of all cases), 3 years were with moderate drought (20% of the total number of studied years), also 3 years were with mild drought (20% of years) and only one year out of 15 is characterized by excessive moisture. Thus, according to the HTC indicator for all the studied years, the driest were 2012 and 2017.

Long-term data on 6 hydrological posts and average monthly air temperature and monthly precipitation on 6 meteorological stations in the South of Ukraine for the period from 2005 to 2018 were used to study hydrological droughts. The situation regarding the formation of hydrological



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droughts within the South of Ukraine is not homogeneous. For various meteorological stations and hydrological posts, the situation has changed from "mild" to "severe" drought, in some cases no drought at all in recent years. The analysis shows that drought indices are an additional tool for analyzing the situation in the studied river basins, as well as forecasting water trends using model values of temperature and precipitation. It should also be noted that the agrometeorological drought index, together with the well-known SPI, can also be used as an indicator of the total humidity of the territory, and has prospects for use in forecasting methods."