Bogdan BĄK, Katarzyna KUBIAK-WÓJCICKA

IMPACT OF METEOROLOGICAL DROUGHT ON HYDROLOGICAL DROUGHT IN TORUŃ (CENTRAL POLAND) IN THE PERIOD OF 1971–2015

Abstract

The paper presents impact of meteorological drought on hydrological drought on the Vistula River in Toruń in the period of 1971–2015. It uses index method for the assessment of hydrological drought threat degree as a result of multi-month lasting meteorological drought. Based on the values of the SPI-24 (24-month standardized precipitation index) it was determined that meteorological drought in Toruń appeared six times and the total time of the phenomenon was 33% of the studied interval. Periods of hydrological drought on the Vistula River in Toruń have been determined based on the values of the SWI-24 (24-month standardized water level index). It has been found out that hydrological drought appeared four times and its total time was 10% longer that the meteorological drought. Based on the values of both indices (SPI-24 and SWI-24) correlation coefficient for months, seasons and years, it was found that the relation between both kind of droughts is weak ($r < 0.5$). That result is also confirmed in the distribution of both kinds of drought. Only in 32 months (8% of the total time) the intensity of the two simultaneously occurring drought was at least moderate. The achieved results revealed that the hydrological drought was occurring periodically, independent on meteorological drought. Hydrological drought was also influenced by the external factors (hydropower plant in Włocławek, Major Groundwater Basin – GZWP) and climate factors appearing in the upper and middle part of the river basin.

Key words: drought indices, hydrological drought, meteorological drought, the Vistula River