

Climate and surface and ground-water in the Baltic region – variability, trends, and impacts



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VARIABILITY OF THE HYDROMETEOROLOGICAL PARAMETERS OF THE CURONIAN LAGOON IN TWO CLIMATE NORMAL PERIODS

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The Curonian Lagoon is a shallow freshwater lagoon located southeast of the Baltic Sea. It is also the largest lagoon of the Baltic Sea, with an area of 1,584 km² (of which 381.6 km² belong to Lithuania). Due to its unique biodiversity, it is protected internationally and included in the Ramsar List, the Bonn Convention and the World Heritage List. However, like other bodies of water, this lagoon has not escaped climate change, which has altered its hydrological regime. The study aimed to determine the changes in the hydrometeorological parameters of the Curonian Lagoon during two climate normal periods (1961-1990 and 1991-2020) using statistical analysis methods. The daily data of air and water temperature, precipitation, wind speed, water level and ice regime observations from the Lithuanian part of this lagoon in the two climate normal periods were used. The Mann-Kendall test was applied to assess the significance of the identified changes.

The performed analysis revealed that the Curonian Lagoon experienced considerable changes during the studied climate normal periods. Due to the rising global air temperature, the air and water temperatures in the Curonian Lagoon region also increased. In the second 30-year period, the air temperature was higher by 1.3°C and the water temperature by 0.9°C than in the first period. Thermal expansion and glacial melt on a global scale had an impact on the rise of the water level of the Curonian Lagoon. In 1961-1990, it was 505.3 cm and in 1991-2020 – 513.1 cm. Climate change has also affected other meteorological parameters. It was found that the amount of precipitation in 1991-2020 was 7.8% higher, and the wind speed was 19.6% lower than in 1961-1990. Due to growing air and water temperatures, in the second period, the duration of the ice cover decreased by 26 days, the ice cover thinned by 7.6 cm, and its breakup began 18 days earlier than in the first period.

Rising water temperatures may have negative consequences for the abundance of stenothermic fish. The rising water level influences even greater coastal erosion of the Curonian Spit. Changes in rainfall and wind speed will likely affect the water balance of the lagoon. The altered ice regime may have a negative impact on the accumulation of suspended nutrients in the sediments.

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