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

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Book of Abstracts

Contents

The purpose of phenological research is to determine the influence of climate change on the occurrence patterns of various phenological phenomena and their interrelationships with environmental conditions.
Due to climate change, deviations of meteorological conditions from the norm have been identified in Lithuania, which have affected the seasonal rhythm of nature. It was found that the starting dates of plant phenophases in spring and summer were strongly correlated with the average air temperature of the two-month period before the occurrence of phenophases (r = -0.93). Dependence on precipitation was weaker, but a tendency was observed for phenophases to be delayed in wet spring. Both temperature and precipitation had little influence on the dates of the onset of leaf yellowing. 1961 – 2020 during the period, the dates of plant phenophases were earlier (from -0.05 to -0.43 days per year), but larger-scale earlier trends have been observed since 1981. In the last decade, the occurrence dates of spring phenological phenomena have advanced by 7 – 11 days on average.
Changes in the length of the growing season are also related to climate change. Growing season in Lithuania from 1961 to 2020 lengthened by 0.26 d. per year. Due to climate change, the growing season has become 5 – 6 days longer than the average multi-year growing season in the last two decades.
The appearance of insects (especially honey bees) in spring and their nutritional conditions are related to the timing of the phenophases of entomophilous plants. It was found that the dates of honeybee appearance on the flowers were strongly correlated with the dates of the first phenophases of plants beginning of flowering in spring (r = 0.73 – 0.80). In the last decade, climate change has advanced the dates of plant phenophases, resulting in more species of entomophilous plants flowering when the honey bees began to fly than in 1961 – 2010.

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Determination of hydrological drought by daily water level data

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Climate change is becoming more and more visible, and the consequences are getting worse. Therefore, it is critical to quickly identify the threat and respond to it. Climate change is causing hydrological droughts, which have become very noticeable in recent years. In fact, in 2022, the runoff of many rivers in Europe reached minimum values. Most commonly used indices to identify hydrological droughts use discharge as input data, but in this paper, based on the example of Lithuania, water levels were tested to speed up the process. The Standardized Water Level Index (SWLI) was calculated in the same way as the Streamflow Drought Index (SDI), but the discharge data were replaced by the water level data. The warm period of the year, namely from May to October, and 10-day accumulation period were taken for the study. All calculations were made for 30 years (1991-2020). To compare the two indices, 15 Lithuanian catchments with an area from 148 km2 to 812,000 km2 were selected. The study revealed that small rivers had more significant deviations of negative values, which could be caused by the high amount of river flora in summer. Therefore, equations of determination were applied to define the threshold value of severe drought. The SWLI showed similar results to the SDI, except for a slightly higher number of days with severe drought. The hydrological drought was most often detected in May. According to both indices, the driest years were 1992, 2006 and 2019-2020. Thus, it was confirmed, that SWLI could be used to determine severe hydrological drought in Lithuanian rivers.

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A New Tool for Climatic Information on Municipality Scale in Latvia

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