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DIURNAL WATER TEMPERATURE DYNAMICS IN LOWLAND RIVERS:
A CASE STUDY FROM CENTRAL POLAND

Abstract

The paper examines spatial and seasonal variations in diurnal water temperature dynamics in lowland rivers. Temperature data was obtained from digital temperature loggers located in nine sites across the Mazovian Lowland during the hydrological year 2016. On the basis of measurement data, mean, maximum, and minimum daily ranges were calculated in the monthly timescale, as well as the timing of extreme temperatures during the day. The results indicate that water temperature dynamics of lowland rivers have a clear seasonal pattern, with the highest variations of temperature in May and June and the lowest in January. Statistically significant differences were found in the daily temperature range between groups of the investigated sites; a higher diurnal temperature range was observed in sites draining a smaller catchment area, while larger rivers were generally more thermally stable in the daily timescale. There was also found an effect of anthropopressure on diurnal temperature dynamics in urbanized catchments, mainly due to impoundments and sewage inflows. Maximum water temperature in the studied sites usually occurred in the morning, from 06:00 to 10:00 CEST, while minimum temperature occurred in the late afternoon, from 14:00 to 18:00 CEST. Spatially, the timing of the maximum and minimum water temperatures during the day was similar in all of the investigated sites, with no statistically significant differences. However, cluster analysis indicated that in the summer half of the year the timing of the extreme temperatures was more varied between investigated sites. The results provide new insight into short-term river thermal behaviour and they are valuable in the context of game fisheries due to the significance of daily temperature variations in fish activity and feeding.

Key words: Central Poland, diurnal dynamics, lowland rivers, water temperature