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## Surface-water temperature variations and river corridor properties

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**Abstract** River water temperature ( $T_w$ ) is an important control of the functioning of freshwater ecosystems. Anthropogenic climate change is expected to increase  $T_w$  over coming decades, with implications for the vitality and composition of plant and animal communities. It has been suggested that planting riparian woodlands along river corridors could provide thermal refugia by shading the channel. This paper describes a pilot survey of  $T_w$  variations along two rivers in the English Peak District linked to regional air temperature ( $T_a$ ) trends, local riparian features, and wider physiographic context. The nine sites exhibit diverse channel and riparian properties including morphology, sediment coarseness, water depth, shading, distance from source, proximity of tributaries and drainage ditches, channel aspect, sinuosity, slope and roughness. At the most sensitive site  $T_w$  has increased by  $\sim 0.2^\circ\text{C}/\text{year}$  since 1995, partly due to changes in measurement times. Greatest sensitivity of  $T_w$  to  $T_a$  is found in the middle reaches of the River Manifold where there is relatively little riparian shade or deep groundwater inflow compared with downstream sites. Our longer-term objective is to collate water temperature data from a much larger number of sites and then use a GIS-based modelling tool to predict from catchment properties, potential reaches for water-temperature amelioration by riparian tree cover.

**Key words** water; rivers; temperature; climate change; adaptation