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Projecting future streamflow under changing climate and urban land cover across the UK

Shasha Han[1] and Louise Slater[2]
[1]School of Geography and the Environment, University of Oxford, Oxford, United Kingdom OX1 3QY (shasha.han@ouce.ox.ac.uk)
[2]School of Geography and the Environment, University of Oxford, Oxford, United Kingdom OX1 3QY (louise.slater@ouce.ox.ac.uk)

Changes in precipitation and land cover are important drivers of change in catchment streamflow, yet quantifying their influence remains a major challenge. This work aims to understand how streamflow may evolve under different scenarios of future precipitation and urbanization across the UK. A collection of catchments from the National River Flow Archive (NRFA) that have experienced significant changes in flows and urbanization were selected. Both historical observations and future projections of precipitation and urban land cover were extracted within each study catchment, for different emissions and socio-economic scenarios including Representative Concentration Pathways (RCPs) and Shared Socio-Economic Pathways (SSPs). Distributional regression models – Generalised Additive Models for Location Scale and Shape (GAMLSS) – were developed using historical precipitation, land cover, and streamflow, and employed to project future streamflow using bias-corrected projections of precipitation and land cover. The results improve our understanding of streamflow response to climate and land cover changes and provide further insights for water resources management and land use development.