

## **Future Flows: a dataset of climate, river flow and groundwater levels for climate change impact studies in Great Britain**

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**Abstract** Science understanding suggests that anthropogenic greenhouse gas emissions will result in a changed climate that will in turn modify patterns of river flow and groundwater recharge, affecting the availability of water and changing the aquatic environment. While many studies have investigated the impact of climate change on river flows in Great Britain, their coverage is uneven and methods vary, and it is very difficult to compare results from different locations and different sectors and to identify appropriate adaptation responses. Future Flows is a set of nationally consistent projections of climate (1-km gridded daily precipitation and 5-km monthly potential evapotranspiration), river flow (for 282 catchments) and groundwater level (at 24 boreholes) for Great Britain at space and time resolutions for hydrological applications. It is based on the Hadley Centre's 11-member ensemble projections HadRM3-PPE run under the Medium emission scenario SRES A1B. The 11 plausible realisations (all equally likely) of nearly 150 years (from 1951 to 2098), described by Future Flows, enable the role of climate variability on river flow and groundwater levels nationally to be investigated and how this may change in the future. Some climate change uncertainty is accounted for by considering all ensemble members together. In addition to the time series, Future Flows contains information on modelling errors in the river flow and groundwater level projections in the form of catchment fact sheets. These fact sheets contain performance measures for hydrological statistics including monthly flow, flow percentiles and for some catchments flood peaks, and separately the hydro(geo)logical modelling errors from the fuller chain of climate-to-hydrology modelling. This information enables any potential user to have a clear view of the modelling uncertainty before they use the data. Future Flows Climate and Future Flows Hydrology are each associated with a Digital Object Identifier and are available to the research community free of charge for non commercial work.

**Key words** climate change; hydrology; hydrogeology; uncertainty; emissions scenario