



## **Applications of hydrological state monitoring along intermittent rivers: longitudinal permanence and drought tracking**

Catherine Sefton (1), Simon Parry (1), Michael Eastman (1), Judy England (2), and Geoffrey Angell (2)

(1) Centre for Ecology & Hydrology, Hydrological Status and Outlooks, Crowmarsh Gifford, Wallingford, United Kingdom (catsef@ceh.ac.uk), (2) Environment Agency, Welwyn Garden City, United Kingdom

Studies of the behaviour of hydrological state along intermittent rivers and through time are required to fully characterise their behaviour and assess their response to climatic and anthropogenic drivers. However, long term, spatially distributed datasets, and therefore opportunities to conduct such analyses, are rare. Monthly observations of flowing, ponded and dry states at multiple sites along ten Chalk rivers in the south east of England are used to demonstrate one method of characterisation (longitudinal permanence) and one of assessing response to a climatic driver (drought tracking).

The behaviour of the rivers is characterised using long term permanence of hydrological state for each site, integrated temporally across all months in a ten-year period. Charted longitudinally, hydrological state permanence thus reveals spatial variability in intermittence, and by extension regime, along a river. Conversely, by spatially integrating all sites on a given river, the monthly composition of hydrological state allows comparison of the development and extent of drought events.

Charts of flow, ponded and dry permanence reveal both broad shapes, as their relative permanences alter incrementally downstream, and localised augmentations from natural and artificial sources. Similarities and differences along and across the rivers are revealed. In the tracking of drought development, contraction of the network increases the proportion of dry state each month on groundwater-dominated rivers, whilst the proportion of ponding is more variable in time and space. The response of the rivers to recent dry winters is compared with that of drought events from the last two decades.

The appraisal of a developing drought against previous dry years and long-term average conditions illustrates the importance of such datasets with good temporal resolution and extent in assessing the response of intermittent rivers to climatic and anthropogenic drivers. The equal importance of good spatial resolution is demonstrated in the characterisation of the rivers. The techniques demonstrate the potential for spatial zoning of intermittent river regime and subsequent assessment of the vulnerability of river zones to drought and artificial influences.