Geophysical Research Abstracts
Vol. 19, EGU2017-18925, 2017
EGU General Assembly 2017


# Attribution of hydrological change using the Method of Multiple Working Hypotheses

Shaun Harrigan
Centre for Ecology & Hydrology (CEH), Wallingford, United Kingdom (shauhar@ceh.ac.uk)

The methods we have developed for managing our long-term water supply and protection from extreme hydrological events such as droughts and floods have been founded on the assumption that the hydrological cycle operates under natural conditions. However, it increasingly recognised that humans have the potential to induce significant change in almost every component of the hydrological cycle, for example, climate change, land-use change, and river engineering. Statistical detection of change in streamflow, outside that of natural variability, is an important scientific endeavour, but it does not tell us anything about the drivers of change. Attribution is the process of establishing the most likely cause(s) of a detected change – the why. Attribution is complex due to the integrated nature of streamflow and the proliferation of multiple possible drivers. It is perhaps this complexity, combined with few proven theoretical approaches to this problem in hydrology that has led to others to call for "more efforts and scientific rigour" (Merz et al., 2012). It is easier to limit the cause of a detected change to a single driver, or use simple correlation analysis alone as evidence of causation. It is convenient when the direction of a change in streamflow is consistent with what is expected from a well-known driver such as climate change. Over a century ago, Thomas Chamberlin argued these types of issues were common in many disciplines given how the scientific method is approached in general. His 1890 article introduces the Method of Multiple Working Hypotheses (MMWH) in an attempt to limit our confirmation bias and strives for increased objectivity. This presentation will argue that the MMWH offers an attractive theoretical approach to the attribution of hydrological change in modern hydrology as demonstrated through a case study of a well-documented change point in streamflow within the Boyne Catchment in Ireland.

Further Reading

Chamberlin, T. C.: The Method of Multiple Working Hypotheses, Science (old series), 15(366), 92–96, doi:10.1126/science.ns-15.366.92, 1890.

Harrigan, S., Murphy, C., Hall, J., Wilby, R. L. and Sweeney, J.: Attribution of detected changes in streamflow using multiple working hypotheses, Hydrol. Earth Syst. Sci., 18(5), 1935–1952, doi:10.5194/hess-18-1935-2014, 2014.

Merz, B., Vorogushyn, S., Uhlemann, S., Delgado, J. and Hundecha, Y.: HESS Opinions "More efforts and scientific rigour are needed to attribute trends in flood time series," Hydrol. Earth Syst. Sci., 16(5), 1379–1387, doi:10.5194/hess-16-1379-2012, 2012.