Ross Woods

Combining Classification and Theoretical Modelling for PUB.

This brief presentation will summarise some contributions that classification and simple theoretical models have made, and can make, in the context of the PUB initiative. Classification is the assignment of catchments (or other hydrological objects) to groups, in a way that two members of the same group have a relatively similar hydrological behaviour. Classification is clearly of general scientific value to hydrology, but can also make a significant contribution to the PUB problem in particular, if it can be achieved without using measurements of streamflow or other hydrological response. For classification to be of interest to the wider hydrological community as well as PUB, it needs to be (i) very widely applicable (i.e. not only local or regional), (ii) simple enough that its principles is can readily be appreciated, (iii) able to assist predictions in ungauged basins. For this reason, there is considerable potential in methods of classification and similarity which rely on: (i) identification of a few distinct kinds of hydrology which are easily recognisable (ii) testable predictive models whose process basis (and limitations) are clear and simple. One way of achieving the latter is through minimalist analytical models which include key scaling relationships that connect climate and catchments to their responses. Even this is an enormous task, given the great variety of space scales, time scales and environments that are of potential interest. This talk will be restricted to systems where spatially uniformity is assumed, the timescales of interest are seasons and years, and the processes of interest are soil moisture, runoff, evaporation and snow. I will demonstrate some examples where the assumptions of minimalist models are consistent with detailed observations, and with long-term climatology. I will summarise the dimensionless model parameters which result from some minimalist models, and then examine the predictive power of such models when used without calibration. I will discuss some of the limitations of this approach, and also its potential for applications to other related questions.