Rainfall-runoff modelling of the Shiquan River using a committee approach

L.M. See (1), A.Y. Shamseldin (2), R.J. Abrahart (3), C.W. Dawson (4), A.J. Heppenstall (1)

(1) School of Geography, University of Leeds, Leeds, LS2 9JT, UK, (2) Department of Civil and Environmental Engineering, The University of Auckland, Private Bag 92019, Auckland, New Zealand, (3) School of Geography, University of Nottingham, Nottingham, NG7 2RD, UK, (4) Department of Computer Science, Loughborough University, Loughborough, LE11 3TU, UK (l.m.see@leeds.ac.uk / Fax: +44 113 3433308)

This paper demonstrates a committee approach to rainfall-runoff modelling on the Shiquan River in China. A committee approach is the combination or integration of different methods to produce a single solution that is superior to any of the individual solutions on their own. The different methods act like experts on a committee. They each have a voice but there are situations in which a) one expert/model may dominate and b) where the combination or consensus of experts/models produces the best result. This is the basis of soft computing where different artificial intelligence methods work together in a synergistic manner to produce a better overall solution. The committee approach, however, expands upon the soft computing approach and allows any kind of model (physical, statistical or data-driven) to participate in the modelling process.

The study area for this research is the Shiquan catchment in West China. This is a semi-humid catchment, positioned within the subtropical continental climate zone, located in the south of Shannxi Province and situated upstream of the Hanjiang River. It is the largest tributary of the Yangtze River and therefore an important river for discharge forecasting. A range of different modelling approaches were applied to this catchment including: neural networks, fuzzy logic, time series analysis and support vector regression for a lead time of one day. The model results were then combined using different committee approaches such as simple averaging and a neural network model. The results are provided along with hydrographs that depict the performance of both individual and committee models.