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Editorial

Andrew Tagg BSc, MSc, CEng, CWEM, MICE, MCIWEM
Group Manager, Flood Management, HR Wallingford, UK

When reviewing the four papers for my first *Water Management* Editorial back in 2012, a key theme that emerged was the importance and availability of data and information. This was not an earth-shattering finding, since we would all hope and assume that decisions are going to be based on sound evidence. However, we cannot take it for granted that adequate information will always be available to us, and the collection and storage of appropriate data remains an important part of our scientific and technological endeavours.

So when approaching the four papers in this issue, I wondered if a similar common theme would be apparent. Three papers are concerned with different river modelling approaches, whilst the final one deals with wastewater reuse in the Caribbean. In spite of this difference in topics, I would like to suggest that it is worth drawing out the balance between simplicity and complexity in how we describe and represent the natural environment. As with 'data', this is not a novel idea, but it is one that is valuable to reflect on from time to time since making things more complicated does not necessarily make them easier to understand, nor may it actually help us in our decision-making and analysis.

It is probably fair to say that the overwhelming majority of papers presented in this journal are concerned with 'models' of the physical world, and as such, a simplification of the natural complexity. So even if a paper simply presents a review of collated information, say in the form of summary statistics, it represents a simplified model of the real world. In the case of computational hydraulic models, as covered in the first three papers, the representation of reality is clear, as is the uncertainty associated with such a simplification. As understanding has grown along with increased computational resources, so has the complexity of our models in the main. But it is worth remembering the aphorism, sometimes attributed to Einstein, that "Everything should be made as simple as possible, but not simpler". In introducing the following four papers, I will try to draw out this dichotomy and the benefits that can indeed be derived on occasions from a simpler view.

The first paper (Zerfu *et al.*, 2015) presents a modelling approach for predicting the erodible river corridor width, which can be important for land use planning and developing erosion protection measures. The modelling method is viewed by the authors as being 'relatively simple', but by using this in a probabilistic framework they are able to better understand the uncertainty inherent in their representation without the need for more complex models. Using a UK catchment they found that the variation in model inputs, resulting from the natural variability in the study area, had a significant impact on the model simulations. So a better understanding of the natural variability and how we sample it is just as important as any model methodology that we derive. The authors conclude that a better understanding of the uncertainty from the assumed model structure and its parameters may also assist in improving simulations, and that the framework could be expanded to accommodate this.

Yu *et al.* (2015) investigated the effects of a diversion dyke on the flow split at a bifurcation on the River Yangtze, with the intention of increasing the flow into the minor bifurcation to ensure the continuing use of the reach for commerce. The authors set up a complex 2D computational hydraulic model and used a suitable shallow water equation solver to capture all of the relevant river processes. Having proved that the model was reproducing observed flows and velocities, they then used it to answer a straightforward or 'simple' question: would a diversion dyke constructed at the point of bifurcation improve the flow split? Moreover, they considered only the length and orientation of the dyke, so the comparison of results involved only two parameters. They found that length and angle of the dyke were important, but that when the angle was about 70° the dyke length was no longer important. Although the results are clearly useful for the future channel management and regulation, they recognise that additional studies are required to consider aspects such as sediment movement.

In the final river modelling paper, Easa (2015) considers a new approach to optimising the Muskingum flood model. This flow routing model has been in use for many decades, and over time more complicated formulations have appeared that use greater numbers of parameters to describe the flow processes. However, in each case the application has adopted a single calibration criterion to the observations; either minimising the sum of squared deviations in the predicted outflows or minimising the sum of squared deviations in the estimated storages. This paper presents a new approach, using a weighted function of the calibration criteria. Figure 1 in the paper presents a typical result, showing that a criteria weight between 0·4 and 0·6 provides a good trade-off between the two criteria (here a value of 0·5 would give a normalised error in the outflows of about 10%, with an error of 20% for the storages). So a 'simple' reassessment of the routing method yields what should be a more robust and useful model.

Finally, Peters (2015) describes the issues associated with current and future wastewater reuse, using the Eastern Caribbean as a case study. This region is diverse in geographical, hydrological and socio-economic terms but, by summarising the available information (including stakeholder views) according to a range of indicators, patterns and conclusions emerge. For example, the

importance of reuse is influenced by the availability, type and cost of existing water supplies, and the existing wastewater systems. In this regard, the hotel and tourism sector provides some successful pilot schemes that illustrate the key issues. These include the benefits in extending the wastewater system so that reuse becomes viable, and the link between desalination and reuse, so that overall operating costs can be reduced whilst still meeting the seasonal water demands. By breaking down the wide range of environmental variables, Peters is able to derive a series of indicators of good potential for wastewater reuse.

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