Editorial

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

Across all areas of the water environment, be it flood management, water resources or water quality, it is important that our assessments and decision-making are sound and based on the best information available. Our understanding of and approach to water management needs to be updated constantly as a result of external change (such as climate and land use), new policy or governance arrangements, or societal priorities. The collection and maintenance of experimental, field and other datasets must be a constant priority for the technical community. In today's difficult economic climate, we cannot assume that data collection will be valued as it was in past decades. Indeed, changes in policy or legislation could question the continuing need for some monitoring (as is happening in the current debate over the acceptability of river flow measuring structures within the requirements of the water framework directive). This issue of *Water Management* contains three papers that deal with flows in channels, and all make use of experimental data, confirming the continuing importance of such evidence for our understanding of flow processes. These studies illustrate well the need to maintain and utilise historical data sources, especially for testing new analytical and modelling approaches. The final paper is concerned with wastewater management in Australia, and again makes use of field and laboratory measurements. This issue provides good examples of the use of experimental data to improve our understanding of the natural world, and I hope you enjoy reading it as much as I did.

The first paper (Conway *et al.*, 2013) provides a good example of the application of new techniques to historical data, in this case the measurements from the Flood Channel Facility (FCF) during the 1980s and 1990s at HR Wallingford. An Irish-Australian collaboration presents an improved approach that uses the 3D hydrodynamic code SSIIM in a predictive capacity to determine stage–discharge relationships in straight compound channels. The model demonstrates good agreement with the FCF observations for smooth and roughened floodplains, for both fixed and mobile beds. The method avoids the problems involved in using ‘divided channel methods’, which neglect the turbulent momentum interaction between main channel and floodplains. With a general accuracy of 5% (to the FCF measured data) the method could be used to predict discharge, velocity and flow distributions in simple compound channels. Once developed further this type of approach could be used to derive stage–discharge relationships in the absence of observed flow data.

The next paper (Jesson *et al.*, 2013) continues the theme of interpreting experimental data on flow patterns, this time collected in a laboratory flume at the University of Birmingham. The research is concerned with investigating turbulence patterns caused by varying bed roughness, so that this can be used to

improve our overall knowledge of flow behaviour in river channels, and the ways in which we simulate this in our hydraulic models. A better understanding of how bed roughness affects flow patterns is also important for ecohydraulics and river restoration projects. Using a flume with two distinct bed roughnesses, the authors found that secondary flow structures exist, particularly concentrated at the rough–smooth boundary. These central flow cells exhibit a transfer of slow water near the bed moving from the rough side to the smooth, with a corresponding transfer of faster water in the opposite direction at higher levels. One conclusion from this study is that the distribution of roughness could be as significant as the type of roughness on the production of turbulence and the flow patterns in rivers. It is worth noting that for this type of experimental work, the authors comment on the contribution of earlier researchers whose work is still important to understanding the laboratory observations.

The third paper represents an Iranian and Malaysian collaboration into the performance of triangular side weirs and the determination of the discharge coefficient from laboratory experiments (Borghei *et al.*, 2013). Side weirs have been used for many decades as an automatic means of controlling excess flows in open channels, particularly if the downstream channel can only take a certain maximum flow. However, it is usually not feasible to design an increasing side weir length, and hence the investigation into the use of triangular weirs to increase the effective spill width. This study found that such weirs increase the flow efficiency considerably, with the discharge ratio being up to twice that for a conventional side weir. A review of relevant experimental work shows that it is possible to derive the discharge coefficient from different variables, and therefore this study presents two equations based on different combinations of non-dimensional variables. The paper also includes a detailed sensitivity analysis of the experimental data.

The final paper presents an Australian study into on-site absorption systems for the disposal of domestic wastewater (Jayaratne *et al.*, 2013). Such treatment systems, typified by septic tanks, are used in large numbers around the world; for example in rural and semi-urban areas of the USA and Australia. Although design guidance does exist for such systems, it is not based on the many environmental factors that can influence the hydraulic and treatment performance, such as soil and vegetation type, climate and depth to groundwater table. The paper describes a field study of eight septic tank sites around Melbourne, and the application of the VADOSE/W software package, which forms a module of the GeoStudio 2004 software suite. Interestingly, the model had been calibrated on data collected 30 years earlier, and was then validated against the new field monitoring undertaken between 2006 and 2007. The predicted soil moisture content in the

vicinity of the septic tank trenches was found to be well-reproduced between 0.5 to 2 m below the ground surface, but greater variation was found above this. A key finding was the significant losses of both incident rainfall and wastewater discharges to evapotranspiration, with values of the order of 60–70%. Such climatic influences are not included in the existing design guidance, and it may be that many such systems are over-designed and could accommodate higher wastewater discharges.

I hope you agree that these four papers demonstrate the value and importance of not only continued data collection, but also of the potential for new uses of existing datasets, which have been well maintained and widely disseminated.

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