Editorial

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This issue of *Water Management* comprises three technical papers and one paper discussing an article that appeared in a previous edition of the journal. Two of the technical papers are concerned with water resource issues, with the first discussing improved optimisation of an existing hydropower reservoir in China, and the other pertaining to rainwater harvesting practice in Trinidad and the need for reliable water consumption data for better design and operation of domestic rainwater harvesting facilities. The third technical paper and indeed the discussion paper were mostly concerned with hydraulics.

The first paper (Yang *et al.*, 2016) is a discussion of a previous paper published in a 2013 edition of the journal (Borghesi *et al.*, 2013), in which the authors had investigated the hydraulic characteristics of triangular labyrinth side weirs with one and two cycles. Much of the discussion focused on the comparison of triangular labyrinth side weirs and trapezoidal labyrinth side weirs, for which apparently conflicting guides have appeared in the literature, especially in relation to the discharge coefficient. The contributors argued that the results presented by the authors are more plausible than those reported by earlier independent studies that appeared to show that trapezoidal labyrinth weirs have higher discharge coefficients than triangular labyrinth side weirs. They also confirmed that while the discharge coefficient of the triangular labyrinth side weir will significantly decrease as the flow rises, trapezoidal labyrinth weirs behave in an exactly opposite way. The authors, in their response, were pleased with the contributors for showing interest in their work and for clarifying some other aspects of their original study. Given the significance of weirs in flow measurements and control, the original study and this discussion have, in my opinion, offered useful information for practitioners and researchers in open channel flow hydraulics and measurement.

The second paper (Shen and Cheng, 2016) describes the development of a hybrid, multi-objective optimisation hydropower reservoirs system operation with application to the cascaded hydropower plants on the Hongshuihe River in China. The hybrid optimisation approach combines three different steps: system evaluation, an integrated search that explores initial feasible solutions thus effectively delineating the rational search range, and a final improved discrete differential dynamic programming (DDDP) method that solves the final optimisation problem with its complex system objectives and constraints. There are two competing objectives considered for the Hongshuihe facilities: the maximisation of the total energy production; and the guaranteeing of power generation during the dry season (i.e. the firm power). The study clearly demonstrated

that, for the case study system analysed, the newly developed method was slightly superior by generating more power during the dry season when compared to the other approaches tested, such as the use of single objective or the use of an evolutionary optimisation sorting genetic algorithm instead of the DDDP. The problem addressed is that this study is a classical one in water resources management, in which although the overall performance (i.e. in this case the total power generated) of a system might be acceptable, critical periods of extreme low flows do occur during which systems performance fails catastrophically and large vulnerability results. Ability to explicitly include consideration of such critical periods as an objective as demonstrated in this study will go a long way in ensuring that systems vulnerability or failure during such periods is minimised.

The third paper (Peters and Monrose, 2016) addressed the increasing contribution of domestic rainwater harvesting (DRWH) to meeting domestic water demands in Trinidad and Tobago (T&T) and the fact that despite its importance, there is very little guidance on water consumption data that could inform the design and operation of rainwater harvesting facilities. This lack of accurate data has led designers to rely on demand data of conventional water supply systems for planning and design of rainwater harvesting systems, which, according to the authors, cannot be right. The authors then reported on the outcome of a survey carried out in three rural communities in Trinidad to gather data on both households' perceived and actual per capita water consumption (PCC). The results showed that, although both the perceived and actual PCC ranged widely, the maximum actual PCC was much higher by about 47% than its perceived equivalence. Although the authors caution against the reliability of this estimate given the relatively small sample size of the survey, this large margin between the perceived and measured PCC cannot be ignored when planning and designing reliable DRWH systems and is thus being promoted in the region. I think the importance of this study goes far beyond T&T but wholesale transfer of the results to other regions may not be feasible without much wider investigation. I would therefore like to challenge other researchers in other parts of the world where rainwater harvesting has become a mainstay of the water supply infrastructure, either due to natural water shortage or, as is often the case, the catastrophic failure of institutions, to embark on similar studies and report their findings for the benefit of all.

The fourth paper (Mirzaei *et al.*, 2016) was concerned with the determination of the dimensions of submerged vanes commonly used in front of intake ports to control sediment inflow

in intake channels. To be effective in performing this function, the vanes must be appropriately sized; a task described by the authors as complex given the large number of factors that must be taken into account. Using the FLUENT, a robust computational fluid dynamics solver, the authors carried out extensive simulations to determine the effect of these factors on the performance of vanes installed in front of a 90° intake from a straight channel for a range of discharge ratios. To obtain the optimum dimensions and configuration for the vanes, a multi-objective optimisation problem was formulated and solved using Fuzzy TOPSIS. The results showed that for the best performance, the height of the vane should be $0.2d$ and the length should be $0.8d$, where d is the flow depth.

It goes without saying that all four papers have a lot to offer the readership of *Water Management* and I therefore commend them to you all. As always, discussions are welcome on any of the articles.

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