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Editorial

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This issue of *Water Management* includes four academic research papers; one paper presents a practical design method for lined channels and three papers use different research approaches to develop and validate their arguments; a laboratory scale experiment, a pilot plant attached to an existing municipal treatment works, and statistics.

The first paper (Easa *et al.*, 2014) describes a non-iterative optimisation tool for designing flexible roadside channel riprap, cobble and gravel linings. The strength of the approach is that it can handle complex lining materials and non-linear channel dimensions for the three design criteria: discharge, permissible shear stresses and side slope stability. The paper concentrates on lining material size selection, includes a section on sensitivity analyses and a theoretical verification of the process using the alternative iterative approach. It would be interesting to understand how the design method can be developed for other groups of linings, such as vegetative linings, manufactured linings and gabion mattress linings as is suggested feasible by the authors, and how the approach could compare alternative solutions specifically where financial and material availability are key issues for the designer. The paper is to be commended for being a practical and useful application of academic research.

The second paper (Sun *et al.*, 2014) presents the findings of physical and numerical modelling of the dynamic processes of channel migration. The paper is an interesting academic exercise using a theoretical model to replicate a laboratory scale experiment. The physical scale model does represent a fairly idealised scenario, but the authors have shown that modern modelling techniques combined with appropriate approaches to sediment movement can reproduce the observed performance with a fair degree of realism, for which they are to be congratulated. However, the conundrum for academics and designers is how to model a real river with all the complexities inherent in a natural watercourse. The amount of data required – topographical, sediment sizing, grading and distribution across the plan form of the river bed and banks, the influence of vegetation and the history and prediction of flows – makes it highly unlikely that full modelling of a real river's migration with time will ever be possible, let alone practical. Nevertheless, the authors have presented a step towards the development of an additional and useful tool for the river engineer for guidance on the possible movements of the river being considered.

The third paper in this set presents the results from a pilot plant operated to research the potential improvements on phosphorous removal resulting from recycled floated sludge in a dissolved air flotation (DAF) process unit (Kwak and Lee, 2014). The research was developed from the industry need to meet total phosphorus (TP) content allowed in effluent water discharge consent standards of below 0·1 mg/l in many receiving waters worldwide; indeed the required discharge concentration for some receiving waters is zero. The pilot plant was attached to the end of an existing municipal waste water-treatment plant. The authors argue that the results from their research over a 12-month period demonstrated that the recycling process linked to alum dosing in the pilot DAF plant did increase TP removal. This paper, together with other research projects into efficient chemical treatment, contributes further insight into phosphorous removal. However, I challenge the authors to extend the work to quantify the energy and chemical costs of operating the DAF plant compared with alternative processes that remove phosphorous biologically without the need for additional chemicals or energy.

The final paper (Shayan *et al.*, 2014) uses historic performance data to derive discharge coefficients for three types of radial gates – hard rubber bar, sharp and musical note – and extend the analysis to the performance of a set of parallel gates in operation. Much of the research work on radial gates goes back to the 1950s; since then different aspects of gates have been written up in a range of papers over the years. Radial gates are widely used on high head structures and quite often as canal control gates, so accurate knowledge of their discharge relationships is important and this paper does provide fairly comprehensive coverage of the three types for both the free and submerged flow conditions. A total of 514 experimental data sets from three sources were used to validate the proposed algorithms statistically, with the data ranging from 1983 to 1999. The authors concluded that the proposed algorithms demonstrated high accuracy in estimating the flow discharge of the gates under submerged flow regime and in determining the discharge exiting from a set of parallel gates under operation. The next stage would to validate the proposed discharge coefficients against accurate measurements obtained from full scale operational gates obtained under controlled conditions. In particular, where radial gates are arranged in sets, it would be useful to understand how the discharge through one gate is influenced by the degree of opening of adjacent gates.

All four papers have merit; some appear to be further advanced than others in terms of their usefulness to the engineer, but all four need to be developed further. The first paper is a good example of the output of applied research, a practical design approach for the practitioner. However the design tool needs to be extended to cover a wider range of linings and include cost-benefit comparison within the optimizer. The other three papers require further work before their practical application can be assessed.

As always, the Editorial team would be pleased to receive comments on this issue and previous issues, or comments related to the *Water Management* journal more generally.

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