Editorial

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Over recent years, the editorial advisory panel has discussed the value of themed issues to authors and readers of *Water Management*. The advantages of the themed issue lie in encouraging authors working in a particular field to bring together recent findings for publication, and in allowing specialists to view, in one issue, the matters that are currently receiving attention in their field.

This themed issue on irrigation and drainage demonstrates these advantages but the papers submitted raised the question of whether practitioners are signalling which areas would benefit from further research and whether current research is focusing on issues that are of most importance to the practitioner.

Many of the complex issues to be addressed in the development and operation of irrigation and drainage schemes are revealed in the seven papers finally selected for publication. The three project papers describe: feasibility studies for the establishment of sugar estates and smallholder developments in Ethiopia; conjunctive use of surface and groundwater for a drought affected area in Chile; and rehabilitation of irrigation schemes in Pakistan and Vietnam. Two papers from Italy and India discuss the design of irrigation structures: the first reports on scour downstream of a low head stilling basin; the second on the design of vortex sediment settling basins. The final papers from Iran and India describe modelling the soil-wetting front from surface and subsurface drip irrigation, and optimising the design of flat-bottomed parabolic-sided drainage channels.

In the first paper Clark *et al.* (2013) describe studies made under the World Bank-financed Ethiopian Nile irrigation and drainage project for the 64 000 ha Upper Beles project. The authors examined options in which a core sugar estate would play a greater or lesser role, with commercial farms and smallholders occupying the balance of the irrigable area. To analyse options, a digital elevation model was developed from stereoscopic satellite imagery. The authors recognise the difficulties in developing a scheme which will serve different end-users and the advisory inputs that smallholders and water-user groups will require. The socio-economic analysis indicated the optimum balance of sugar estate, smallholders and commercial farms and it will be interesting to see whether this balance is realised in the years to come.

Irrigation water supply for the Upper Beles scheme will be secured by making use of water diverted from Lake Tana through a recently constructed tunnel. Water security for irrigated agriculture in the Peumo valley of south central Chile, however, is affected by the variable rainfall associated with the El Niño

southern oscillation phenomenon and the low rainfall linked with La Niña episodes. Arumí *et al.* (2013) report on a six-year study of the irrigation system in the Peumo area which serves vegetable, fruit and vine growers in an important wine-producing region. The canal network not only supplies water to the irrigable areas but losses contribute significantly to recharge of the underlying unconfined aquifer. During drought periods, farmers use wells to abstract water from the aquifer but abstraction rights, which are set to keep the aquifer in balance, are insufficient to meet demand. Details of the monitoring network and the ground-water model developed to analyse different scenarios are given. The results raise issues on conjunctive use and the role of canal lining, which have wider relevance.

The third paper (Donaldson, 2013) reports on work undertaken and the lessons to be drawn from the rehabilitation and modernisation of irrigation schemes. Donaldson draws on his experience in rejuvenating a 100-year-old scheme in Pakistan and six schemes in Vietnam that were built during the last 30–60 years. Scheme rehabilitation and modernisation is a subject currently widely under consideration, as the demand for food and fibre production grows and the efficient use of water becomes increasingly important. The author deals principally with the civil engineering and hydraulic aspects in the context of the countries concerned but, in most of the Vietnam schemes, systems for monitoring canal operations using supervisory control and data acquisition (Scada) systems are being employed and the implications of this are also discussed.

The impact of scour downstream of irrigation and drainage structures is an issue frequently faced by those involved in the rehabilitation of irrigation schemes. Oliveto (2013) provides the details of physical model tests on the spatial evolution of scour downstream of a horizontal apron at the foot of a low-head spillway. The experiments were undertaken in a 1 m wide, 20 m long rectangular channel at the University of Basilicata, Italy. Three nearly uniform bed sediments were used and tests of up to 72 h each were run to produce well-developed scour holes. Oliveto presents his conclusions on the dimensionless parameters governing scour and on the reliability of power-type equations given in the literature, by others, for the rate of development of the scour depth.

The efficiency of vortex settling basins in sediment removal is discussed in the fifth paper (Ansari and Athar, 2013). The authors concentrated their experimental programme on the impact of the width ratio (diameter of basin to width of inlet channel) and the diameter ratio (diameter of basin to diameter of orifice) on

the efficiency of sediment removal. They concluded that the efficiency of removal varies with diameter ratio, reaching a maximum at 10–15, and that the efficiency varies with width ratio, reaching a maximum at about 7.5. The authors compare their findings with the existing literature and conclude that the width and diameter ratios are important factors to be considered when optimising sediment removal efficiency.

Predicting the effectiveness of surface and subsurface drip irrigation emitters is of growing interest and knowledge of their impact on the root zone is of fundamental importance. This subject has previously been addressed in a number of papers, acknowledged by Monjezi *et al.* (2013) who plot the evolution of the actual soil-wetting front for various arrangements of single point and pairs of emitters in silty loam soils. The authors compare the results obtained with those derived from the two-dimensional Hydrus-2D numerical model. They report that the model proved effective in predicting the wetting front from a single emitter but conclude improvements could be made in application of the model through further calibration of soil hydraulic parameters.

The final paper in this issue (Adarsh and Sahana, 2013), describes the application of the probabilistic global search Lausanne algorithm (Raphael and Smith, 2003), a meta-heuristic tool, to optimise the design of drainage channels with a horizontal base and parabolic sides. This class of channel has been widely studied and reported upon (Das, 2007, 2010). Adarsh and Sahana consider two probabilistic channel models, one with channel capacity constraints and the other with the overtopping probability constrained. A number of variables are considered including the longitudinal slope, channel roughness, individual channel dimensions, the costs of excavation and lining, and uncertainties arising from variations in siltation, scour and channel roughness. The authors conclude that the approach can be used effectively to address a variety of channel complexities and geometries.

I hope you enjoy this issue of the journal and are moved to contribute to discussion of the papers.

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