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Editorial
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Editorial

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This issue brings together five papers covering a range of diverse and interesting topics. The first three papers are based on measured data obtained from existing water resources, irrigation canal and water distribution network systems, and the last two papers are based on results from laboratory experiments.

Good integrated water resources management can be crucial for maximising available resources whilst minimising ecological impact. The first paper in this issue, (Fatemi *et al.*, 2013) examines an integrated water resources approach to modelling the Gorganrud River Basin in north-eastern Iran. Two different types of dynamic systems models, Vensim and Weap, were used, making use of 38 years' of recorded data. The outputs were found to be similar but the former, once calibrated, was over 100 times faster to run than the latter. The Gorganrud Estuary is currently dry over 50% of the time, causing great environmental damage. By operating reservoirs to maintain environmental flow requirements, flows can be maintained all year round. The trade-off is a 10% reduction in available supply for agricultural use, but this can be managed by reducing demand, water recycling and alternative water supply. In addition flood risk will be reduced about 35% of the time.

The authors of the second paper, Swamee and Chahar (2013) have both previously published on the design of lined canal sections and there is an extensive body of literature on this topic. In this paper they investigate the less-studied subject of fixing the alignment of a canal. The most economical canal alignment is along a watershed but the authors examine ways to optimise the alignment of the canal between the head works and the watershed. The major cost item of a large canal is usually the cost of earthworks and ideally the amount of cut is equal to the amount of fill in order to keep costs down. In this paper the topography of a given area is expressed as a Fourier series representation which is then used to find the depth of cut or fill along a particular route. The technique means that several alignments can be evaluated to give the minimum cost route and the method can also usefully be used to bypass or pass through features like settlements, difficult terrain, archaeological sites or places of religious or heritage importance.

The third paper (Hashemi *et al.*, 2013), describes a method of reducing losses when a water distribution network has to be directly connected to a water resource. Normally a tank would be used between the source and the network but for cost reasons this is not always possible, leading to excess pressure and unreasonable water losses. This paper assesses the reduction in leakage and excess pressure in the water distribution network by imposing a schedule to a pumping station. For two water distribution networks in Iran, smart scheduling is shown to give energy cost savings of 34%, leakage reduction by 11%, and excess pressure reduction by 53%. Increasing the number of pumps or using variable pumps improves the savings by providing increased flexibility in the pumping schedule. Where variable pumps cannot be installed it is worthwhile to instead increase the number of pumps. Usually an optimisation algorithm would be used to put together a pumping schedule for a water distribution network. The authors demonstrate however that on networks without a tank, the size of the search space is reduced so that using an optimisation algorithm is not necessary.

Weirs can be used for many purposes including water level control, flow measurement and environmental enhancement. The capacity of a weir directly relates to the crest length and so greater flows for a given channel width can be achieved by using a long-crested weir, using the same upstream head. The next paper (Kabiri-Samani *et al.*, 2013) focuses on rectangular labyrinth weirs as a means of increasing flows over a weir. The authors demonstrate experimentally that this design could be five times more efficient than the equivalent traditional broad-crested weir. This will help in reducing the required freeboard upstream of the weir position.

The final paper (Tokaldany and Shayan, 2013) also uses experimental results, in this case to examine seepage, uplift force and exit gradients under diversion dams. The results from experiments using a laboratory model inside a flume are compared against widely used methods for estimating seepage, uplift force and exit gradients. The authors found that for the soil type used in their experiment, the method of Khosla *et al.* (1936) gives a better estimation of seepage than the creep theories of Bligh (1910) and Lane (1935). Of the latter two theories, Bligh gives better agreement with the observed data for uplift pressure, seepage discharge and piping than Lane. The finite-element method was then used to study Lane's theory further. This also allowed for recommendations to be made on the best position to control seepage and exit gradient and on the location of the maximum and minimum uplift forces.

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