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Editorial

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Most of the papers in this issue of *Water Management* are concerned with the area of water quality analysis and management. This is an area of engineering which is vital to the health and well-being of millions of people worldwide. For example, fluoride contamination of groundwater from geochemical sources is a serious environmental and public health issue in India and 62 million people are potentially at risk from drinking fluoride-contaminated water.

The first paper by Huong *et al.* (2010) illustrates the problems of heavy metal contamination to river sediments in Vietnam, which occurred due to inadequate industrial wastewater treatment. The second, third and fourth papers describe solutions to improve river water quality through the design of detention ponds, (Prohaska *et al.*, 2010); design of biological aerated filters for the treatment of food-related industrial effluents (Osorio *et al.*, 2010); and improvements to monitoring of the activated sludge process used to treat sewage (Wu and Wheatley, 2010). The fifth paper (Rao *et al.*, 2010) continues with the water quality theme but focuses on the issue of drinking water quality, evaluating the use of magnesium oxide in India to reduce excessive fluoride levels. The final paper (Clayton *et al.*, 2010) is concerned with the issue of leakage from water supply pipes and evaluates the contribution due to tree root-induced desiccation of clay soils.

The paper by Huong *et al.* (2010), analyses the issue of heavy metal contamination of river sediments in Hanoi, Vietnam. The environmental impact of this industrial wastewater pollution is high as the rivers are the main source of irrigation water for suburban agricultural land and feed water sources for fish farming ponds. The level of heavy metals in aquatic environments has been of much concern due to the adverse effects of some metals on living organisms in the food chain as well as on human health. Most of the heavy metals have exceeded the maximum permissible level for crop growth. Metal concentrations in sediments appear to be closely related to the type of manufacturing plants located along the rivers. Countermeasures by the government and the technological improvement of wastewater treatment in manufacturing processes are needed.

It is well known that detention storage ponds reduce flood risk. They also play a vital role in protecting the water quality of natural water systems by retaining contaminated storm water runoff from construction sites, agricultural land or industrial areas. In order to design detention ponds the outflow characteristic must be accurately known. The paper by Prohaska *et al.* (2010) examines the discharge characteristics of a circular orifice cut into a vertical riser pipe as an outflow mechanism for the detention pond. In particular, the effects of the head above the orifice, the size of the orifice and the size of the riser pipe on the discharge coefficient are evaluated.

Some food and agricultural industries consume a great deal of water and generate large quantities of wastewater. This wastewater contains high levels of pollutants which require extensive processing and treatment. For example, the effluents from citrus processing plants have a high organic and COD load, a high suspended solids concentration, and acid pH values. The paper by Osorio *et al.* (2010) checks the applicability and optimises the design parameters of biological aerated filters (BAF) for the treatment of effluents.

The activated sludge process is the most common wastewater treatment process used to protect river water quality. An excess of filamentous bacteria is a common settlement problem affecting the activated sludge process. In the paper by Wu and Wheatley (2010), the activated sludge morphology was monitored by image analysis and laser scattering. These were compared with the conventional sludge volume index (SVI). A simpler image analysis procedure was developed using common software and equipment available in most laboratories. This should enable reproducible microbial morphology measurements to be used more widely to routinely predict the onset of poor settlement.

By far the most serious natural groundwater-quality problem in India derives from high fluoride, arsenic and iron concentrations. Fluoride contamination of groundwater from geochemical sources is a serious environmental and public health issue in India. The continuous ingestion of fluoride-contaminated water can potentially result in dental and skeletal fluorosis in affected individuals; in advanced cases, this causes pain and damage to bones and joints. Current practice in rural India is to treat the drinking water with activated alumina which can result in high concentrations of aluminium in the drinking water. There are health concerns that soluble aluminium fluoride complexes in the treated water can have adverse effects on the nervous system. The paper by Rao *et al.* (2010) describes the development and application of an alternative water treatment process based on the use of

magnesium oxide, also known as the IISc method. The advantages of this method are that the chemicals used in the process are non-toxic, avoiding the generation of corrosive and toxic wastes.

An understanding of the causes of water loss is essential in the management of water distribution systems. Water distribution networks worldwide are ageing and deteriorating. At the same time, demands on these networks are increasing, both as a result of population growth and expectations of a better quality of life. The causes of pipe damage that lead to leakages and bursts in water distribution networks are numerous, and the significance of each possible mechanism is not yet fully understood. The paper by Clayton *et al*. (2010) evaluates the potential for tree root-induced desiccation to impose significant bending and therefore additional stress on buried water pipes.

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