

## REPORTS

1991 NATIONAL CONFERENCE ON IRRIGATION AND DRAINAGE ENGINEERING AND GROUND WATER IN THE PACIFIC RIM AND LYSIMETRY SYMPOSIA, M. E. Close, Institute of Geological and Nuclear Sciences, P.O. Box 29-181, Christchurch.

The 1991 National Conference on Irrigation and Drainage Engineering and Ground Water in the Pacific Rim and Lysimetry Symposia were held in Honolulu, Hawaii from July 22-26, 1991. The conference and symposia were organised by the Irrigation and Drainage Division of the American Society of Civil Engineers and were attended by about 250 people.

The conference began with a general session and a keynote address by Robert Chuck, a senior water engineer in Hawaii. He gave an outline of present problems and possible developments in water resources in Hawaii which gave a good background for other papers and discussions dealing with local water resources. Following this address, the conference was divided into five concurrent sessions, three for the Irrigation and Drainage conference and one for each symposium. There was a wide range of session themes both in the conference and symposia. My main interests were in the Agricultural Water Quality Issues sessions and in the Ground Water symposium.

The main theme in the Agricultural Water Quality sessions was the leaching of nitrate and pesticides from agricultural activities into the ground water system. A major inter-agency study into the effects of various farm management systems on leaching of these chemicals is currently being undertaken in five states in the mid-west area of USA. High levels of nitrate are widespread in this area and pesticides are often detected. Several papers describe the projects in the different states and reported on preliminary results. Two papers were given by Thomas Broz (US Environmental Protection Agency) on the National Pesticide Survey of USA that has recently been completed by the EPA and its strategy concerning pesticides in ground water systems. He summarised results from 150 monitoring studies which indicated that 46 pesticides had been detected in wells in 32 states due to normal use of pesticides. Most of these wells had levels less than health guidelines for drinking water.

A wide range of topics was presented in the Ground Water symposium. Frank Peterson (University of Hawaii) gave a paper on atoll hydrogeology and presented a dual aquifer system as the presently accepted conceptual model for atolls. Typically the upper Holocene aquifer is less permeable than the lower Pleistocene aquifer. Tidal signals, which can be used to investigate the system, are propagated laterally through the lower aquifer and then vertically through the upper aquifer, rather than just laterally through a single aquifer. He showed that tidal response data from several atolls fit this pattern and discussed implications of such systems on ground water pumping patterns.

There were a number of case studies on salt water intrusion as a result of overpumping of ground water. An interesting paper was given by John Izbicki (US Geological Survey) on distinguishing between several sources of high-chloride water in aquifers in the Oxnard Plain, California. These sources included seawater, irrigation return in an unconfined aquifer, and non-marine brine underlying the basin. He used trilinear diagrams, ratios of boron, bromide and iodide to

chloride and stable isotope to distinguish between these sources. A major problem was discovered with some older wells being used for monitoring. These wells had high chloride concentrations which had previously been taken to indicate seawater intrusion. The water was actually from the overlying unconfined aquifer and had travelled via corroded well casing to contaminate the aquifer.

There were three papers in the Ground Water symposium from New Zealand, all from DSIR Geology and Geophysics. Hugh Thorpe discussed ground water in the Canterbury Plains and Len Brown discussed the formation and investigation of aquifers in the Heretaunga Plains, Hutt valley and northern Canterbury Plains. My own paper was a summary of a recently completed assessment of pesticide contamination in ground water systems in New Zealand. The study indicated that some pesticides are getting into the ground water but the concentrations are usually low.

One disappointing aspect of the conference was that several authors did not turn up to present their papers, many of which looked very interesting. Apart from that, the conference was very worthwhile. The proceedings of the conference and symposia have been published in three volumes by the American Society of Civil Engineers, 345 East 47th Street, New York, NY 10017-2398.

I would like to thank DSIR Geology and Geophysics and the New Zealand Hydrological Society for providing partial assistance with funding to attend this conference.

INTERNATIONAL SYMPOSIUM ON LYSIMETRY, 23-25 July 1991, Honolulu, Hawaii, USA. D. L. Murray, Dept of Geography, University of Otago.

The symposium was one of two held in conjunction with the National Conference on Irrigation and Drainage Engineering sponsored by the American Society of Civil Engineers.

Having come relatively recently to the practice of lysimetry I was impressed to meet and listen to several of the *gurus* of the business. References to installations at Coshocton, San Dimas and Davis, and many other famous locations brought to life much of the now voluminous material on 'square vs. cylindrical', 'disturbed vs. monolith', and 'weighing vs. drainage' and all the other choices that must be made during lysimeter planning.

There were 36 papers presented in nine sessions over the three days, and as the printed proceedings were not distributed until we arrived at the venue there was some difficulty in coping with the flood of information and data. Formal discussions rarely rose above the usual desultory questions on detail of construction or analysis. The informal discussions during breaks and at the social functions were, as always, the more useful source of enlightenment without the constraints of time or an impartial chairman.

On the last day there was a poster session with 13 contributions. This was very well attended and to my surprise I found it very worthwhile. Barry Fahey, from FRI, (*et al*) had an outstanding presentation and we got some useful feedback from participants.

For me three aspects stand out above the detail of the papers. First is the sheer scope of lysimetry research around the world, and in the USA in particular. This is no outmoded technique; it has developed such that load cells and strain gauges are more common than beam balances now, though hydraulic systems

still have some favour. But the basic techniques remain much the same. International consultants will design and install your lysimeter wherever you want — for a fee.

Second is what I must call the American 'field crop' approach. There is now a great body of experience with lysimeters for estimation of the ubiquitous *ET*-based 'crop coefficient' for many annual crops in various parts of the US and elsewhere. Discussions at this symposium often centred on the question of whose crop coefficient was the biggest, smallest, or most unusual. Worse, there were arguments as to what the 'reference *ET* crop' should be — usually grass or alfalfa.

While I can see why this approach is useful to irrigation engineers, it seems remarkably empirical when useful evaporation models are available to be parameterised. In almost all experiments the required micro-meteorological data are collected, interpreted, and could be discussed in terms of physically based evaporation models. And they had fetch at a scale we could only read about!

The third aspect is related to user pays — rather how much some users are willing to pay. Several papers from the US Department of Energy Hanford Site near Richland, Washington, illustrated the difference between nickels, dimes, and real money. The objectives of the research at Hanford, are close to the original meaning of the term lysimeter — percolation measurement, and as you may guess they are concerned with underground disposal of radioactive and hazardous waste. Something like 150 lysimeters are operated at this site, with the two largest being 18 m deep with an underground control room. The scale of the science and the funding were difficult to comprehend.

In conclusion, it was a very interesting conference. The main benefits were in the personal contacts made and the informal discussions, although it was most instructive to hear and see the wide range of lysimeter installations in different countries. I am grateful to the University of Otago, and the NZ Hydrological Society for assistance with the costs of attending the conference.

The proceedings are available from the American Society of Civil Engineers, 345 East 47th Street, New York, NY 10017-2398, USA as *Lysimeters For Evapotranspiration and Environmental Measurements* Proceedings of the International Symposium on Lysimetry, edited by Richard G. Allen, Terry A. Howell, William O. Pruitt, Ivan A. Walter, and Marvin E. Jensen.