

REPORT AUSTRALIAN STUDY TOUR AND GROUNDWATER CONFERENCE

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The NZ Hydrological Society provided a grant to Mr Andrew Fenemor, groundwater hydrologist with the Nelson Catchment Board, to contribute to his attendance at an international groundwater conference in Brisbane during May 1986. His report on the conference and preceding study tour is reprinted below:

A two week study tour was undertaken with the assistance of the NSW Water Resources Commission, from Sydney to Brisbane. I was accompanied by Mr R. de Joux, hydrologist with the South Canterbury Catchment Board. The trip culminated in attendance at the International Conference "Groundwater Systems under Stress" in Brisbane, 12-16 May.

NSW WATER RESOURCES COMMISSION

The NSW Water Resources Commission assesses and manages the State's water resources. This includes providing low interest loans to farmers for bores or irrigation schemes, and supplying water to large-scale irrigation projects. The Commission's corporate objectives emphasize community relations, water management strategies, flood mitigation and organisational efficiency. Its Groundwater section employs 20 geologists and geophysicists, also field assistants, drilling crews, meter readers and data processing staff.

GROUNDWATER INVESTIGATIONS

NSW groundwater investigations are concentrated on reducing groundwater salinity and rising water tables, which are not generally a problem in New Zealand.

Groundwater models are being developed to help manage the large aquifer systems and normally take one to two years to complete. For example, the Macdonald and Harbaugh USGS model is being applied to a large basin on the Murray River. It is being run on an IBM PC-AT computer with a 15 year calibration period and 3-month timestep.

In the *geophysics* area, seismic refraction and resistivity techniques are widely used. Marked changes in subsurface geology have been mapped over much of NSW, one seismic transect being over 150 km long.

The Commission has just published its first *hydrogeological map*, at a scale of 1:250,000. Geological formations are coloured to show groundwater yield,

sediment thickness, mean stream flows, groundwater flow direction, piezometric contours and salinity concentrations.

Within the Groundwater Section the emphasis is gradually shifting from investigations to management.

WATER RESOURCE MANAGEMENT

Licences (water rights) are required for all dams holding more than 7000 m³, stock and domestic bores pumped at more than 50 l/sec, and for irrigation of more than 2 hectares. The fee depends on the area irrigated, ranging up to \$725 for 160 hectares.

All groundwater bores require licences so that geological data can be collated, but the licence fee of \$125 is only charged for irrigation, industrial and town water supply bores.

All bores taking more than 50000 m³/yr (say 3 l/s for irrigation) require meters. Water meters are read 4 times annually by Commission staff, for which an annual charge of \$80 is levied.

The NSW Commission has produced a Question-and-Answer booklet on water licences which is available to water users. Discharges to water are licensed by a different body, the State Pollution Control Commission.

CASE STUDY: NAMOI VALLEY

We visited the Namoi Valley in northern NSW which is a classic example of groundwater over-use, and now of detailed management policies. Because of the high capital investment in cotton growing and delays in responding to increasing declines in water level, the Commission's policy is to "mine" the groundwater. Total annual licensed allocation is 30% of annual storage plus recharge. After 30 years of pumping at the allocation rate, the groundwater will be exhausted and irrigation will practically cease.

Because most land is cropped in the valley, every irrigable hectare has a water allocation which varies with the local groundwater yield, so that unlike most other parts of Australia, there is no priority for existing users. Public relations and user committees play an important role in the acceptance of these sometimes harsh allocations. The Commission produces an annual report on water level trends for all users, to keep them informed.

INTERNATIONAL CONFERENCE: "GROUNDWATER SYSTEMS UNDER STRESS"

The groundwater conference in Brisbane attracted about 150 delegates. Two New Zealand papers were presented: "Water Availability Studies of a Shellbed Aquifer System, Franklin County, NZ" by David Greig and Roger High, and my paper "Water Management in a Water-Short Area of NZ using a Three Dimensional Groundwater Model".

Other papers of interest included those on the use of isotopes to identify sources of groundwater, modelling to evaluate management scenarios, and management strategies for over-pumped aquifers. Rather than having a question-and-answer session after each paper, discussion sessions on a particular

theme were held at the end of each day. The following were some of the themes developed at the conference:

- *Groundwater models* are useful for supporting management decisions, but the cost of development may be prohibitive in areas of complex geology. They are usually more accurate in single-crop areas or where pumpage is all metered.
- *Water rights* must reflect actual water usage as closely as possible, otherwise water management during droughts is difficult. Advisory committees are the best form of support for restrictions on water use. High penalty charges for excessive water use encourage efficient water use.
- *Water allocation policies* generally protect the existing user. Groundwater should be allocated to the perceived yield (eg. mean annual recharge plus a percentage of available storage) and controls should be put on bore spacings. Some Australian states now reserve water for priority future use e.g. town expansion.

CONCLUSIONS

The tour and conference reinforced the fact that successful water resource management requires detailed technical assessments (e.g. definition of the groundwater system, characterization of river flows, modelling) working in concert with an effective administration system (water rights and rationing). Restrictions on water rights and intensive monitoring are the major tools for efficient water use and management.