THE HYDROLOGICAL SOCIETY OF S.A. INC.

c/o Water Resources Branch
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GUEST EDITORIAL

IN SEARCH OF NATIONAL WATER RESEARCH PRIORITIES

On 17 and 18 September the first National Water Research Seminar was held in Canberra. This was organised by the Australian Water Research Advisory Council (AWRAC) with the principal aim of identifying national water research priorities. I was one of approximately 180 attendees at the seminar. The delegates fell into the following four groups :

(a) The researchers. Each member of this group of starry-eyed individuals felt he could make a major contribution towards solving Australia's water resource problems if only given sufficient time and money and left alone to do the work.
(b) Representatives of the water authorities and the water industry. Members of this group were expecting the researchers to tackle the immediate problems of the industry, preferably at someone else's expense. Many of the problems identified by this group are of a financial and organisational nature and, in my view, represent challenges for water managers rather than research problems.
(c) Members of the research funding bodies (principally AWRAC). This small group has the unenviable task of allocating limited funds among group (a) while attempting to please group (b).
(d) The onlookers who came along to see "which way the water is flowing".

As a researcher, I found the opportunity to talk with so many other people who are active in the water field quite stimulating. This informal aspect aspect of the seminar was perhaps more valuable than the series of brief presentations (usually 5-10 minutes) on research needs.

Clearly a group of 180 people is unlikely to agree on anything, and the seminar can best be seen as an exercise in generating ideas. The task now remains for AWRAC to assemble a set of priorities for water research in Australia based on the seminar discussions and the position papers which had been previously circulated. In doing so, a number of possible conflicts need to be resolved. For example, the recent emphasis of water research funding has been on ecological research. Perhaps this is only offsetting the previous emphasis on technical and engineering matters, or has the pendulum swung too far ?

Another issue raised by Graham Allison in the last editorial is the undesirability of research being funded on a contract basis. I feel that this is not a bad thing as long as there is some money for basic research. We have, as a nation, fallen down in the areas of applied research and development in the past.

Finally, to what extent are organisational or institutional issues genuine research problems? We need to strike a balance between research into management practices and scientific and technical problems in the water industry.

Graeme Dandy

ARTICLES OF INTEREST

WAVE-POWER PROJECT FOR TASMANIA

An Australian wave-power research project is being developed in Tasmania with the assistance of the Norwegian company Norwave.

Norwave has had discussions with the Tasmanian Hydro-Electric Commission about wavepower for the island state, based on previously commissioned prototype plants.

Australia has a 36,735 km coastline - and some very rough seas - and is therefore well placed to turn wave power into useful energy.

Since July 1985, the CSIRO division of oceanography in Hobart, has been measuring waves off Cape Sorrell on Tasmania's west coast. The project is supported financially by the Western Australian consulting firm Steedman.

The waves at this coastal area have a "fetch" which is one of the world's longest; the term applies to the distance of water over which winds can blow in the same direction without interruption. One reason for measuring them is to gauge the long-term nature of the waves, additional to the energy they generate.

Energy generated by the wind as it blows over the oceans is accumulated by waves, which carry it over long distances. The largest wave recorded so far by CSIRO under the Tasmanian project, measured 16.78 m from trough to crest.

CSIRO researchers have placed measurement buoys about 20 km off the Tasmanian coast; these send measurement information back to Hobart via a radio and telephone link.

Dr. Chris Fandry of CSIRO's oceanography division, stated that the project had calculated the wavepower generating capacity on the island's west coast. Consequently, the Tasmanian Commission was considering the feasibility of installing an ocean wave-power plant on nearby King Island.

The average power dissipated by waves along 53 km of the west coast is equal to Tasmania's total present installed hydro-electricity capacity of 2,055 MW.

Fandry explains that "this is about three times larger than the power of the waves off the coast of Norway, where Norwave's pilot plants have been constructed".

The Norwegians are among the world's leading designers of pilot wave-energy power plants and have built two types of the plant so far (World Water, March 1985).

The first and most successful, the oscillating water column, generates 850 kW - enough to supply a community of 1000. When a wave hits the shore, it forces water up a 21 m tower; air in the tower is displaced and rushes upwards through a turbine which drives an electric generator.

The second type of plant uses a wave focusing device to drive water up a sloping channel to a reservoir at the top of a cliff. Water collected in the reservoir rushes through an electricity generating turbine on its return journey to the sea.

Fandry believes that waves will never supply more than a modest part of the world's energy, but for island nations, he says, electricity from the oceans could become more important.

(reprinted from "Water World", August 1987)

UK TO ABANDON RIVER BASIN MANAGEMENT ?

In its determination to float the ten regional water authorities in England and Wales on the stock market, the UK government is prepared to break the principle of integrated catchment management which only 18 months ago it recognised as being a "good and cost-effective model for other countries to follow" (White Paper, February 1986).

A discussion "green paper" published on 16 July explains the Conservative government's revised proposal - which first appeared in its successful election manifesto in June - to strip the water authorities of water resources planning, pollution control, land drainage, fisheries, navigation, and conservation. These functions would be transferred to a newly constituted public sector National Rivers Authority (NRA), leaving ten privatised "water services public limited companies" with the utility functions of water supply, sewerage, and sewage disposal.

The NRA is the government's answer to the widespread opposition that its original proposal to sell the water authorities intact provoked from the Confederation of British Industry (CBI), the Council for the Protection of Rural England (CPRE), the labour unions, and several of the water authorities themselves.

Forced to abandon the first plan in the face of opposition from many of its traditional supporters (the Country Landowners' Association was another dissenter), the government looks like getting an equally stormy ride with the NRA idea.

While it may have placated the CPRE and other environmental groups, the idea of the NRA is seen by many within the water industry as a return to the bad old days before 1973 when a gaggle of utilities, authorities, boards, and councils squabbled over water and sewerage functions.

It also flies in the face of its own 1983 Water Act which abolished the National Water Council (NWC) because "in the Government's view there is no longer any need for a central statutory body in the water industry".

At the time it was widely held that the government wanted rid of the NWC and its outspoken chairman, Sir Robert Marshall, for constantly complaining that the squeeze on water authority finances would lead to deteriorating standards and quality.

In May this year, Sir Robert seems to have been vindicated by the House of Commons Environment Committee, which reported that river quality was no longer improving and recommended that the water authorities be allowed to borrow money commerically, either by privatisation or by ending the Treasury's borrowing limits - applied to the water authorities by a variety of devices.

With its Green Paper, the government has brought the argument full circle, using the Committee's findings on river pollution (but not its recommendations) to justify the NRA. Lord Belstead, the Environment Minister, said that one reason for setting up the NRA was that the steady improvement (in river quality) since the late 1950's has faltered.

Environment Secretary, Nicholas Ridley, has gone further and cast doubt on the right of water authorities to police rivers even if they remain in the public sector. At the same time, the government is suggesting that the NRA will be able to contract out some of its resource management and pollution control work - to the privatised water service PLC's.

This hybrid body with a foot in both the public and private sectors is not pleasing anyone. Most observers are convinced that the government is not concerned about pollution at all, but obsessed with the doctrine of privatisation. The magazine New Scientist summed up informed reaction, accusing ministers of "outrageous humbug".

(reprinted from "Water World", August 1987)

ON THE PROBLEM OF RISING MSL
(contributed by John Argue)

I ran across an interesting "new" approach - new to me anyway - to solving the problem of rising mean sea level created by the gradual increae in temperature of planet Earth. The "solution" is offered in an article by geologists Walter Newman (City Univ., NY) and Rhodes Fairbridge (Univ. of Columbia, NY) in "Nature" (27 March 1986). Newman and Fairbridge estimate the rise in MSL over the next 200 years to be at least 1.25 mm per annum. This corresponds to an increase in Earth's seawater volume of about 150 km^3 each year.

Newman and Fairbridge propose what they call "anthropogenic management" of the hydrological cycle - interrupting the cycle so that the additional 150 km^3 (each year) is abstracted, temporarily, by storing it in locations where the land surface is below sea level. Suggested locations include Imperial Valley (California), the Qattara Depression (NW Egypt), the Eritrea depression in Ethiopia and the Aral-Caspian depression. (Presumably our own Lake Eyre would fall within the scope of this suggestion.) The total volume of seawater which could be stored in these depressions, operating as evaporation basins, amounts to some 7000 km^3. The proposal is therefore only a short-term solution to the problem but one which has some side benefits, e.g. hydro-power generation, salt production, etc.

So, if the Newman/Fairbridge proposal were to be adopted, we may see Bradfield's "inland sea", centred on Lake Eyre, sometime next century. In which case those intrepid explorers who set out to find it in the early 19th century may have been just 200 years early !

I believe that Newman and Fairbridge's main contribution to the "greenhouse effect" discussion is not so much their solution to the problem of steadily rising MSL, as their portrayal of the magnitude of the problem facing the great cities of the world, most of which are located beside the sea.

GEREDE-ANKARA AND ANKARA PERIPHERAL MOTORWAY PROJECT, TURKEY : HYDROLOGY AND DRAINAGE DESIGN CRITERIA

(contributed by A.M.D. Hall)

BACKGROUND :

At the beginning of 1987, Maunsell and Partners, in association with Parsons Brinckerhoff International, were appointed consulting engineers by the Emka-Bechtel Joint Venture with the task of designing a 110 km section of the six-land TransEuropean Motorway into the Turkish capital, Ankara. As well, the brief called for the design of a 160 km six-lane ring road around the city. The geography of the area includes high mountains and rugged plains, best described as "difficult terrain".

Earlier this year, Adrian Hall (Adelaide office of Maunsell and Partners) joined the project on three months secondment in order to carry out the initial hydrological analysis and to establish design criteria for the drainage systems. He reports on some of the technical aspects as follows :

THE PROJECT

For a motorway project traversing rugged terrain, a wide variety of drainage facilities is required, ranging from bridge crossings over major rivers, down to small channels, chutes and pipes draining the roadway surface. In estimating flood discharges from rainfall events, several different hydrological methods were investigated, and a selection was made of the most appropriate analytical procedures.

For the smaller catchments (up to 20.0 km^2) where box or pipe culverts were required, the Rational Method was favoured, because of its simplicity and speed. When compared with hydrographs derived from synthetic unit hydrographs, the Rational Method 'peak flow' discharges were found to be conservative, but not excessively so. In determining runoff coefficients for rural catchments, the most important factor was identified as "terrain slope" (i.e. typical overland slope), the parameter affecting soil depth, vegetation and soil type.

For the larger catchments (up to 2,000 km^2), requiring large box culverts or bridges, stream-flow records from several gauging stations were used to develop a series of Regional Flood Curves for various return period events. While the overall correlation between the Median (1 in 2 year) flood and catchment area was good, it was necessary to apply rainfall correction factors, to account for the variation in mean annual rainfall across the region. The Regional Flood Curves were used to derive preliminary estimates of peak discharge for the large catchments in the project.

On some rivers, flows were observed and estimated during site visits. By observing marks left by recent floods (e.g. flood debris lines), flood flow cross-sections were measured, and the corresponding flood discharges were calculated. These "Bankfull Analyses" provided a useful check on the median flood values obtained from the streamflow records.

RORB, an Australian-developed Runoff Routing computer programme, was used to analyse the larger catchments more rigorously, in order to confirm the peak discharge values estimated from the regional curves. The RORB model is spatially distributed, the catchment being divided into subareas, and represented by a tree-like arrangement of channel reaches, each simulated by a reservoir of the form $S = KQ^m$, where S = storage km^3), Q - outflow discharge (m^3/s). M is a dimensionless exponent (usually 0.8). K is an empirical coefficient formed as the product of two factors : K = KcKr, where Kr is the relative delay time applicable to an individual reach storage, and Kc is the storage parameter applicable to the entire catchment. For gauged catchments the RORB model was fitted to known hydrographs, enabling the determination of Kc and m. For the larger catchments, a logarithmic relationship was established between Kc and Catchment Area - which conformed very closely to the results of South Australian RORB studies such as were carried out recently by the Engineering and Water Supply Department.

H.S.S.A. BUSINESS

HONORARY LIFE MEMBERSHIP

In the 17 years since its inception, HSSA has conferred Honorary Life Membership on only one of its distinguished members - Mr. B.C. (Skip) Tonkin. There are a number of members of our Society for whom this honour would be appropriate. Accordingly, nominations for this category of membership are sought from members.

The main criteria for selection are current membership and distinguished service to HSSA. In addition the candidate's contribution to hydrology may be taken into account.

Members deserving the Society's recognition and appreciation will no doubt spring to mind. Don't leave the responsibility to someone else. Put pen to paper and give them the recognition they deserve.

Nominations should be forwarded, in confidence, to the Secretary for consideration by the Executive Committee. It is hoped that the number admitted to Honorary Life Membership of our Society will be significantly increased in the near future.

TENTATIVE PROGRAMME FOR 1988

- February meeting*
  "Hydraulic behaviour of the Hunter River, NSW sediment transport, river bed scouring, etc.
- April meeting
  "Hydrology of the Northern Flinders Ranges, Leigh Creek catchments" (David Kemp)
- June meeting
  Debate on groundwater "To mine or not to mine?"
- August meeting (and AGM)
  "Hydrology of the solar system"
  (Vince Kotwicki)
- October meeting
  "Groundwater hydrology of the Great Artesian Basin - an update"
- November meeting*
  "The design and operation of data bases for storing hydrological information" (Russell Marks)

*The February and November meetings may be interchanged

HYDROTRIVIA (contributed by Claus Schonfeldt)

1. Which world river system drains the largest catchment area ?
2. What had Archimedes discovered when he, reputedly, ran down the street exclaiming "Eureka" ?
3. What is the (approximately) T.D.S. of Perrier water ?
4. Which is the longest river rising in SA ?
5. Who conceived the Rational Method of peak flow estimation ?
6. The flow data of which river led to the discovery of the Hurst effect ?
7. What are the true units of E.C. for measuring salinity ?
8. Which amoeba is responsible for amoebic meningitis ?
9. What does a radiometer measure ?
10. Which modern water appliance did Michelangelo Buonarotti invent ?

ANSWERS : 1) Amazon; 2) Buoyancy; 3) 420 mg/L; 4) Alberga; 5) T.J. Mulvaney; 6) Nile; 7) microsiemens per cm @ 25°C; 8) Naegleria Fowleri; 9) radiation, particularly solar radiation for evaporation studies; 10) toilet cistern - he painted the Cistern Chapel didn't he.

EDITOR : John R. Argue (Tel. 343 3131)
C/- School of Civil Engineering
S.A. Institute of Technology
The Levels, S.A. 5095
FAX : (08) 349 6939