

JOURNAL OF HYDROLOGY

NEW ZEALAND

Published twice annually by the New Zealand Hydrological Society

Volume 12

1973

Number 1

PRESIDENTIAL ADDRESS*

The Society: A Look Back and a Look Forward

As you are no doubt aware, I have been president of the Hydrological Society for 12 years. In fact I have been the only president to date, and inevitably some aspects of the Society bear perhaps the stamp of my influence. However, do not expect me to present you with a eulogy of myself, because my achievements, at best, have been small, and the Society has been successful largely because of the untiring efforts of its Committee and the continuing support of its members.

It is fair to say that the Society has flourished. The eight hydrologists who met in August 1961 to form the New Zealand Hydrological Society could not really foresee the excellent growth and have some reason to be proud of their initiative.

After 12 years we have over 433 members, an excellent journal which has appeared 22 times, and we have held 9 symposia. This is no mean success considering that hydrology has come through some major struggles and in fact was until recently not thought by many to be a science but a branch of civil engineering!

The firm establishment of hydrology among other sciences has been helped enormously by the formation of the International Hydrological Decade. The IHD provided the stimulus to promote hydrology as a scientific pursuit and, of course, this has been the aim of the Society. The Society has also grown up amidst a growing concern about water problems. In New Zealand, legislation on water and soil conservation was passed in 1967, and throughout the world water is becoming rapidly regarded as a commodity which has been undervalued for too long. This again has helped the growth of the Society. But, looking back, the Society was also necessary to assist IHD work and to promote the science of hydrology in New Zealand and to make New Zealanders aware of the need for hydrological work.

* Presented at the 11th Annual General Meeting of the New Zealand Hydrological Society on 28 November 1973 at Lincoln College, Canterbury, New Zealand.

So let us look at what we have done to date.

We have been concerned with a wide range of topics in the field of hydrology.

We have published some 140 papers so far, with, for instance, 25 papers dealing with precipitation, 21 with erosion and sedimentation, 28 with instrumentation and observation methods, and 11 with mathematical models. Curiously, only three papers have dealt with groundwater and two with water quality so far, and this of course reflects the hydrological problems in New Zealand. Without doubt there will be an increase of papers on these topics in future. Of interest is that about one-third of the papers are from government sources, one-third from universities and one-third from overseas. This is a healthy distribution, showing no particular dominance by any one group.

We have held symposia on correlation techniques; representative and experimental basins; erosion and precipitation; catchment characteristics and streamflow; floods and droughts; climate change, snow and ice and lakes; catchment control; and two general symposia. The outstanding feature of these symposia has been, in my opinion, that we continually see new faces at these gatherings and these faces come from a wide range of disciplines.

The need to clarify what is hydrology and its relation to the outside world has been reflected in Presidential Addresses which dealt with, amongst other things, the place of hydrology in the New Zealand economy, in science, and in the environment. The Society has also been active recently in commenting on the Dunford Report and on proposed changes in water legislation, and the Committee of the Society now also acts as the National Committee for the International Association of Hydrological Sciences. As well, the Society has formed subgroups on mathematical modelling and on erosion and sedimentation, and has local branches in Hamilton and Christchurch.

So far so good – now what of the future? Hydrology is firmly established as a science, the IHD will be followed by the International Hydrological Programme in 1975, the International Association of Hydrological Sciences is becoming more and more a vigorous and prominent organization in the international scientific world, and the Society will no doubt continue to publish a healthy journal and hold symposia. But there are problems which have not been solved.

Hydrology, if it is to prosper, needs more great thinkers, since scientific progress is really insufficient to cope with a rapidly increas-

ing complexity of the water problems that face the world.

Ven Te Chow wrote in 1972 "Most natural hydrological phenomena are so complex that they are beyond human comprehension". This means that approximations have to be made and are being made, and solutions are in reality not any better than, say, 30 years ago because the problems have become more complex. For instance, in flood hydrology, our progress has been very slight, because we are still far from understanding the processes. New approaches are in fact no more than refinements of techniques developed some 50 years ago.

Perhaps we need more scientists who look at problems sideways and approach them from entirely new angles. We often get bogged down in approaches because a lot of work has been done in that direction. For instance, is it really useful to continue work on refining unit hydrograph techniques and might it not be better to spend more time on studying the origin of streamflow?

Yevjevich* said during the IAHS symposium in Moscow in 1971 "to be deterministic is dogmatic, to be stochastic is pragmatic". Perhaps it is dogmatic to consider only limited approaches and pragmatic to look at problems from entirely new angles.

Another problem is perhaps one of the future of hydrology in New Zealand. It will grow because there will be an increasing need for hydrological information. However, although there has been a very satisfactory growth of hydrology in the universities, and regional water boards are becoming active in this field also, there could be some clouds on the government hydrological horizon.

Whether we agree with it or not, the fact is that the Ministry of Works and Development has played a dominant role in the hydrological field in New Zealand. The Dunford Report has now recommended changes in their hydrological organization which could be felt throughout the country. If implemented as proposed, hydrology, as a science, could well be set back. This, of course, depends partly on what we mean by hydrology.

Hydrology – as a science – has been clearly defined, and I referred to an accepted international definition in my Presidential Address in 1969. The definition indicates that hydrologists are involved in many aspects of basic and applied studies of natural water. But we must be careful of interpretations!

Perhaps somewhat arbitrarily, we can look at three aspects of natural water:

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- (i) water quantity,
- (ii) water quality, and
- (iii) water management.

The determination of the *water quantity*, the study of the effect of natural or man-made changes on water quantity, and hydrological processes governing water quantity, are clearly within the orbit of hydrology.

The same applies for *water quality* as far as physical, chemical and isotopic water quality is concerned, although it is understood that close co-operation will exist with specialized chemical and nuclear scientists in this field. As far as the biological quality of water is concerned, this is really the field of the freshwater scientist (by New Zealand definition). Freshwater scientists are by training biologists and are therefore a breed apart from hydrologists. Close co-operation normally exists between freshwater scientists and hydrologists, since the former are interested in hydrological aspects when – for instance – studying eutrophication, and hydrologists may be interested in, say, photosynthetic processes when developing prediction models for water quality.

Water management is quite a distinct field. It comprises river control, drainage, irrigation, soil conservation, hydro-electric power development, water pollution control, water allocation, and so on.

Several or all of these activities together are referred to as water resources management, watershed management, catchment control, water and soil conservation, or similar terms. Confusion is rife, but surely the hydrological picture is clear.

Hydrology is the fundamental science required for all water management projects, although many other sciences and technologies are required also. Water management research, if one wishes to use such a broad term, is not hydrological research, but makes frequent use of hydrological principles. For instance, water resources systems development is strongly dependent on mathematical models developed for strictly hydrological purposes. But this does not mean that water management experts need to be hydrologists. Clearly, co-operation needs to exist – but then, hydrology is a science that has to co-operate with many technologies and sciences if it is to prosper at all.

Now Dunford proposes a merger of hydrology with somewhat unrelated sciences, and this may be questioned.

I said in my 1968 Presidential Address that the combination of climatology, oceanology, and hydrology should deserve considera-

tion, if hydrology has to be combined with anything at all. However, it would perhaps be better if it were to stand on its own and if hydrologists were to co-operate strongly with every scientist and technologist who is interested in water. Otherwise hydrology may develop in the direction of the associated science, perhaps to the detriment of other problems.

The Society has shown that this is a sound and practical principal. It is a "Hydrological Society" dealing with the science of hydrology, and it is co-operating with everyone who has some interest in water – as is demonstrated by the very large percentage of our members who are non-hydrologists.

This, I believe, is the strength of the Society – being multi-disciplinary in its membership – but it deals with only one science. Long may it prosper.

CORNELIS TOEBES