

M.J. Cooper

# JOURNAL OF HYDROLOGY

NEW ZEALAND

Published twice annually by the New Zealand Hydrological Society

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Volume 7

1968

Number 1

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## EDITORIAL

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### HYDROLOGY, RESEARCH AND EDUCATION

#### Scientific Hydrology

To define hydrology as a science, distinguished from the application of science-in-general to problems of water assessment and management, the Ad Hoc Panel on Hydrology of the U.S. Federal Council for Science and Technology recommended the following definition:

**Hydrology is the science that treats of the waters of the Earth, their occurrence, circulation, and distribution, their chemical and physical properties, and their reaction with their environment, including their relation to living things.**

The domain of hydrology embraces the full life history of water on the Earth.\*

There is certainly considerable scope for hydrological research, and it is scientific research in which New Zealand can make an important contribution. This has been recognized by Parliament, who recently passed the Water and Soil Conservation Act.

#### Water and Soil Conservation Act 1967 and Research

On 1 April 1968 the Water and Soil Conservation Act 1967 came into force. For the first time in New Zealand, this Act introduced a unified control over natural waters by the creation of the National Water and Soil Conservation Authority. Among other things, the functions of the Authority are:

To guide and encourage research in matters relating to natural water and soil conservation and the application of knowledge thereby acquired. (Section 14, 3k);

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\* Ven Te Chow (Ed.) 1964: *Handbook of Applied Hydrology*.

To organize the establishment of records of availability, volume, and location of resources of natural water. . . . (Section 14, 4a);

To carry out hydrological research, and to promote research in matters where, because New Zealand conditions may differ from those upon which work has been done overseas, there is a lack of research data which would enable the applicability of overseas work to New Zealand conditions to be assessed. (Section 14, 4k).

### Research and Education

In the above the emphasis on research on natural waters is strong. But effective research requires the suitable education and training of a sufficient number of workers. Stated functions of the Authority in this direction are:

To promote the training and education of persons engaged in the administration of natural water and other water and in soil conservation. . . . (Section 14, 3p);

To foster the proper training of waterworks personnel. . . . (Section 14, 4g).

It may reasonably be asked if "administration" in the former statement is intended to embrace research, because there appears to be no clear statement on education and training for research. Mere implication is unsatisfactory. Omission of an explicit statement on education and training for research workers in the fields of water and soil conservation is unfortunate, and particularly is this so for the field of scientific hydrology.

Although the facilities for tertiary hydrological education overseas are improving, the fact remains "*. . . that the training of most hydrologists, and of others whose training emphasizes hydrology, is oriented predominantly toward engineering; that is, toward using the information we already have and gathering additional data in the solution of practical problems rather than toward the science of hydrology, whose aims are directed more to an understanding of the cause-and-effect relationships between water and its environment.*"\* A similar situation exists in New Zealand.

In recent years our Universities have shown an increased awareness of the need for basic education in hydrology and closely related sciences — such as climatology and rangeland management — but nowhere in New Zealand is a comprehensive course available to produce hydrologists. It is appreciated that one basic course in

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\* U.S. National Committee for the International Hydrological Decade 1967: I.H.D. Bulletin No. 4. In: *Trans. Am. Geophys. Un.* 48 (4).

hydrology would not make a hydrologist, because a broad training in all sciences that intersect the science of hydrology is really necessary. However, few on university staffs have this necessarily broad educational background coupled with sufficient experience. It would be a move in the right direction if university staff in departments teaching hydrology and allied sciences would obtain summer employment in hydrological work.

A small handful of science graduates have entered hydrology recently and this is heartening. At least they have been trained in the principles of scientific method. But the numbers coming forward are far too low for hydrology to cope satisfactorily with increasing demands being made; and from now on, as a result of recent legislation, demands are likely to outpace at an even greater rate the capacity to meet them.

It appears to be the responsibility of the National Water and Soil Conservation Authority to recognize the inadequate supply of scientists in hydrology, to realize the likely repercussions in relation to its research functions, and to consider seriously, and take action on, ways of improving the situation.