

## Hydrological Histories: Hugh Thorpe

During the summer of 1957–58, I was a student with a scholarship from the old Ministry of Works and Development, and part of that was that they arranged summer work for us. I was based at Palmerston North, and was working with what was called in those days the North Island Hydraulic Survey party. They didn't even use the term hydrology. We ranged over the southern half of the North Island, as far as Taranaki on the west and Gisborne on the east, and for me as a student it was just a fun, fun time travelling around. And all we were doing was servicing instruments, changing charts, checking the gear, doing gaugings, all that sort of stuff – absolutely basic hydrology.

During that time, I was involved in the first, as far as I'm aware, collection of suspended sediment samples of New Zealand rivers, on the Whanganui River which is quite a turbid river. We did our gauging of a cableway about 1100 feet (335 metres) long. We did our sampling by attaching a milk bottle vertically above the bomb. Into that milk bottle there was a rubber bung with a string on it. This would be laughed at these days in terms of sediment collection, but that's what we did. We lowered the bomb into position and then yanked on the string, pull the plug out, the water poured in, and we got a turbid sample. It was my responsibility to analyse these back in the laboratory in Palmerston North – very tedious work.

I went back to do my final year of engineering degree and realised that what I was interested in was fluid mechanics. I did a masters in fluid mechanics with Professor Frank Henderson, who wrote a famous textbook on open channel flow. I went to do some ordinary civil engineering work with the Ministry of Works, although I did get back into hydrology a bit because I was based here in Christchurch in the late 1950s when there was a big bridge replacement programme.

All we had in those days was Technical Memorandum 61, or TM61, an empirical means of estimating flood flows based on catchment area and whatever rainfall data existed. I did a number of bridge investigations on both the Waimakariri and on the Waiau Rivers and some of the tributaries.

Then I got a scholarship and went off to Britain to do a PhD in fluid mechanics, followed by a two-and-a-half-year stint in Thailand, where I taught at Khon Kaen university on a Colombo Plan assignment.

Coming back to New Zealand in 1964, I joined the Water and Soil Division of Ministry of Works and Development. We had a little research group led by Kees Toebes in our division, and within the Power Division there were Steve Thompson and Richard Ibbitt working on hydrological data handling and processing systems. I provided technical oversight on the work of catchment boards, because at that stage the government was providing them with a lot of subsidy money for various river works, and wanted to make sure the work was well done.

### Emergence of groundwater science in New Zealand

When people started to show interest in groundwater as a source of irrigation, they went to the local office of the geological survey. The geologists would say, "No, apart from Christchurch, there's no groundwater under the Canterbury plains." The man who started it all, from an irrigation point of view, was Brian Cameron. He farmed down at Pendarves, between the Rakaia and the Ashburton. He really needed water down there in the 1960s. He thought, "Damn it, I'm going to ignore the experts," and drilled a six-inch well. He found good water. It all started from that one well in Pendarves.

Groundwater was a matter of growing interest, but it was just by chance that I got into it. I was mid-career, in my 40s, and a job came up. It was intensely political – a dispute between the Hawke’s Bay Catchment Board and the Hastings City Council. The Hastings City Council (HCC) wanted to extend its urban boundaries westwards over the unconfined aquifer, but the catchment board said HCC shouldn’t do that because of its potential to pollute their own water supply. The hydrogeology of that area is very similar to Christchurch. It got to a political stalemate with these two local bodies fighting each other, so as often happened in those days, they went to the Minister of Works and Development and said, “We’ve got a problem”.

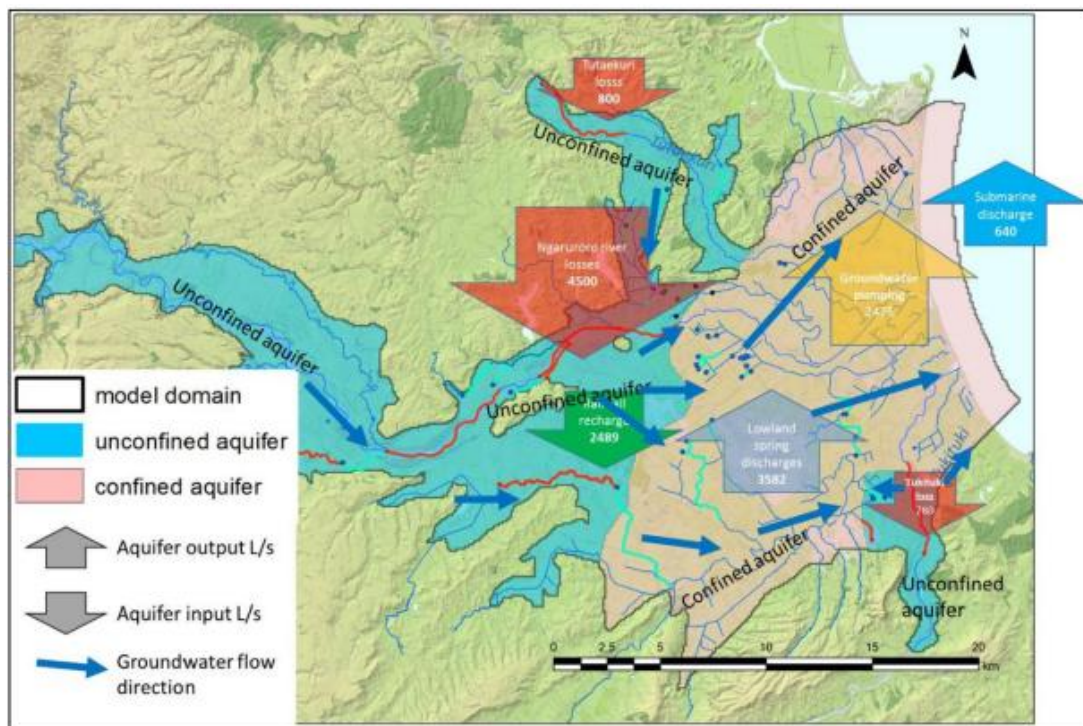


Figure 1. Main features of the Heretaunga Aquifer Arrows show typical flow components in L/s. Today, a great deal more is understood about the Heretaunga aquifer system (Figure 2-15 from Rakawski and Knowling, 2018)

The Minister wrote to the Ministry of Works and Development and said, “There’s this groundwater problem up there, solve it”. I had no background in groundwater at all. Hardly anybody did in 1976. But the Water and Soil Division had a new research director; another scientist, Mike Taylor, was in charge of issues related to water quality; and my role was in water quantity. This was a groundwater pollution issue, so Mike Taylor was supposed to lead the programme to solve the problem.

The research director came in one day and said, “We’re going to do this work Hugh, and I want you to write a letter to the Minister to tell him that we’d have it solved in nine months.” I said to him, “This is a big job, there’s no way we can do this in nine months,” and he just said, “Write the letter.”

I thought I wasn’t going to be involved, so I sat down and wrote the letter. I thought, poor Mike Taylor, he’s got a terrible job there.

About two weeks later the research director came back to me and said, “Mike Taylor is too busy Hugh, you’re going to have to do it”.

In those days, cooperation between government agencies was much easier than it is now, and so we pooled together whatever scientific expertise we had in groundwater. We had the geological survey, the

Institute of Nuclear Sciences, and Bruce Hunt, who was a groundwater mathematician at the University of Canterbury, plus others. We all got around a table.

The research director turned on all the resources. Money was no object. If we needed more people, they were recruited. We spent about a quarter of a million dollars in nine months, big money in those days, and established several research sites on the unconfined aquifer. We drilled holes like mad all over the place. Wasted a significant amount of money and time because of our inexperience. We actually did complete the job in nine months, to the hour.

I was responsible for writing the final report, and I was working like crazy. The research director kept me under a lot of pressure to meet the deadline: 5 o'clock on 30 June 1977.

I slid the report into the letterbox in Wellington at 5 o'clock on 30 June 1977. I got some kudos from that, but I was working with a really good team of people, and the guys who did the field work up in Napier put in a huge effort and did a great job. There was a rumour the director and the chair of the catchment board had a bet for two bottles of whisky on whether we would get it done. The director won, but he did not touch spirits himself, so I don't know where it went. Hopefully to the guys up in Napier!

The Heretaunga Plains job was the first multi-disciplinary groundwater investigation ever done in New Zealand, and I suspect it's the largest and most intense one still. It was a unique combination of circumstances, because people were happy to cooperate in those days. I learned a huge amount about groundwater in the space of nine months, and I thought, I like this, this is really interesting.

## Growing and extending groundwater science

In 1978, the Water and Soil Division was setting up its science centre in Christchurch, and I got a job leading the groundwater group. I was very keen to get away from Wellington. I worked closely with David Scott in the groundwater group for many years, but we also had a water quality group and could get Murray Close and Lester Sinton involved on groundwater quality issues. That was a unique combination. We recruited other scientists into the group such as Rob Burden, Paul White and Michael Broadbent, plus several very competent technicians.

The Ministry of Works was heavily involved in irrigation development in those days. At that stage they were proposing the Lower Rakaia Irrigation Scheme that, 40-odd years later, eventually came to fruition in the Barrhill Chertsey Irrigation Scheme. But in those days the irrigation engineers were turning their thoughts to using groundwater rather than just surface water. The task we were given was to quantify the groundwater resources between the Rakaia and Ashburton Rivers, because they wanted to minimise the amount taken out of the river and maximise the amount taken out of the groundwater system.

Dave Scott developed a groundwater model, and Rob Burden and I contributed bits to it. We became very aware that understanding of groundwater as a resource in New Zealand was very limited. We just didn't have the skills.

So, we initiated training programmes for catchment boards on groundwater. Then people like Dave Murray at Otago University began teaching groundwater and groundwater modelling. There was some groundwater being taught at the Victoria University of Wellington, and I believe also in Auckland. That got groundwater science underway in New Zealand, and it was very satisfying to be a part of that.

We didn't really talk about surface water and groundwater interaction all that much, although the Heretaunga aquifer and the Rakaia/Ashburton jobs were about surface/groundwater interaction. It dawned on us that quite often they are not separate systems.

In 1992, we all got caught up in the restructuring of the scientific civil service, which was quite a setback for groundwater because it became, again, political. Groundwater hydrology and surface water hydrology within the Ministry of Works should have stayed together, but they didn't. We got split off and put into what became Geological and Nuclear Sciences (GNS Science). There was interest in geophysics, geology, and groundwater was just on the margins.

After 1992, I went to the Civil Engineering department at the University of Canterbury, Christchurch, on a grace-and-favour basis. I never had an official title. I never had a salary. All they gave me was some space to work from and I was grateful for that. I taught on contract, so I continued to teach groundwater, both at Canterbury University and at Lincoln, and running courses on contract with GNS or whoever.

*Hugh Thorpe was one of the pioneering groundwater hydrologists in New Zealand, and very forward-thinking for his times. Hugh's recollections, from an interview on 14 May 2016, are part of a New Zealand Hydrological Society [series](#) that documents the times and memories of New Zealand's senior hydrologists.*

Rakawski, P. and Knowling M. 2018: Heretaunga aquifer groundwater model. Executive summary of development report. Hawkes Bay Regional Council Report No. RM18-16; Publication No. 4999.