

Wairau Aquifer science & management update for Climate Karanga Marlborough.

Dave, Don, Pete and Budyong had a two hour meeting at MDC offices on Wednesday, August 23rd. Peter Davidson, Groundwater Scientist organised the meeting to give us a presentation bringing us up to date on the latest research about the aquifer and its decline and sharing some of their thinking about how they might better manage the water allocations being extracted from the aquifer. Other staff attending were Pere Hawes, Sarah Pearson and Clementine (Clem) Rankin.

Peter gave a comprehensive Powerpoint presentation. Initially he stated that their aim in regard to aquifer water is -

“Certainty for water users, community & environment (not there yet)”

As you can see by from Peter’s words in brackets there is still work to do to provide the certainty they are aiming for and they are currently *“refining some limits & balancing water budgets”*.

For context it is important to note the “Hierarchy of Needs” as expressed in Te Mana o te Wai is -

- first, the health and well-being of water bodies and freshwater ecosystems;
- second, the health needs of people (such as drinking water);
- third, the ability of people and communities to provide for their social, economic, and cultural well-being, now and in the future.)

They do recognise that -

- *“Consented abstraction lowers summer Wairau Aquifer levels (especially in drier seasons)”*
- *“Summer aquifer levels also reflect slightly lower Wairau River flows” due to “(consented abstraction & drier climate patterns)”*

Note these slightly lower flows are from data over the last 65 years. The graph shows only a small downwards trend over that time. The major cause of the decline in the aquifer is not so much the flows but the changes to the river bed in the recharge zone, as I reported last year.

What has become very clear is that the aquifer is a very dynamic system. It refills/drains quickly in response to Wairau River floods/low flows. At the end of August 2022 it was recorded at the Condors Bend monitoring bore as being at it’s highest level ever recorded and then by February this year it is was at its lowest level ever recorded for that time of year. They therefore believe it is valid to manage the entire aquifer from the Waihopai River to the sea as a single system using a real time management approach.

What is very important to understand is that the aquifer storage volume that is available for allocation is only about 10% of the total. In other words a maximum of 10% of the total can be allocated before having an unacceptable impact on environmental needs (springs/seawater interface/maintaining gradient). For water users the reservoir is effectively empty when groundwater falls to the minimum level required to maintain acceptable spring flows.

This brings us to the major challenge the MDC team are trying to address - how best to apply limits to water extraction from the aquifer without compromising environmental needs. They have to re-interpret minimum levels required to provide for the springs (Awarua-Spring Creek) in the new context of Te Mana o te Wai.

Some limits were set when the draft Marlborough Environment Plan (pMEP) was first released in 2016 along with limits on all other rivers and aquifers in Marlborough. It is relatively simple to manage limits in rivers by measuring river flows and applying appropriate cut-offs to retain adequate flows in the rivers to meet environmental needs. As it is not possible to measure flows into the aquifer this method is not available. It can only be done by monitoring the fluctuating aquifer levels. With the Wairau aquifer being so dynamic, these fluctuations can be large in short time periods.

The Wairau aquifer did have an annual maximum extraction limit set of 73,000,000 M3. The latest data on extraction indicates up to about half of that amount (about 35,000,000 M3) is currently being extracted annually depending on the season. Additional limits aiming to protect the springs were also set on three sub-zones adjacent to the springs where cut-offs apply once the aquifer drops to pre-set levels. As I've reported before, with the knowledge gained from the GBR research, it is now accepted that neither of these options are seen as being fair and equitable for users or adequate for optimum springs protection. In other words the hard cut-offs in the pMEP are now seen as not viable. The water users in these sub-zones all objected but after discussions have agreed to accept the current limits as defined in the pMEP pending the completion of the process described in this paper. An annual allocation is also seen as too crude for managing seasonal variations.

Even with the knowledge that the aquifer holds less water than originally thought, it still holds a lot of water. Water enters it from the river in the recharge zone and leaves it through extraction or the springs. Council staff have to convince the 600 water users that the majority of the water in the reservoir is not available for extraction. The upside is that the effect of current abstraction is seen as acceptable under most seasonal conditions with the acknowledgement that understanding of how overall abstraction changes groundwater level is still imprecise. Most consents are now metered but there are still data quality issues. Once actual use is accurately known then the cause and effect relationship (abstraction vs groundwater level) can be defined. This is an issue across NZ and staff recognise we need to do better. Confirming the Wairau aquifer quantity limit is an essential foundation for the pMEP.

Our future climate & how it may affect catchment land use, naturally results in uncertainty. Climate variability will affect rainfall and runoff and the level of natural gravel supply for replenishing the depleted gravel bed of the river is also unknown. This means there is uncertainty if the long-term declining trend will continue, reverse or stabilise as this is directly related to natural sediment supply. The aquifer computer model has now been expanded to include the whole plain. It is a key tool for refining limits & exploring alternate management approaches. There is more confidence that the latest computer model is hydrologically correct now we have the Gravel Bed Rivers research information.

The model will be used to review the sustainability of the pMEP annual volumetric limit. The effects of water use up to the limit can be simulated by extrapolating from current use. Results will not be available until 2024. Wairau Aquifer hydrological processes are well understood but fluxes/actual use are still approximate. The MDC priority is to balance the water budget. The need for an instantaneous cumulative abstraction limit complimenting the annual limit, to avoid seasonal stress of Wairau Aquifer, is being investigated.

In conclusion MDC are considering three different options for managing limits.

- 1) A fixed seasonal allocation – this would be an unrestricted, set quota providing sufficient groundwater for the average irrigation season. It would be indexed against the overall aquifer storage required to maintain spring flow/environmental servicing.

This provides certainty but would be a rationed amount in lieu of seasonal restrictions. It would be simple administratively but need to be adjusted if aquifer trends upwards or downwards.

2) Fixed seasonal allocation – this would be an unrestricted, set quota indexed against the aquifer state on 1 October each season with a reduction in lieu of restrictions. It would have to be within any revised overall volumetric limit.

This provides certainty but the season may change and it would be complicated administratively.

3) Dynamic storage approach – this would be a variable monthly quota with more water available when the aquifer is full & less when empty. The quota for an upcoming month would be specified as a percentage of the consented share of the total Wairau Aquifer volume.

This provides less certainty for irrigators but better reflects the state of the aquifer with increases/decreases made when appropriate. It also accounts for climate variability. It is capable of automation but consent holders would need a tool to help plan water use.

National Policy Statement on Freshwater (NPSFM) update.

MDC are undertaking a process of community consultation as a part of their obligation to make plan changes necessary to implement the requirements of the NPSFM. The first consultation on values and overview has been completed and submissions are being analysed with a full report being presented to the Environment and Planning committee in October. CKM did put in a submission.

The main community concerns expressed are -

- Plantation forestry effects on water yield and quality.
- Wilding conifer infestations effects on water yield and quality.
- Waterway maintenance.
- Flooding hazard.
- Appropriate water allocation and minimum flow setting for healthy waterbodies.
- Pest management.
- Dealing with and understanding the changes to legislation and the regulation that goes with them.
- Lack of availability of important information so informed decisions can be made.

There are two more community engagements planned, one for later this year and one for mid 2024. The process has to be completed by December 2024.

Council are also looking to set up region wide water users' groups. There are likely to be 2 groups, 1 specifically for the Wairau being our biggest system and then a second which will have all the other area users. These groups would be used to discuss regulatory options and test/run scenarios. They are looking to start work on this process probably early 2024.

They have an expectation for regular meetings/discussions.

The three members of the team overseeing this process who attended our meeting on August 23rd indicated they hoped CKM would participate in the Wairau water users group to provide an alternative perspective to commercial water users. I indicated we would see our involvement as being a voice for Te Taiao and the needs of the environment would be our interest.

Nga mihi, Budyong.
29/08/2023