IRRIGATION, WATER USE EFFICIENCY AND WATER QUALITY – WAIKAKAHI

Shirley Hayward

DairyNZ Ltd, PO Box 160, Lincoln University 7647, New Zealand

The Waikakahi catchment is one of the five Best Practice Dairying Catchments, but differs from the others in that dairy farming in the catchment depends on irrigation water. Farms are supplied with irrigation water via the Morven Glenavy Ikawai irrigation scheme (MGI), which takes water from the adjacent Waitaki River and distributes it via a canal system to irrigate over 18,000 ha. Waikakahi Stream is one of several small catchments within this scheme area.

The MGI irrigation scheme was originally developed for border-dyke irrigation. In recent years, some conversion to spray irrigation, re-bordering and laser levelling of borders has resulted in improved efficiency of water use, enabling irrigation of more land. Consequently, the irrigation company had to recently renew its water take and use consents, and included a proposal to develop an 'Environmental Management Strategy' for the company operations and require individual farms supplied with scheme water to prepare and implement 'Farm Management Plans'. This includes most farmers in the Waikakahi catchment. New irrigators (or farms with new areas of irrigation) are required to develop farm management plans first, followed in successive years by existing irrigated farms.

Auditable farm management plans as a requirement of irrigation water supply arrangements provides leverage for driving good farm planning and practices beyond that of voluntary measures. Good progress has been made in the Waikakahi catchment to address community concerns around poor water clarity and sediment inputs on a voluntary basis by farmers, with significant reductions in sediment loads to the stream through fencing and planting efforts. Furthermore, instream concentrations of phosphorus and E. coli concentrations have remained steady despite increased production in the catchment over the past decade (~40% increase in milk solids/ha). However, nitrate loads have increased over the past decade. Therefore, the voluntary measures of farmers in the catchment can be considered as successfully improving some aspects of water quality, but it is likely that greater incentives will be required to drive further improvements.

Background

Prior to becoming a 'Best Practice Dairy Catchment' (BPDC) in 2001, Environment Canterbury had been working with the Waikakahi catchment farmers to address concerns raised by members of the public. Concerns were raised about the poor overall condition of the Waikakahi Stream and its impact on valuable trout spawning habitat in the stream. In 1996 the Waikakahi Resource Care Group was formed, and a 'Waikakahi Stream Protection and Enhancement' project was initiated in 1998. This project focussed on stream fencing and planting.

In 2001, the catchment became part of the 'Best Practice Dairy Catchment project', an initiative by the Dairy industry with the broad aim of integrating environmentally sustainable practices into dairy farming, while sustaining business viability. This included development

of a suite of 'best management practices' specific to key issues in each catchment and a monitoring programme consisting of water quality and flow monitoring sites set up and maintained by NIWA, and farm system and soil surveys conducted 2-3 yearly by AgResearch (Monaghan et al. 2009). The projects were funded from MAF's Sustainable Farming Fund, Regional Councils and FRST and the Pastoral 21 environment programme.

Key issues were identified for the Waikakahi Stream:

- Public complaints in 1990s around water colour and clarity
- Perceived decline in trout fish numbers
- Concern at loss of trout spawning habitat from siltation
- Maintaining the drainage capability of the stream and tributaries

The Waikakahi catchment differs from the other BPDC's in that dairy farming in the catchment depends on irrigation water. Farms are supplied with irrigation water via the Morven Glenavy Ikawai irrigation scheme (MGI), which takes water from the adjacent Waitaki River and distributes it via a canal system to irrigate over 18,000 ha. Waikakahi Stream is one of several small catchments within this scheme area.

The MGI irrigation scheme was originally developed for border-dyke irrigation (flood irrigation). This type of irrigation, while a lost cost system to run, has a high risk of overwatering paddocks, generating excess water (wipe-off), and discharging this wipe-off water and associated contaminants into nearby streams. Wipe-off water discharge to waterways was identified as a key source of nutrient and faecal bacteria inputs to Waikakahi Stream. In addition, stock access to unprotected stream reaches was another key factor in the sediment inputs and poor aesthetic appeal.

Farm management practices focussed on stream fencing and plantings, re-bordering and laser levelling of irrigation borders resulting in improved efficiency of water use and less run-off, bunding of borders and, in some cases, conversion to spray irrigation (eliminating wipe-off water generation).

Changes over the past decade in the catchment

Farmers in the catchment have voluntarily implemented a range of measures on farm, such as improved irrigation management and efficiency, and stream riparian management in an effort to be more efficient and reduce environmental impacts. At the same time productivity in the catchment has increased. Changes at the farm level included:

Irrigation changes to more efficient forms

- 40% converted to spray-irrigation
- 30% laser-levelled to wider borders
- 30% original borders

Other change in practices

- 93% of the stream fenced
- Less P and N fertiliser per ha

Change in productivity

- 39% increase in MS/ha (Campbell et al. 2010).

In terms of water quality, there has been no change in phosphorus or E. coli concentrations, other than fewer and smaller high concentration events. Nitrate concentrations have trended upwards (Campbell et al. 2010). The most significant improvement in water quality was a 3-fold decrease in the sediment load in the stream, which had positive effect on stream clarity and appearance.

The voluntary measures of farmers in the catchment can be considered as successfully improving some of the key water quality concerns (e.g., appearance and water clarity) at the same time as increasing production.

Farm environmental planning through irrigation schemes

Most farmers in the Waikakahi catchment use irrigation water supplied from the Morven Glenavy Ikawai Irrigation company scheme (MGI). The MGI company has taken a strong sustainability stance through the development and adoption an 'Environmental Management Strategy' for company operations. The strategy also requires individual farmers supplied with scheme water to prepare and implement 'Farm Environmental Management Plans', along with auditing requirements as part of a Water Use agreement (Robyn Murphy, pers comm.). This approach of requiring farmers to have auditable farm environment plans in order to access irrigation scheme water is the first to be implemented in Canterbury but is likely to be a requirement of new and renewed irrigation scheme consents in the future.

The auditable farm environment plans focus on 6 key management areas; irrigation, soil, nutrient, effluent, riparian, biodiversity. They are developed by farmers in a series of workshop, followed up by one-on-one work with farmers (Claire Mulcock, pers comm.). This approach is considered as a very positive step towards continuous improvements in farm management, leveraged through water supply agreements.

Key messages

- Farmers have made great progress in identifying and addressing priority management issues
- Farming community has engaged in the issues and are trying to do the right thing
- Voluntary approach has been effective at addressing some of the most significant and immediate issues (stock access, wipe-off water discharges)
- Full credit to MGI Irrigation Company for driving responsible management of irrigation water through supply agreements with farmers
- Is a process of continual improvement and will take time to reach a next level of implementation

References

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