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Landowner Barriers to Irrigation

Report prepared as part of the Rangitikei Strategic Water Assessment project, jointly funded by Rangitikei District Council and the Ministry for Primary Industries (Irrigation Acceleration Fund)

Rangitikei
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Ministry for Primary Industries
Manatū Ahu Matua

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1 Introduction

The Rangitikei district is heavily reliant upon the primary sector for its economic and social well-being. This sector is founded upon the district's topography, soils, climate, water resources, and farmer innovation. However, the district's water resource is coming under increasing pressure from irrigators, and the impact of droughts.

In response to these challenges the Rangitikei District Council and Ministry for Primary Industries (via the Irrigation Acceleration Fund) are jointly funding The Catalyst Group to undertake a strategic water assessment for the district. This project will generate information about the:

- availability and certainty of water supply (surface and groundwater) in the district;
- efficiency of current water use, and opportunities for improvement;
- costs, benefits, on-farm implications, and regulatory and environmental considerations around irrigation, and
- alternative uses for irrigated land.

Such an assessment is a priority for Rangitikei District Council as this project will provide guidance on what additional benefits and opportunities could arise through smart use of the water resource, and identification of the costs of capitalising on these opportunities at a district and individual level.

One of the tasks within the wider Rangitikei Strategic Water Assessment project is an analysis of the barriers landowners have encountered during the process of considering or developing irrigation on their properties. Through a series of workshops information about the barriers encountered, and the solutions to overcome some of these barriers, was discussed.

The purpose of this review was to:

- identify what barriers landowners in the Rangitikei district have encountered in the process of considering or developing irrigation on their properties
- establish if there are any barriers that are unique to the Rangitikei district
- determine if barriers encountered vary by land use type, geographical location, or size of farming enterprise
- identify what workarounds exist amongst landowners to overcome common barriers, and
- ensure the wider Rangitikei Strategic Water Assessment project addresses as many of the indentified barriers as possible.

2 Background

Irrigation can generate many benefits for landowners (e.g. increased production, peace of mind), but development of irrigation comes with a number of attendant risks (e.g. installation costs, economic return) and considerations (e.g. availability of a suitable water supply). These risks and considerations (both real and perceived) are collectively referred to as barriers to irrigation. These barriers can be encountered by a landowner when initially contemplating irrigation for their property, or during the more considered planning and development phases.

At the initial contemplation stage, landowners may disregard irrigation for their properties as they:

- are planning on selling their property or exiting farming in the near future
- receive sufficient rain or retain sufficient soil moisture levels
- operate a farming system that does not require irrigation
- own a property that is unsuitable for irrigation

At the more detailed planning and development stages, landowners may encounter a wide range of barriers when considering irrigation for their properties. Critical barriers identified in the literature (e.g. Molner *et al.* 2011) and covered in various reports and studies on the Irrigation New Zealand website (www.irrigationnz.co.nz) are listed below in no particular order:

- lack of information on establishment and running costs
- high installation costs
- high running costs
- difficulty in securing finance to cover costs
- insufficient or fully-allocated water resources
- unfamiliarity and/or concerns about resource consent process
- lack of information on water sources
- lack of information on irrigation methods and approaches
- lack of information on economic returns and how to get the best out of an irrigated farming system
- profit margins are too small/pay-back period is too long
- requires too much effort to develop irrigation
- requires too much effort to manage once irrigation is installed, and
- peer reaction to installing irrigation

For some landowners these barriers will prove insurmountable, and so they will not pursue irrigation further, whereas other landowners can and will develop solutions to overcome these barriers and proceed with installing irrigation.

3 Method

A workshop approach was used to generate information on what barriers landowners had encountered when considering or developing irrigation on their properties. Two workshops were organised, which were publically advertised in local papers, and through farmer networks.

The two workshops were held at Marton Golf Club and Rangatira Golf Club on 20 and 25 March 2014, respectively. The Marton Golf Club meeting drew people from the southern Rangitikei district (coastal sand country and Turakina valley), while the Rangatira Golf Club meeting drew people from the middle and upper Rangitikei district (effectively from Hunterville north).

Each workshop had approximately 30 people in attendance, of which around three-quarters of the attendees were farmers, the remainder being made up of farm advisors, bank representatives, council representatives, media, and other interested parties. Only 2-4 of the farmers present at each workshop were currently irrigating, although the largest irrigators by area in the areas covered by each workshop were represented at the meetings. Of the remaining landowners, many had contemplated irrigation, but most had not progressed much beyond considering where they may be able to source water from and/or done some 'back-of-an-envelop' calculations of the costs of developing irrigation on their property.

The workshops were run informally, but structured around a question and answer format. At the start of each workshop the wider Rangitikei Strategic water Assessment Project was introduced, and then the purpose and format for the workshop was explained.

A series of questions were asked based on the types of barriers described in the literature. Attendees were prompted to provide feedback to these questions. If no responses were forthcoming (as was the case at the start of the workshop), then individual landowners were targeted to provide a response based upon their own experiences. As the workshop wore on, and those attending became more comfortable, each question was answered more freely and quite often generated an open discussion amongst participants. Participants even asked questions of other participants. All participants gave freely of their experiences, and there was a good flow of information between workshop facilitators and attendees, and between the attendees themselves.

Each workshop spanned approximately 1.5 hours, and then concluded with a barbeque supper and refreshments. These post-workshop opportunities allowed attendees to mingle and discuss topics of interest, and for the workshop facilitators to have more in-depth discussions with some of the participants.

The workshop facilitators were Greg Carlyon (workshop chair) and Alistair Beveridge of The Catalyst Group.

4 Workshop Outcomes

As mentioned above, most farmers attending the workshops had considered the possibility of irrigation for their properties, with several having done some initial basic calculations of costs and production improvements. Only a small number of those attending had actually installed irrigation.

Drivers for landowners contemplating/installing irrigation were:

- The financial, stock welfare and psychological impact of the recent series of dry summers
- The significant productivity gains that are possible in the sand country via irrigation (in conjunction with land contouring and increased inputs)
- The opportunity to better manage their farms in terms of inputs, production levels and timing, and profitability

There was a general acknowledgement by participants that the initial drivers for investigating irrigation options for their property may have been emotional ('heart') ones i.e. in response to a drought, but that as planning progressed more rational ('head') factors were considered.

Of those attending, low numbers indicated they were not pursuing irrigation because the topography of their property was unsuitable for irrigation (i.e. too hilly), or were simply not interested in irrigation (for unspecified reasons).

Age or stage in farming was not considered a barrier to landowners contemplating irrigation, with the sentiment expressed 'if it is viable, then age is irrelevant'.

Table 1 summarises the workshop participant responses to questions about each of the critical barriers identified in section 3 above. The table also includes commentary from the authors that expands on the participant responses, provides greater context or explanation about a particular barrier, or details the approaches taken by landowners to overcome barriers.

Table 1: Workshop participant responses to questions about critical barriers, and additional commentary from the authors providing context or explanation of the barriers and any solutions developed by landowners.

Key barriers	Participant responses	Commentary
Lack of information on establishment and running costs	Not considered a barrier by most landowners attending the workshops, because they generally had not progressed much beyond an initial consideration of irrigation for their properties	Many landowners at the workshop had done back of an envelope calculations of areas, production levels, and costs. These calculations are likely to be wildly inaccurate but give the landowner the confidence to either leave things for a few more years, or proceed to the next step. Many landowners were uncertain as to what that next step was or who to contact for advice/assistance.
High installation costs	The capital costs associated with installing irrigation can differ significantly between properties, depending upon the scale of the enterprise and other factors. For instance, if water and power are located close by, and only a small area of land is being irrigated, then this could be achieved for less than $100k. If however, the land needed to be recontoured, bores needed to be developed, and power supplies upgraded, then the costs of development regularly exceed $1M. Large irrigators indicate the cost of converting a dry stock property in the coastal sand country to a functioning dairy platform is about the same as the initial land purchase price. The magnitude of the installation costs is off-putting to some landowners, but those that have proceeded with irrigation have done so on the basis of productivity increases and pay-back periods	The state of the district's power supply network and its ability to meet the demand of current and new irrigation was identified as a significant barrier. Currently, the only options available to large irrigators are to: (1) upgrade transmission lines and install transformers, or (2) install diesel generators, to meet their electricity needs. This is an additional cost of many $100k's. In the southern part of the region there is an electricity supply grid which can support more users, whereas further north, much of the power is supplied via single dead-end lines. As such, even small irrigation proposals could overload the system, resulting in 'brown outs' for other users of the line. Other significant development costs include: • bore development – approximately $1000/metre. Recent bores in the coastal sand country have been extending to a depth of 350m, with some exploration bores extending to a depth of 600m • pumps – in the middle/northern part of the district the rivers and streams are deeply incised, requiring large pumps to lift water at least 50m vertically. The cost of such pumps, and their associated infrastructure, is prohibitive when only relatively small areas of land are being considered for irrigation (i.e. 20-40ha). • Liners - due to the need for expensive liners, storage of water in the sand country is unlikely to be cost effective.

Key barriers	Participant responses	Commentary
		The cost of on-farm storage in the middle/northern Rangitikei is highly variable depending upon the geology/topography of the area, the volume wanting to impound, and excavation requirements
High running costs	Ongoing running costs are highly variable depending upon the scale of the enterprise and other factors.	It is not unusual for large irrigators to have a $300-400k annual power bill. Given most of the electricity consumption is associated with moving water (i.e. out of the bore/river, and distribution on the farm), rather than operation of the irrigator, placement of the intake/bore relative to the irrigator can have a major impact on power use. Similarly, minimising the amount of water used through installation of technology such as soil probes and variable rate irrigation can reduce water use by 20%. Maintenance costs are highly variable, with decisions made during the installation phase having a major bearing. For example, an unstable power supply can greatly increase pump maintenance costs, unless this has been allowed for through the installation of soft start and variable rate pumps.
Difficulty in securing finance to cover costs	Not a barrier	Bank representatives present at the workshops reinforced this view, stating that if the business case for irrigation was strong, then banks would lend. Banks also had funding available for individuals and consortia of farmers looking at communal schemes
Insufficient or fully-allocated water resources	This was not something that those not irrigating had given much thought to, but was something that those irrigating from rivers were acutely aware off and had worked into their calculations and had management systems in place to deal with	The One Plan water management framework splits the Rangitikei catchment into a series of water management zones (WMZ). Each WMZ has an allocation limit and minimum flow. Once the allocation limit is reached, no further takes can be consented for that part of the river. Once a minimum flow is reached in a river, all non-essential (i.e. irrigation) takes must cease. Several WMZ of the Rangitikei catchment are reaching the point of being fully allocated. In dry summers (e.g. 2013 and 2014) minimum flows are reached, forcing irrigators to cease. This creates the paradox where irrigators may not be able to irrigate when they most need to. Further, this situation is exacerbated as a WMZ becomes fully allocated, because the minimum

Key barriers	Participant responses	Commentary
		flow is reached more often and lasts for longer. The One Plan has significantly freed up the amount of groundwater that is available for use, by reducing the need to consider the impacts on neighbouring shallow bores. Sheep/beef farmers, particularly those in the middle and northern parts of the region, indicated that if the water supply was insufficient for irrigation purposes they would still be interested in investigating (at a property or community scale) stockwater supplies. Stockwater surety and security is still a major limitation on sheep/beef farmers in the district during droughts.
Unfamiliarity and/or concerns about resource consent process	Several landowners expressed concerns about the resource consent process – costs, delays, the need to engage with effected parties, and uncertainty around outcomes	Prior to the One Plan, landowners seeking a resource consent to take water (surface or groundwater) had to undertake a full resource assessment, and engage with a range of potentially affected parties. There were considerable costs and uncertainty associated with this approach. Under the One Plan the situation have changed dramatically. If the applied for volume fits within the water allocation framework, the resource consent can be processed almost 'on the spot'. Further, there is no need to engage with potentially affected parties. This greatly reduces costs and uncertainty. However, under the One Plan installing irrigation on a property triggers the need for a resource consent to manage nutrient losses off-farm.
Lack of information on water sources	Again, most non-irrigators had not given a great deal of thought to the water resource they would irrigate from, or whom they would talk to about it. Those that were irrigating agreed that because the water source was a property-specific matter it was not considered until the decision to invest more time in investigating irrigation was made.	In general, knowledge of the district's water resource can be summarised as: • surface water is well understood, but may not be available during the most critical times because of minimum flow restrictions • groundwater is still poorly understood, but is generally not affected by restrictions. That being said, a decline in groundwater recharge levels has been detected in the Santoft

Key barriers	Participant responses	Commentary
		area in recent years. What this means in terms of future availability and use of the groundwater resource is the subject of an investigation by Horizons Regional Council currently • on-farm water storage is very site specific in terms of areas/volumes, geology/topography constraints, and costs In order, landowners typically access this knowledge by talking to: 1. farmers that are irrigating 2. well drillers for information on groundwater 3. farm advisors/irrigation companies 4. the regional council
Lack of information on irrigation methods and approaches Lack of information on economic returns and how to get the best out of an irrigated farming system	Most attending the workshops admitted they didn't know who to talk to for advice/assistance with designing their irrigation system and modifying their farming practices to maximise benefits and economic returns.	Those landowners that had developed irrigation said they had made extensive use of farm advisors, irrigation consultants, and even research institutes. The advice from these irrigators was to put in the best system you could afford, and tweak it over time once your understanding of how your farm responds to irrigation improves. One large irrigator indicated he was still tinkering and making improvements 10 years after installing his irrigation system. A critical difference to emerge is that the information on the benefits and uses of irrigation for dairy farms is well established and readily available. Information on irrigation of sheep/beef units, particularly involving relatively small areas, is significantly less well developed or available (either in written form or via advisors). Most irrigation companies offer a free advisory service, which becomes more comprehensive the further a landowner progresses along the path to installation. A critical first step in determining the irrigation needs for a property is a farm map detailing soils, land classes, topography, infrastructure etc.
Profit margins are too small/pay-back period is too long	Not a barrier	It was agreed there is a lift in production and profitability, but that this is dependent upon what is grown and having the right farming systems in place to capitalise on the increased production. For

Key barriers	Participant responses	Commentary
		instance, dairying in coastal sand country is successful, large-scale cropping and horticulture in the sand country has its very good and less good years. Irrigation in the middle/upper Rangitikei district is likely to be focussed around lamb finishing using high value fodder crops.
Requires too much effort to develop irrigation	Landowners that were not irrigating did not identify this as a barrier.	Interestingly, irrigation advisors and those that had gone through the process indicated development of irrigation required a significant investment of time and effort by landowners. The installation process from initial enquiry through to installation could take several years, with typically a year of intensive interaction required to design, cost, and maximise an irrigation solution for a property
Requires too much effort to manage once irrigation is installed	Not a barrier	The benefits of irrigation are considered to significantly outweigh the extra effort required. It was admitted that irrigation changes the nature and timing of on-farm work
Peer reaction to installing irrigation	Not a barrier	This is no longer considered a barrier to landowners given the acceptance within the farming community of the need to lift production/profitability and adjust to current and future dry periods.

5 Summary

Two workshops were held in the Rangitikei district during March 2014 to ascertain what barriers landowners had encountered or overcome as they contemplated and/or developed irrigation for their properties.

A small number of landowners in the Rangitikei district have installed irrigation in the last decade, and there are many more that have contemplated the potential of irrigation for their properties. For those that have installed irrigation, the primary motivation has been to lift production and better manage their properties. This has generally coincided with conversion to dairying. Landowners contemplating irrigation are largely motivated by a desire to reduce the financial, stock welfare and psychological impacts of dry periods and droughts.

Landowners did not consider the following factors to be barriers when considering irrigation for their properties – age/stage, securing finance to develop irrigation, profit margins following installing irrigation, peer reaction, or the effort required. Incidentally, irrigation advisors indicated landowners typically underestimated the time/effort required to develop and then install/run irrigation.

The following factors were identified as barriers by landowners – these are a mixture of perceived and real barriers:

- Costs – the costs associated with installing and running irrigation can be significant depending upon the scale of the enterprise. The quantum of these costs was sufficient to put some landowners off. Those that had installed irrigation were comforted by the projected increase in production and the expected investment pay-back period. The costs associated with installing large pumps in the middle/northern parts of the district capable of lifting water at least 50m vertically, and using liners in storage ponds in the coastal sand country are likely to be prohibitive.

Figure 1: Most waterways in the middle/northern parts of the district are deeply incised, requiring the installation of large pumps to lift water significant vertical distances, and incurring high ongoing pumping costs as a result. This is a typical image of the middle Rangitikei River, at Mokai Gravity Canyon, where the river is incised at least 70m, which likely makes irrigation of the adjacent flats from this water source uneconomic.

- Electricity – the quality and supply of electricity is a major consideration for landowners contemplating irrigation. The district's electricity network is near capacity in most areas, so any major draw on the power supply (i.e. irrigation) is likely to exceed the capacity and/or adversely affect other users. Lines companies are now requiring irrigators in the sand country to upgrade the power lines supplying their properties, or to install diesel generators (both options incur significant costs). In middle and northern parts of the district, even small irrigation proposals are likely to overwhelm the existing lines networks.

Figure 2: Power pole stockpile in preparation for upgrading an existing line. The existing power supply network in the Rangitikei District is inadequate to enable even mid-range irrigation. New irrigators are required to either fund upgrades to the existing network or install diesel generators.

- Advice/Assistance – most landowners contemplating irrigation for their properties had undertaken some initial calculations. However, most did not know where to go to get further advice/assistance. Landowners that were irrigating stressed the importance of getting good external advice during the development, installation and running phases. There are many advice/assistance options available to landowners, particularly dairy farmers, less so for sheep/beef farmers.
- Resource consents – landowners perceived that getting a resource consent to take water was likely to be a major barrier. However, the One Plan water management framework has greatly streamlined the resource consent processes for getting surface water and groundwater take consents. If the applied for amounts fit within the allocation framework, applicants are not required to engage with potentially affected parties, and the consent can be processed relatively quickly and cheaply. Landowners do need to be aware however, that the installation of irrigation on their properties is likely to trigger the One Plan's nutrient management rules, requiring an additional resource consent.
- Water availability – landowners expressed concerns about the availability of water, and the surety of supply. Generally speaking, under the One Plan water management framework, the surface and ground water resources in most areas are not fully allocated. However, as surface water allocation increases, the surety of supply declines. This is especially so in times of greatest need (i.e. droughts) because of the need to maintain minimum instream flows. Further, groundwater level declines have been detected in the Santoft area. What this means for future management of this resource is unknown at this stage.

6 References

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