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Collaboration and practice change in resource management: collective action case studies from Central Otago

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Summary

Governments are increasingly seeking to do more to ensure the sustainability of natural resources. Imposing limits on resource use and resource users has been a key policy tool. A common structure of limit-setting policy has been to require individuals to abide by rules, regulations or practice change plans to achieve an overarching limit, target or outcome. The underlying assumption is that the actions of many individuals will, ultimately, accumulate to the overall required or agreed limit, target or outcome.

To encourage thinking about the possibilities of different ways of structuring limit-setting policy and implementing resource limits, we present water and pest management case studies from New Zealand's South Island region of Central Otago. We show that governing resource use individually, cumulatively and collectively is possible and important to do, given that water and pests, for example, move across private property boundaries, and the actions, inactions and practices of others can have significant effects beyond an individual's land.

Drawing on practice-based theories of change, and interviews with farmers and representatives of organisations involved in local environmental management, we trace how collective action emerged in particular places and contexts. The research identifies a number of collective action-governing practices, and the factors that have enabled them. In particular, we found that monitoring technologies and legal instruments are key governance tools, and that the knowledge needed for collective action goes beyond science to include legal, accounting and relationship management expertise.

The research indicates what can be achieved when governance structures are put in place to help people work together while retaining their individual autonomy at the local level. We conclude that the cases and governance practices examined in this study require further consideration, because they appear to be an effective way of collectivising transparency, responsibility and accountability to address cumulative effects at scales conducive to fostering stewardship actions beyond private property boundaries. They also have the potential to transform *participatory* collaboration (i.e. involvement in processes to establish limits) into *binding* collaboration (i.e. implementation of actions to achieve limits).

1   The need to govern individually, cumulatively and collectively

Current approaches to the implementation of resource limits policy in New Zealand and elsewhere require individuals to abide by rules, regulations or practice change plans to achieve an overarching limit, target or outcome. The underlying assumption is that the actions of individuals will, ultimately, accumulate to an overall required or agreed limit, target or outcome.

While the sustained actions of individuals can be cumulative, and this policy structure has ushered in the establishment of necessary overarching limits, there are often constraints on what farmers can do individually to address cumulative effects. For example, environmental problems often arise from issues, land features or critical source areas that cross multiple property boundaries.

Hence, while the cumulative approach has been highly useful in moving debate, policy and actions further than before towards addressing cumulative effects in New Zealand, we are concerned it is limited in its ability to foster the collective responsibility, accountability and actions that are needed to effectively address the social-ecological issues we now face.

Holley (2015) maintains that research is needed in New Zealand to show how people come together to manage common resources, and the practices, policies and technologies that enable or constrain how they go about it. We concur, and have identified irrigation companies and other agricultural cooperatives (what we refer to as 'collectives') to be important but overlooked examples of collaboration in resource management (although see McCorkindale 2019; Simpson 2015).

Our exploratory research focuses on collectives that are managing water and invasive pests in unique ways. These collectives offer useful insights for understanding governing practices that foster and enable collective action. Importantly, they are distinct from the collaborative experiments that dominate New Zealand's collaborative governance and water management literature (e.g. Brower 2016; Cradock-Henry et al. 2017; Duncan 2013, 2014, 2016, 2017a, 2017b; Eppel 2014; Harmsworth et al. 2016; Hughey et al. 2017; Jenkins & Henley 2013, 2014; Jenkins 2018; Kirk 2017; Kirk et al. 2017; Memon et al. 2012; Memon & Weber 2010; MfE 2015; MfE 2017a, 2017b, 2017c; Robson et al. 2017; Robson-Williams et al. 2018; Sinner et al. 2015; Sinner et al. 2016; Tadaki et al. 2020; Thomas 2015; Thomas & Bond 2016; Thomas et al. 2020). We conceive of these collaborative experiments as participatory collaboration because they have involved bringing people together at the beginning of limit-setting planning processes to establish resource limits. Once the process is over, participants usually disperse, and the implementation of the limits falls to those affected by the decisions, regional councils, and industry groups.

The collectives we focus on are part of regional plan implementation. We conceive of them as examples of binding collaboration, as in each case the governing practices they have used have involved individuals putting 'skin in the game' to work together to address water and pest management. Understanding why and how they have done this can make an important contribution to the collaborative governance and policy implementation academic literature. It can also provide important insights for advice provision through regional councils, industry groups and non-government organisations.

In summary, this research proposes an extension of the individual-based limit-setting policy structure approach to natural resource management by offering insights for governing natural resources individually, cumulatively and collectively.

2 Practice-based theories of change

In what follows we summarise recent work on social practice theory, managing common resources, and stewardship action. We draw on these bodies of practice-based theory to complement existing work on collaborative governance and to inform the research questions outlined in section 2.4.

2.1 Social practice theory

Social practice theory emerged as a critique of overly simplistic accounts of behaviour change. Hargreaves (2011) suggests that behaviour change models tend to begin with the assumption that people's beliefs, attitudes and values are predictors of behaviour. Consequently, if a person's underlying beliefs, attitudes or values can be changed, then so can their behaviour. Behaviour change is therefore seen as a relatively linear and logical process undertaken by supposedly rational individuals. While there has been some recognition of the significance of wider social norms and structures on people's behaviour, this has tended to result in the development of increasingly complex behavioural models with various proxies and variables, rather than a rejection of the underlying theory[1].

Hargreaves suggests that the popularity of these behavioural change models can partly be explained because they make policy responses simpler: if people can just be provided with more information then they will act differently (see also Duncan & Robson-Williams 2018). Shove (2010) and other social practice theorists argue that these approaches are overly individualistic and fail to account for the 'social relations, material infrastructures and context' that are integral to the performance of social practices (Hargreaves 2011, p. 82).

Social practice theorists point out that pro-environmental actions are not necessarily 'the result of individuals' attitudes, values and beliefs', but are embedded within and occur as part of wider social practices (Hargreaves 2011, p. 82). While understanding attitudes and motivations is important, seeking to instigate behaviour change in this way is increasingly recognised as too narrow a focus that exaggerates the 'autonomy of individual choice', and leaves unresolved the 'value–action gap' (i.e. why the actions of people do not always match their values). There is concern that these approaches limit the possibilities for lasting and transformative change because interventions extrapolate from existing practices and offer solutions 'to that imagined future, rather than imagining the future differently' (Duncan et al. 2018; Spurling et al. 2013, pp. 6–7; see also Hoolohan & Browne

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[1] For example, in attempts to capture the impact of social norms or an individual's sense of agency, complex behavioural models have been devised that incorporate aspects such as people's beliefs about what others think of their behaviour, or the perceived level of control over one's behaviour.

2020; Shove 2010; Shove et al. 2012; Shove & Walker 2007; Strengers 2011; Strengers et al. 2015).

Shove et al. (2012) conceive of practices as made up of three interlinking elements: meanings (i.e. what makes an activity significant or important to do – why?), competencies (i.e. what skills and knowledge enable an activity – how?), and materials (i.e. the physical objects of an activity, as well as the broader socio-technical and political systems that make obtaining and using them possible – with what?). Shove and Pantzar (2005) point to the importance of understanding the connections between these three elements as practices emerge, are maintained, change, and die out, as the links between these elements are made, remade and broken.

Social practice theorists therefore tend to focus on the routine and everyday performance of people's actions, such as eating and cooking, washing and shopping. The emphasis is on the practices themselves, not the individuals who perform them. In this way, the people 'doing' things become the 'carriers' of social practices, and in the process become skilled at negotiating and performing a wide range of practices throughout their lives. Consequently, fostering pro-environmental changes is not only about education or social marketing to shift people's values and attitudes, but also about transforming the elements of social practices themselves. Understanding how meanings, competencies and materials intersect and create certain practices is the first step in identifying how practices can potentially be shifted.

2.2   Managing common resources

Alongside the research using social practice theory, there has been significant work on collaboration for managing common resources[2] (what we refer to here as commons). Recent research has tracked the creation, use of, care of, and access to a variety of both old and emerging commons (Caffentzis & Federici 2014; Gibson-Graham et al. 2016; Healy 2008; Ostrom 1990; St Martin 2005). While Hardin's influential (1968) paper titled 'The tragedy of the commons' captured many people's imagination, he later acknowledged that a key missing adjective from the title was 'tragedy of the *unmanaged* commons' (emphasis added, Hardin 1998). Commons research has sought to show how well-managed commons can lead to positive social and environmental outcomes. This research has focused on a variety of aspects – from the ownership and access arrangements that sustain commons, to understanding how communities form around commoning practices, to theorising how people are moved to undertake commoning practices.

Drawing on Ostrom's influential (1990) work, Gibson-Graham et al. (2013) argue that to function as a sustainable commons, a commoning community must negotiate five key aspects:

- access – which must be shared and inclusive

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[2] By 'common resources' we are referring to those that are rival (i.e. one person's use diminishes another's) and non-excludable (i.e. a person cannot be easily prevented from using it, or there are not clear or enforceable private property rights).

- use – which must be negotiated by a community rather than just an individual
- benefit – which must be distributed to the wider commoning community
- care – which must be performed by the commoning community
- responsibility – which must be assumed by the commoning community.

These questions of access, use, benefit, care and responsibility relate to negotiations between humans and their wider environment (Linebaugh 2008, p. 279). While ownership might be an important consideration[3], this is only to the degree that it enables the practices of commoning to actually occur.

The work on commons connects to social practice theory because researchers argue that commons are more than the material things you can touch (like water or trees), and include the social relations and practices that connect people, places and ecology (Caffentzis & Federici 2014). Gibson-Graham et al. (2013, 2016) frame commons 'as a verb, as commoning', which involves a certain labour whereby people move towards, or away from, commoning practices. Dombroski et al. (2018) point out that people who are attempting to common often come up against infrastructural and techno-legal obstacles that favour more dominant norms based on individual property ownership. In New Zealand, these obstacles might include the need for complicated legal agreements and financial arrangements, specialised insurance requirements, and other forms of risk management that protect individual property rights. Finally, commoning can present significant challenges to people's sense of security and attachments to their perceived rights to land or resources.

Commoning scholars point out two key ways to overcome these barriers:

- highlight already-existing and ubiquitous commoning practices
- show how people shift and move towards commoning by documenting their language and practices (including interactions with the non-human) (Byrne & Healy 2006; Gibson-Graham 2006; Healy 2010; Latour 2005; Roelvink et al. 2015; Roelvink 2016).

Commoning research has many similarities to social practice theory. Both bodies of research focus on people's everyday actions and practices and understand people as embedded in social-ecological contexts that shape what they are able to do and how they do it (Schmid & Smith 2020).

2.3 Stewardship action

Social practice theory and commons research highlight the importance of understanding the multiple dimensions of practices (i.e. the meanings, competencies and materials that are folded into what people do) and how care can be bound up in such practices through

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[3] Commons are not necessarily limited to properties, practices, or knowledges that are *owned* in common, but may extend to many other kinds of arrangements that don't require private or individual 'ownership' (see Gibson et al. 2016).

meaning. Concepts of practice and care are reflected in recent work by West et. al. (2018), who bring together understandings of stewardship action (i.e. practice) as reflective of care, knowledge and agency (see also Enqvist et al. 2018). Care, knowledge and agency are proposed as three key elements of stewardship action, which can be viewed as mutually supportive (rather than mutually exclusive) strands of a rope (Figure 1).

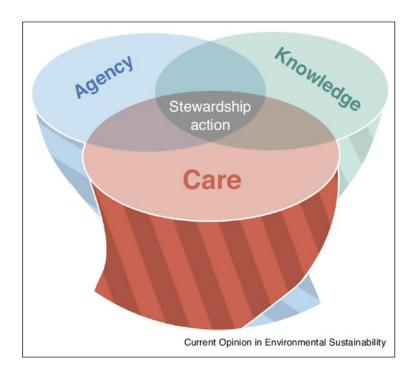Current Opinion in Environmental Sustainability

Figure 1. An illustration of the rope metaphor of intertwined knowledge, care and agency, which is a framework of stewardship action developed by Enqvist et al. (2018) and elaborated by West et al. (2018, p. 31). Illustration by J. Lokrantz/Azote.

West et al. (2018 describe these elements or 'strands' as follows:

Care:
Explicitly normative, subjective aspects considered to influence stewardship action – the desire to 'look after' something informed by, for example, values, meanings, emotions, preferences, and senses of attachment, connection or responsibility.

Knowledge:
Information, know-how and ways of knowing that inform and characterize different types of stewardship action. This includes knowledge about ecological, social and governance aspects, as well as the processes and practices of knowledge generation such as participation, experiential and social learning, adaptive management, and indigenous knowledge systems.

Agency:
The abilities and capacities of individuals, groups and organizations to engage in (collective) action and affect change, as well as the physical affordances and constraints provided by nonhuman ecologies and material technologies that affect the shape and form of stewardship action.

West et al. (2018, p.31) suggest that *care* emerges in specific social-ecological contexts and reflects 'senses of attachment, connection or responsibility'. Their conception of *knowledge* in this stewardship action framework is broader than science and extends to society and governance. Knowledge in this formulation is adaptive, emergent and generative. *Agency* is often assumed to be enabled by linking knowledge to action through, for example, brokers (West et al. 2018). Separating out agency from knowledge recognises that the ability to act requires more than knowing (as explained above in the section on social practice theory). The agency strand also recognises that the non-human world presents humans and the social groupings they create with physical constraints, and plays a mutually constitutive role in the way we navigate and create the world. Agency is very much about how people do things and what enables and constrains them, which are important issues in this research.

In this report we draw on concepts from social practice theory, commons research and stewardship action to trace how collective action emerges in specific places and contexts, and to help us identify how collective actions can be fostered to better manage natural resources and improve community and environmental outcomes.

2.4   Research questions

Drawing on the work from the three broad bodies of theory outlined earlier, this research addresses these questions:

1   What are the governing practices of collective action to manage freshwater and pests in Central Otago?

2   What are the prospects for extending collective action governance beyond these groups and places?

To explore these questions, we build on the work of Crutchley (2018) to describe three case studies of collective action from Central Otago. The three cases illustrate how collective approaches to managing common resources (water) and environmental concerns (pests) can foster better community and environmental outcomes.

3   Methods

This research used a qualitative case study approach to understand phenomena in real-world contexts and to provide insights into wider social systems and processes (Yin 1981). The research draws on grey literature, media reporting, and eight semi-structured interviews with nine participants, all of whom were either associated with the case studies or had knowledge of the context. This included farmers / community members, council staff, representatives from non-governmental organisations (NGOs), planning consultants, and national government representatives. See Table 1 for a list of participants and their role.

Table 1 . Research participants

Role	Number of interviews
Farmers (including Geoff and Emma Crutchley)	4
Planning consultant	1
Fish & Game staff member	1
Otago Regional Council staff members	2
Department of Conservation staff member	1
Total	**9**

Participants were initially identified through media reports and personal contacts, and then through snowball techniques, and invited via email to participate. Participants were provided with an information sheet and consent form (see Appendix 1). Ethics approval was obtained through Manaaki Whenua – Landcare Research's social ethics process. While participants were asked slightly different questions depending on their role, the emphasis was on people's relationships to place, how they negotiated collaboration and worked together with others to manage freshwater or pests, and the effects of this in their community and on their perceptions of planning regulations.

Six interviews were conducted in person and two were online. The duration of interviews was typically 60 minutes, and they were digitally recorded, stored on secure computer drives and transcribed in full. Each transcript was read through by one of the authors to check for errors and identify preliminary themes and then emailed to the participant for checking. Participants were provided with a copy of their transcript and invited to edit or change these prior to analysis being undertaken. Two participants, Geoff Crutchley and Emma Crutchley, waived the option of anonymity.

An interpretive thematic analysis was undertaken, with transcripts read several times and organised to develop as many descriptive codes as possible. This coding was guided by the interview questions and the three bodies of theoretical literature set out in section 1. Hence, we initially used a deductive approach, whereby concepts from theory were used to code, organise and interpret the data, followed by an inductive approach, whereby themes emerged from the data as the analysis proceeded (Cope 2005; Merriam & Tisdell, 2015).

4   Water management Case studies

Planning and resource use in New Zealand are managed through the Resource Management Act 1991 (RMA). The RMA requires regional and territorial authorities (councils) to prepare objectives, policies, rules and other methods specified by regional policy statements, regional plans, and district plans. These policies and plans outline which activities and environmental effects are permitted and which require resource consent to avoid, remedy or mitigate adverse environmental effects. The RMA enables the Minister for the Environment to direct councils to set relevant environmental objectives, policies and rules through national policy statements and national environmental standards.

In relation to water management, New Zealand has been experimenting with collaborative approaches to water governance since 2010 (e.g. central government's national-level Land and Water Forum and the Canterbury Water Management Strategy). Inspired by these collaborative efforts, when New Zealand's first National Policy Statement for Freshwater Management (NPSFM) was introduced in 2011, a number of regional councils across the country elected to adopt collaboration to implement the NPSFM. Given the potential for conflict in meeting the requirement under the NPSFM to establish enforceable water quality and quantity limits in catchments, or what are referred to as freshwater management units, collaboration was seen as the appropriate option for opening up conversations that were needed to move beyond conflicts of the past and build common ground to share what has become a limited and precious resource.

In these cases of collaboration in New Zealand, where the stakes have been high in terms of retaining or gaining access to water resources and setting water quality limits, involvement of the community, mana whenua and stakeholders has served as a collaborative front end to regulation to build legitimacy for the limits required under the NPSFM and consequent rules instituted by regional councils (Duncan 2017a). These state-led collaborative processes have generally involved regional councils organising and facilitating planning processes that bring together, in varying combinations, regional and district council representatives, community and mana whenua representatives and, in some regions, a range of stakeholders to share and build understanding, reflect on the values held for water, and develop shared community visions for resource use and development for input to regional plans (see Duncan & Robson-Williams 2018). There have been a number of changes and directives in relation to freshwater management over the last decade, with the NPSFM revised three times. Through each revision the expectation is that the overarching limits ultimately set by regional councils will be met by the cumulative actions of individuals.

4.1 Otago Regional Council water resource management

As discussed, under the RMA central government provides direction to regional councils and territorial authorities through national environmental standards and national policy statements. It is then up to councils to decide how to implement these directions through instruments such as regional plans. The Otago Regional Council's Water Plan, Regional Plan: Water for Otago, became operative in 2004 and has had 15 plan changes since then (Skelton, 2019). Skelton notes that there are approximately 1,400 water takes authorised

by 883 resource consents in Otago. However, there are a further 600 or so water takes authorised by 356 historical deemed permits. These permits pre-date the RMA and were once referred to as 'mining privileges' that were held as a property right. Mining privileges began in 1858 to give gold miners access to water and land for sluicing. As mining declined they were re-purposed for farm irrigation, and during the first half of the 20th century most were acquired by the Crown to enable large-scale irrigation and dam development to support agriculture.

Since 1958 the mining privileges shifted through various Acts and amendments, with the most recent being the RMA. During the 1980s and early 1990s the Crown privatised many assets and the mining privileges were sold to local farmers, private irrigation companies and others, who, to protect their investment, negotiated a 30-year exemption from RMA processes. When the RMA came into effect in 1991 it therefore provided for the mining privileges to be 'deemed water permits' that would expire on 1 October 2021. At the expiry date, any 'deemed water permits' would cease and land managers/owners would need to apply for resource consents under the RMA if they wished to continue taking water.

Given this water management context, we now turn to two of our three case studies to examine collective action governing practices.

4.2   Upper Taieri Water Resource Management Group

The Upper Taieri Water Resource Management Group (Upper Taieri Group) was formed in 2007 as the next step of the Taieri Trust, which had been created in 2001. The Taieri Trust evolved from a University of Otago research project (Parkes 2003, cited by Tyson et al. 2005), which sought to raise awareness, build knowledge, and catalyse actions and coordination with stakeholders within the Taieri catchment to address river health issues. The Taieri Trust brought together landowners, iwi and a range of stakeholders, including Fish & Game Otago, the Department of Conservation (DOC), Otago Regional Council (ORC) and district councils. According to Crutchley (2018), the Trust instigated riparian restoration projects and created a range of environmental awareness resources, including a children's book for schools, videos, media coverage, and newsletters to the community and stakeholders.

From its Taieri Trust beginnings, the Upper Taieri Group stated its objectives as follows:

- research into efficient water use and best use of a water resource
- management of water quality and quantity
- dealing with the high number of remaining mining licenses yet to be renewed
- to produce a model for community self-management of water resources in a high demand area.

(Crutchley 2018, p. 15)

At the outset, the Upper Taieri Group included more than 150 water users, many of whom were facing the expiry of their deemed permits, which dominated activities and discussions over a number of years. The group has recently reconvened to address a wetland issue.

While not formally recognised or adopted by the regional council, the proposed governance model shown in Figure 2 envisages the Upper Taieri Group playing an intermediary role between government and 'sub-catchment groupings'. It also represents a 'self-management model', referred to above in the group's objectives.
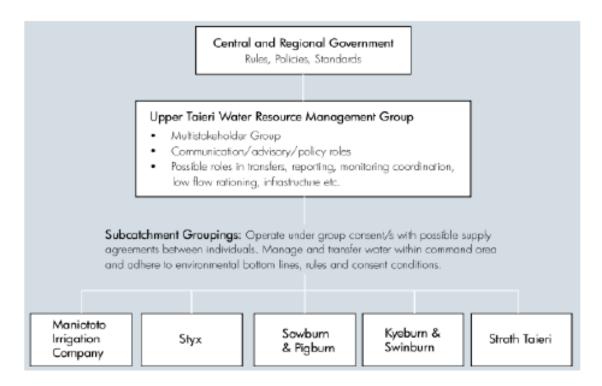

Figure 2. The community self-management model proposed by the Upper Taieri Group in 2018 (Crutchley 2018, p. 15).

This three-tiered structure is informed by Geoff Crutchley's experience in establishing the Maniototo Irrigation Company (MIC) and as a director of its board. Geoff explained that it is now his view that there needs to be some way for the 'community interest' to be a factor in determining how water is allocated and used. For example, he explained that a concept of 'fair value' was written into the constitution of the MIC when it was established. The constitutional requirement of demonstrating fair value means that when a shareholder wants to sell their farm and/or their shares in the irrigation company, the shares have to be valued by a valuer (at the cost of the vendor) and first offered to other shareholders. It was explained by Geoff that this fair value provision seeks to ensure that transactions and their outcomes are transparent and in the wider community's interest. It seeks to overcome concerns that a commercially focused – rather than community-focused – entity or person with considerable financial resources could offer large sums of money to purchase multiple farms and create 'massive shareholdings'. Such a shareholding would equate to voting rights within the MIC and could be used to dominate, change or make rules about water allocation that did not reflect the wider community's social, economic and ecological interests.

It was explained by Mr Crutchley that there could be problematic and irreversible outcomes arising from these circumstances. In particular, it would mean that water could change hands and its use could change without oversight. Outside the irrigation company

there would be a consenting process that would provide opportunities for submissions from a range of parties to be made, and from these submissions the regional council would have to weigh up the community interest in a transparent and accountable way. In the absence of a consent process, Mr Crutchley wanted to ensure the irrigation company had at least some level of oversight to ensure land and water prices were not being inflated out of the reach of those within the company, which could jeopardise the community interest.

Subsequently, Mr Crutchley's concerns came to fruition during his time as a director of the MIC board, which paved the way for recognising the role stakeholders needed to play in helping define and protect the community interest. Involving stakeholders became an important governing practice of the Upper Taieri Group:

> I suddenly thought we're going to lose this, we're not going to have anything that is close to representing community goals. ... that was one of the things that I had in mind, we need to get out of our own nest, we need to bring in Fish and Game, DOC, people who have a real community perspective, to make some of the critical decisions for this company. (Geoff Crutchley)

In Mr Crutchley's view, the company would, ultimately (e.g. when the irrigation company's consent had to be renewed), need to be able to demonstrate to the council that water was being used in the community interest. On this basis, the community interest needed to be broadly defined (i.e. not only on commercial and economic grounds, but also on social, cultural and environmental grounds). This broad conception of the community interest is reflected in the 'self-management model' of the Upper Taieri Group, which is to involve a multiple stakeholder group to help make decisions about what the community interest should or could be and how water management could or should achieve it.

Referring back to Table 2, group consents are also key to the 'self-management' governance model, and are recognised as reducing consent costs, providing economies of scale and controlling water transfers (Crutchley 2018). The rationale is as follows:

> If water users apply for resource consents individually there is still competition between users because if one user leaves water in the river above their residual flow someone else will likely utilise it. A single collective consent was also much easier for the ORC to monitor compared to many different individual takes. As a group the water users must work together and share to manage one residual flow. (Crutchley 2018, p. 16)

Importantly, the use of group consents, or what the ORC refers to as 'shared consents', is enabled by ORC's regional plan. Under the heading 'Integrated water management', clause 6.4.0B is titled 'Promotion of shared use and management of water' and states the following purpose:

> To promote and support shared use and management of water that:
>
> a   Allows water users the flexibility to work together, with their own supply arrangements; or
>
> b   Utilises shared water infrastructure which is fit for its purpose (ORC 2018, pp. 6–12; see Appendix 3 for full wording).

The involvement of stakeholders and company constitutional and regional plan provisions for shared consents have been adopted by the Upper Taieri Group as governing practices to enable collective action and to define the community interest within the Upper Taieri catchment. What follows is a closer examination of these practices and their emergence in the Kyeburn catchment, in our second case study.

4.3   Kyeburn Catchment Limited

The Kyeburn River runs from the Kakanui Range into the Taieri River. Land surrounding the Kyeburn River is primarily owned by families that have held the land for many generations. The Upper Taieri River catchment and the Kyeburn River are within the Maniototo basin, where the Maniototo Irrigation Scheme is situated. While there is relatively low annual rainfall in the Kyeburn area, flash-flooding is common as are periods of extremely low flow. The climate and land use (primarily sheep and beef farming) create high demand for water, which, prior to 2007, was managed through a system of historical priority rights, including 24 deemed permits and six resource consents for water takes. By 2007 not many deemed permits had been converted, and the holders were likely to lose significant amounts of water entitlement due to the requirement to maintain residual water flows in the Taieri River, which had been set under the RMA.

While deemed permit holders were technically entitled to the same amount of water under a resource consent, they might not have been able to practically exercise these rights due to the minimum flow requirements set for the Taieri River. This created many issues for permit holders, affecting financing and future land-use / production options. For example, during spring a permit holder may have been able to take their entitlement of water, but in January the minimum flow requirement in the Taieri River would stop them taking water.

According to a regional council participant, because of this uncertainty permit holders had difficulty arranging financing or planning for land-use / production changes, because they did not know how much water they would have access to. In response to these issues and the impending deadline to convert deemed permits to resource consents, Kyeburn Catchment Limited (KCL) was formed in 2007. KCL was composed of 15 water users, who decided to apply for a shared resource consent (Crutchley 2018).

The decision to work together and use a shared consent involved a number of negotiations related to costs, benefits, use, access, care and responsibility for the water resource. First, individual water right holders had to be persuaded that a collective approach would result in better outcomes than individual resource consent applications. In preparation for the resource consent application, KCL water users had to identify and document water use and prove they were actually using the water their deemed permits entitled them to.

To do this, water metering was required. Participants noted that there was some initial resistance to water meters, but following standardisation, price reductions and evidence of benefits, this resistance dissipated. With metering came the ability to share water use information between group members through a telemetry provider. This meant that everyone in the group could see what water others were using. Crutchley (2018, p. 32)

notes that 'having flow data accessed by all members of the group was identified as a key turning point, creating trust, because members were no longer suspicious that some were taking more water than they said' (Crutchley 2018, p. 32). One participant described how significant this was:

> it's remarkable what actually happens with the group when you start to share data. A lot of those suspicions of 'he's stealing water' and 'he doesn't honour his priority', etc, actually turned out to be 'there's a losing reach between my take and his take' or 'the waterway responds like this, which means that I get this water'. There was a lot of learning by everyone through those processes. (Planning Consultant)

This participant went on to suggest that the commitment to transparency around water metering helped embed the sense of a collective:

> being able to see each other's data, just being in a joint process where you actually commit to doing something jointly and for the good of the catchment, you're all in it together. You're stronger as a group, so you're prepared to work through issues'. (Planning Consultant)

Using water meters to observe real-world changes is illustrated in the following account of an experiment undertaken by farmers in the sub-catchment to confirm what they had been told by their hydrologist:

> Matt Hickey [consultant hydrologist] was always saying Joe Bloggs up the road here would say 'My water's not going to have any effect down on the Taieri River, it never will'. Matt's like, 'It's gravity, water falls'. Anyway, we did a test two summers ago, [abc], they were sort [of] like, 'I don't know whether our water will impact down there'. Anyway, [xyz] … said, 'I'll bloody do it'. He let his water go and I rang Matt and I said, '[xyz] has let his water go. We'll just see what happens.' It was across the water meter in Kyeburn within 24 hours and Matt's like, 'Told ya'. (Farmer)

After gathering water-use data over a number of years, KCL agreed that the best way to progress was to relinquish historical deemed permit priority rights held by individuals within the group. This was significant, as priority rights associated with deemed permits meant that there was no obligation to share water with a user downstream or leave it in the river, as long as one maintained a residual flow in the river specified in their permit. Consequently, in droughts, those with priority rights had access to more water than others downstream or with lower-order priority rights. Giving up these priority rights meant some people were sacrificing much more than others. Participants noted that while these negotiations took time, modelling was used to show how access to reliable water could actually be improved overall through a collective approach rather than the previous individual system. Importantly, a collective approach would enable more water to be left in the river to sustain larger residual flows.

As noted earlier, the individualised deemed permits transfer to resource consents and ORC's requirement for people to demonstrate they 'use' the water they are entitled to encouraged people to 'use' water even when they did not need it in case it was not available later on. As part of the resource consent preparation process, KCL engaged consultants to identify residual flows at each point of take and worked with other groups

(including the Department of Conservation, Kai Tahu and Fish & Game) to negotiate what minimum flows were required to maintain ecological, cultural and recreational values. While these negotiations were not easy, following an appeal by Fish & Game Otago and associated mediation, a decision was reached that KCL would aim for a residual flow of 200 L/s in 5 years to give the KCL members time to adapt to lower water takes, and consequently less irrigation and the associated flow-on farm effects. Crutchley (2018) notes that the collective approach encouraged consideration of environmental effects across the sub-catchment and meant that farmers could 'safely leave water in the river without being concerned that they will lose access to it, or that others will use it, as the collective can behave as a community responsible to one another. Crutchley (2018, p. 32) describes how

> Individual resource consent for water takes create[s] competition for water because if it is not utilised by one individual another will likely take the water, if it exceeds residual flow. As flows drop, this creates a 'use it or lose it mentality'. By sharing the resource water KCL has given the top priority to the environment and achieved equity within the group with each take dropping their extraction equally as flows decrease.

All participants agreed that the collective approach by KCL provided better economic, social, and environmental outcomes than individualised resource consent outcomes. While still expensive and time-consuming, participants described how much more difficult and fraught an individual resource consenting process would have been. In what follows we describe these benefits in more detail.

4.3.1   Economic benefits

All participants agreed that the collective approach reduced economic costs. One farmer noted that the consenting and opportunity costs were lower: 'there's the cost of not doing it because you won't have the water of course, but there was the idea that it would probably work out cheaper at application time because, essentially, we were only applying for one consent rather than 22 different individual ones'. ORC participants described how collective management (through shared resource consents) reduced processing, compliance and monitoring costs for the council.

Similarly, DOC and Fish & Game participants described how working with collectives reduced their transaction time and costs, and helped to facilitate greater shared learning and an increased recognition of environmental, cultural and recreational values. For example, a DOC participant described the difficulties of taking an individual approach as follows:

> It takes a lot of time and energy to decide what a good thing is at any one place. When you're going out there and meeting with them, you're trying to understand what the in-stream values are and you're trying to understand the hydrology, you've got to repeat that whole process every time you get an application. It's just extremely inefficient. I don't understand why they don't join together more as well because the RMA says that applicants need to pay for this stuff. By the others not

being in there means that they're going to have to pay for all these consultants and experts and stuff to come and do this again.

4.3.2 Social benefits

All participants described the social benefits of collective approaches. As noted earlier, participants recounted increased trust that had been fostered by the transparent sharing of water meter data. Participants also described how communities of practice formed where people continually learnt from each other and then used this local knowledge to inform farm management decisions.

Participants also noted that KCL enabled wider community representation (including from DOC and NGOs) and the incorporation of a wider range of values in debates about how to use water. This meant that social and environmental values were discussed alongside economic concerns, which was significant in prompting what some participants referred to as a 'culture shift'. Geoff Crutchley described how '[i]f you can bring in Fish and Game and DOC and all of those people at community level, you're not only developing important relationships but you're sharing perspectives'.

Finally, participants described how KCL's collective structure helped people reflect on how their individual actions on their land affected others, and the environment. This was considered important because it helps prepare people for future challenges and opportunities – whether this be responding to proposed regulations, or planning for climate change, such as building dams or winter harvesting of water. One participant (the planning consultant) noted that the KCL structure gave farmers a 'vehicle to respond' to these issues and a model for thinking about how solutions can be designed that go beyond individually owned land. For example:

> *Interviewer:* Do you think having the collective structures that you guys are creating puts you in a better position to manage things like climate disruption, extreme weather events and that kind of stuff?
>
> *Interviewee (farmer):* Yeah because climate change falls into the same category. It's an environmental issue and it's way harder. I always think, what if you could do your climate change stuff at catchment level? What if you could look at your tussock country and balance that out with the rest and calculate your emissions that way, instead of on an individual level?

4.3.3 Environmental benefits

As described earlier, the key environmental benefit that came out of the KCL resource consent process was that more water would be left in the river. While Fish & Game argued that the residual flow was still too low, other parties saw the outcome as a significant improvement on the current situation and on what could have occurred with an individual resource consent process. For example, a farmer in KCL described how priorities changed with the collective approach:

the real clincher for our group that made it change was when we decided to get rid of the priority system, because essentially what happens now is that the priority in the river is actually the flow you've got to leave for the environmental flow. That's the priority, not the person taking it out for irrigation.

Crutchley (2018) notes that because KCL worked with scientists at the sub-catchment level across individual farms, they could also implement measures to benefit native fish, like the endangered galaxiid. These kinds of joined-up landscape measures would have been very difficult through individualised resource consents. When talking about environmental benefits, one participant summed it up as follows:

> Collectively is definitely the way to go. I'm seeing repeated places throughout Otago, where sometimes it's the irrigators not working together and ... the regional council ... not able to get the irrigators to apply as a catchment group. From the [Department of Conservation's] perspective, it's extremely frustrating to be dealing with consent applications to take water on a consent by consent basis, when the ecological effects affect the whole catchment. We want to try and be fair to all of the applicants, by having the same approach, and if we're not dealing with them in the same way, at the same time, it's a real challenge. (DOC participant)

Inevitably there will be trade-offs and costs associated with prioritising environmental outcomes over others. Participants noted that a collective approach enabled these trade-offs and costs to be shared by people across a sub-catchment or landscape rather than only being borne by a few. For example:

> Most people would agree that it's not a good idea to have a disjointed creek but it's not an easy thing. Some of these creeks that we talk about were naturally ephemeral in places but sometimes you've got 90% or more of the flow being taken out of the system due to water abstraction. If the impact of that could be shared amongst multiple people, then there's the potential for a lot more ecological gain and economically sharing the burden of what that means as well. (DOC participant)

Participants also noted other environmental benefits from the collective approach, such as groups being eligible for environmental funding that is not available to individuals. This funding could then be used for wetland restoration or erosion control methods across individually owned land. The KCL collective structure provides the vehicle to apply for such funding, and then to manage and implement the work. Participants described how a collective approach enables farmers to better understand and respond to environmental issues that span individual farms.

While we have summarised the benefits of KCL's collective approach in terms of separate economic, social and environmental benefits, in reality these benefits intersect. Importantly, they reflect the emergence of new water-governing and management practices. Participants' accounts show how KCL represents a shift in local culture and farming practices, from the deemed permit individual competitive priority system to an emerging collective system.

While this shift has been instigated by new environmental and political realities embodied in water management reforms, practice changes occurred through the use of technologies

like water meters and telemetry, digital interfaces that facilitate the sharing of new modelling data, and ecological information. Change also occurred through tapping into narratives of autonomy, efficiency, good stewardship, and the importance of bringing a wider range of values to the negotiation table to pursue community interests. We explore the implications of these themes in section 6.

5   Pest management case study

Pest management in New Zealand is an important and controversial subject that spans concerns relating to the economy, the environment, biodiversity, trade, humaneness, and food safety (EnFocus 2008; Royal Society of New Zealand 2014). The Royal Society of New Zealand (2014) note that the economic costs of managing pests, and the impacts on lost revenue in New Zealand, amount to billions of dollars annually. Pests also have significant impacts on indigenous biodiversity and ecosystems that cannot be measured in economic terms.

Pest control is managed primarily through the Biosecurity Act 1993 (BSA). While the Ministry for Primary Industries is the lead agency managing biosecurity, regional councils are also required to manage pests in their regions under the BSA. Section 13 of the BSA allows for regional councils to monitor and undertake surveillance of pests, pest agents and unwanted organisms, and prepare proposals and implement regional pest management plans. As Enfocus (2008) note, since the RMA and BSA came into law in the early 1990s, regional councils have developed a much broader focus and are under increasing pressure to better manage pests.

5.1   Pest management in Otago

Pest management in Otago has historically been dominated by debates over, and investments in, managing long-eared grey/brown rabbits, primarily due to their impact on pastoral land. Issues with rabbits began as early as 1830, when colonists introduced them to New Zealand for food and sport. By the 1860s rabbits had flourished and were devastating crops throughout Otago and Southland (Edwards 2019).

In response, locally elected Pest Destruction Boards formed, funded by local landowners and the Crown. Throughout most of the 20th century these boards managed rabbits and other pests, with some changes in jurisdiction and processes but a general emphasis on local leadership and autonomy. Following the restructuring of government in the late 1980s and early 1990s and the enacting of the RMA, regional councils formed and ORC assumed oversight of the Otago Pest Destruction Boards.

In the early 1990s ORC undertook community consultation and shifted from charging flat fees (as the Pest Destruction Boards had done) to a user-pays contract system for rabbit poisoning. The intention behind this was that the costs of pest management would be incurred by those benefiting from it (notably farmers), and local land managers would have more autonomy over pest management (Rosson 1993). While some land managers

supported this approach, others did not, claiming that they were not seeing decent results for what they were charged, and consequently opted to manage pests themselves.

In addition to debates and changes about the scale of management, there have been long-running debates about methods of control, including the appropriateness of using poisons (1080 in particular), viruses, shooting, and fencing. Also, as land-use and social changes have occurred across Otago more recently (increasing numbers of lifestyle blocks and tourism operations), there are different imperatives for pest management, and different tolerances for control options (Edwards 2019).

The ORC's current Regional Pest Management Plan was made operative on 11 December 2019. It forms one part of the wider biosecurity strategy in the region, which includes investment in community assistance, public education and various biodiversity projects. The plan categorises 49 species of plants and animals as 'pests' in the region due to the economic, social, cultural or environmental problems they cause. While the plan focuses on controlling and limiting the impacts of most pests, three are specifically targeted for eradication: Bennett's wallabies, rooks and spiny broom. The plan also doubles the ORC's investment in pest management, from approximately $900,000 to $1.8 million (Miller 2018).

The Pest Management Plan requires land managers to control pest plants and animals on their land, but does not specify the technical methods they have to use (e.g. spraying, poisoning). An interesting requirement under this plan are 'good neighbour rules', which require land managers (including the Crown and local government) to match the control efforts of their adjoining neighbours within specific distances of boundaries to stop pests spreading to neighbouring land. For example, the plan requires land occupiers to control rabbits to at or below level 3 on the Modified McLean Scale (MMS 3)[4]. Control methods are permitted as long as they comply with the relevant rules in the regional and district plans, and the Pest Management Plan itself. If land managers are not meeting these requirements, they can either be directed by council and/or biosecurity officers to undertake pest control, and if they fail to do so may be prosecuted under the BSA.

5.2   Maniototo Pest Company Limited

As outlined in section 5.1, in the 1990s pests were managed by the ORC, who charged landowners for rabbit poisoning. At this time some local landowners in the Maniototo were unhappy with the pest management provided by ORC, as they felt they were not getting value for money and were seeing a rise in pests – both on their own land and on neighbouring land. One local farmer in particular, Geoff Crutchley, was influential in proposing a return to locally managed pest control. Following agreement by many in the region, Maniototo Pest Management Limited was incorporated as a New Zealand limited company in 1996, and then moved to a registered company in 2015, when it was renamed Maniototo Pest Management Incorporated (MPMI). It currently operates as a not-for-

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[4] The MMS is a scale of rabbit droppings over a specific distance used by councils to determine rabbit numbers.

profit incorporated society with approximately 70 shareholders and employs 2.5 full-time equivalent staff.

Shareholders in MPMI contribute a levy four times a year based on a combination of how much land they own and how much of a problem their land has historically had with pests. The goal is to balance the costs of pest management with the benefits in a more equitable way. The levy is attached to a shareholder's land, so if a member sells their land, the money set aside for that land moves to the new owner. MPMI essentially operates like a savings pool, where individual levies are ring-fenced for pest control on specific properties. MPMI manages rabbits, wallabies, hares, possums, geese, pigs and deer.

Shifting to locally managed pest control in the 1990s was controversial. Participants noted that when they set up MPMI they did not have any statutory authority and the ORC was not initially supportive, although this changed over time. The founder, Geoff Crutchley, describes how the MPMI was initially established:

> [we] were a nuisance to [ORC] because they had the whole of Otago to worry about and there were no other regions that were organising themselves into a community group … The ultimatum [ORC] gave to us was 'you're either in or you're out. … In other words, you're on your own as an individual looking after your own farm, go back to the old days of the 1940s, which didn't work, or you're gonna join in with us'. We said, 'We don't want to do either of those things. What we want to do is form our own company, we want you to let us buy the local pest depot and all the things that have been there from the old days of farmer boards (which had been taken over by the Local Body Amalgamation Act in 1989). Let us buy that back, let us form our own pest company and we will take it over.' 'We're not interested in any of that, you're either in or you're out. If you're gonna do that, you can do it if you like but as far as we're concerned, you will just be a bunch of farmers who are doing your own thing and we will enforce the limits on you.' We went ahead and did it anyway and as far as they were concerned, we were user pays. (Geoff Crutchley)

Over time the relationship shifted between MPMI and ORC:

> They didn't like us for a start but eventually, they came to change their minds. The way they operated was that they applied a rule which said they could enter onto any property anywhere in Otago and if the farmer had rabbits exceeding scale three on the MacLean Scale, then that farmer could be forced to implement a control programme to the satisfaction of the ORC. When we set up, we got all the farmers in the whole of the Maniototo catchment to sign up to our company, to get our staff those rights to enter onto their property to do inspections and to implement a long-term control programme over all of the properties. The regional council looked at that and said, 'We've got nothing left to do here because if we go onto any of your farms, we find the scale three and we say to that farmer, "You've got to implement a control programme," he just says, "I'm a part of the Maniototo Area Pest Management Company, we've already got a programme here. Here it is".' The council basically left us alone. (Geoff Crutchley)

All participants we spoke with who had knowledge of MPMI saw it as a success. Participants described the environmental benefits in terms of well-managed pest control:

> [T]hey've had a positive outcome with a top pest company that doesn't have rabbits because they've got a plan of action that they implement ... every year. You go anywhere else in Central Otago at the moment, especially at dusk or dawn, you would see [rabbits]. (Regional council participant)

Other benefits included the sense of agency, autonomy and accountability MPMI shareholders have to implement effective pest control measures suited to their context. Participants described this in different ways, with one farmer talking of 'getting away from [council] bureaucracy', ensuring you see the benefits of what you're paying for, and another referring to removing that 'free ride issue of when you see that your rates that you're paying get used by somebody else'.

While MPMI have had success in managing pests, participants also noted that this success relies on other landowners in the region who are not part of the MPMI also effectively managing their pests. Participants described how this was not always occurring, especially in the case of non-pastoral land (primarily forestry and urban land). Some participants were of the view that until the ORC is resourced to effectively monitor and enforce pest control on all landholders, the good work of the MPMI could be undermined by adjoining landowners who do not manage pests in accordance with ORC's Regional Pest Management Plan.

6   Discussion

Current approaches to the implementation of resource management policy in New Zealand (and elsewhere) are dominated by an individual approach to limit-setting policy, which embodies the assumption that the actions of individuals will, ultimately, accumulate to a required limit, target or outcome.

While the sustained actions of individuals can be cumulative, and this policy structure has been used to establish necessary overarching limits, there are often constraints on what farmers can do individually to address cumulative effects. For example, environmental problems often arise from issues, land features or critical source areas that cross multiple property boundaries.

Viewed from this perspective, we are concerned that the individual-based policy structure is limited in its capacity to foster the collective responsibility, accountability and actions that are increasingly recognised as needed to address the many social-ecological issues we now face.

6.1   Differentiating participatory collaboration from binding collaboration

This research has focused on three collectives that we identified as having the potential to provide important insights into governing practices for collective action. As such, they align with other examples of 'participatory collaboration' (i.e. convening people to share concerns and propose ways how to proceed) that have been the focus of collaborative governance research in New Zealand. In each case, what became shared concerns had multiple starting points (e.g. concerns about endangered native fish, water allocation, the

change-over from deemed permits, who should define the community interest, how to retain autonomy and the need to control invasive pests). These concerns were catalysts for coming together and listening to each other and hearing about alternative approaches.

While these processes of participatory collaboration are essential, and many regional councils across New Zealand have focused on them as a starting point for limit-setting and consequent regulation, we argue that building caring capacity and taking enduring stewardship action requires 'binding collaboration' (i.e. taking actions together and being accountable to each other). In our case studies, binding collaboration mobilised important conversations and concerns into collective action.

6.2 Using the elements of practice to identify key governing practices for collective action

To identify key governing practices for fostering collective action in our case studies, we have lined up the elements of the stewardship action framework with those of social practice theory. We see one as the expression of the other (e.g. care reflects meaning and meaning can be expressed as care) (Table 2).

Table 2. Alignment of the elements of social practice theory and stewardship action

Stewardship action	Care	Knowledge	Agency
Social practice theory	Meanings	Competencies	Materials

These elements are mutually reinforcing and generative. For example, care for community, the environment and access to water were identified as key starting points for crucial conversations. From a social practice perspective, venues and communication technologies have allowed people to come together and have been essential initial materials of participatory collaboration. For the Upper Taieri Group and KCL, people with diverse backgrounds, experiences and values for water have been brought together to express what is important to them (i.e. meaning) and to nut things out.

For those involved in KCL, early in their process they were operating as individuals. However, things changed. Part of understanding their shared concerns and building a sense of collective identity included sharing values, touring the catchment, identifying what species live where, and essentially having people from different organisations holding different perspectives involved. This included farmers, DOC, Fish & Game, ORC and iwi. Over time these gatherings moved to talking about the upcoming resource consent transition, potential ways to increase water efficiencies, putting in water meters, and agreeing to share data.

Technology (water meters and telemetry in this case) enabled KCL farmers to collectivise accountability as they were sharing individual water take data. As a sub-catchment grouping of the Upper Taieri Group, KCL sought to gather information to at least substantiate for the council that allocated water was being used efficiently and by whom. It was shown that monitoring – which included buying and installing meters, measuring water use, running a physical test to see how fast water moved through the sub-

catchment, and the sharing of information through telemetry and via computer interfaces – became a new set of key materials and competencies that had to be developed and had significant implications for farmers in this small tributary, how they engaged with the ORC, and how they interacted with stakeholders.

Measuring water use and sharing water-use data helped build a usable and verifiable picture of actual water usage and where water losses might be occurring, which contributed to building trust and sharing knowledge about the hydrology and ecology in the tributary. The information the monitoring revealed helped build trust between members of the KCL group when it became visible who was using water when. These new materials and competencies helped farmers develop new meanings; for example, identities as responsible water users, rule followers, and trustworthy to others in the tributary (see also Myles et al. 2015).

Having built trust through data sharing and improved understanding of the sub-catchment's hydrology and ecology, somewhat surprising decisions were subsequently made as a 'we're all in this together' dynamic emerged. Some farmers agreed to give up their priority deemed permit rights to apply for a shared consent and to work together to achieve a residual flow for the benefit of the river. Hence, other materials became involved: a company structure to share responsibility and accountability for KCL and shared consents that were encouraged under the Otago Water Plan were the chosen mechanism for providing agency for collective action.

Ongoing use of water-monitoring data and water-use practices enabled by metering and telemetry (which had fostered responsible water-user identities) created new possibilities for managing water within the catchment, and new meanings (e.g. good steward identities). New practices embodied new meanings and meant farmers could 'safely leave water in the river' as they had become 'a community responsible to one another' (Crutchley 2018, p. 32).

While West et al. (2018) focus on the care strand of stewardship action, this research highlights key aspects of agency (i.e. the ability to act) and what they involve for collective action (e.g. materials such as water monitoring and data sharing technologies, as well as legal instruments and entities, and how they are enabled by institutional settings that reside with the state). Shared consents, not-for-profit incorporated societies, companies and their constitutional provisions gave the Upper Taieri Group, KCL, MIC and the MPMC agency to come together and govern a common pooled resource or pest control services autonomously and accountably, and to negotiate benefits, care and responsibility.

6.3   Factors that contribute to collective action

What instigated the emergence of collective action was that key people took the lead and advocated for a collective approach over an individual approach. It was recognised by our participants that certain people are needed to have the vision for the collective approach, convince others of the benefits, build consensus, and help develop the collective structures that enable access, use, and benefit while outlining how care, costs and responsibility could be distributed. These insights highlight the significant emotional labour that goes into making collective practices work, and that not everyone has this

capacity or the time to take on these challenging roles. Care for people, place and community is clearly an important motivating factor.

We also found that scale and geography matter in terms of operationalising collective approaches. Participants suggested that shorter sub-catchments with fewer landowners are generally easier to organise collective responses than larger, multi-use catchments with complex hydrology. Larger, complex catchments may require more resourcing or different approaches to realise collective action, but further research is needed here. However, it is important to consider the implications of limited resources and consequent imperatives to use a 'one size fits all' approach on failed attempts at catchment management.

We have seen that key people often identify and build on existing or historical collective practices, arrangements and relationships (like the historical priority system that has been running for many years, family, former localised approaches to pest management and the MIC). These previous practices are drawn on as evidence of success, and re-imagined and adapted to new issues and circumstances. This is significant because it makes visible existing and historical collective practices, helps to legitimise them, and provide stepping stones for people to imagine how new ones could successfully operate. Essentially, new visions of what might be possible draw on social-ecological memories to imagine and legitimise new practices.

This research highlights that regulatory approaches need to respect and align with people's meanings, aspirations and sense of identity. This means councils need to be able to support collective approaches and process resource consents for groups of people. Stretched resourcing is always a problem, and ORC participants talked about balancing, not wanting to impose 'collective approaches' on communities, and the impetus for these needing to come from communities. Councils currently have no ability to 'require' people to apply for collective resource consents or manage environmental issues at a landscape level. However, there may be other ways to incentivise or encourage collective approaches.

Finally, labour markets, mobility and place attachment all shape the nature of collectives. Participants noted that KCL (and MPMI to a lesser extent) were successful because they primarily involve farmers with long-term place attachments (multi-generational farms). The socio-economic structure of dairying (with migrant share-milkers, higher average debt, increasing prevalence of corporate-based dairy farming) were identified as potential impediments to collective approaches, as the economic and community values and farm imperatives are often different to sheep and beef, or other forms of less intensive pastoral agriculture or other farm ownership models.

7   Conclusions

Current approaches to the implementation of resource management policy in New Zealand (and elsewhere) are dominated by an individual approach to limit-setting policy that embodies the assumption that the actions of individuals will, ultimately, accumulate to a required limit, target or outcome.

To encourage thinking about the possibilities of different ways of structuring limit-setting policy and implementing resource limits, we have presented three case studies from New Zealand's South Island region of Central Otago related to water and pest management.

We have argued that governing resource use and resource users individually, cumulatively and collectively is possible and important to do given that water and pests, for example, move across private property boundaries, and that the actions, inactions and practices of others can have significant effects beyond an individual's land.

We have traced how and why the imperative for collective action emerged, and have identified how practices can be fostered to manage common resources and improve community and environmental outcomes collectively. Conceptualising what the collectives of this study have done as an assemblage of elements has been useful for identifying enabling factors of collective action.

In particular, our analysis draws attention to the materials element of governing practices for collective action, which links to agency in the stewardship action framework. Monitoring technologies as well as legal entities and instruments provided the Upper Taieri Group, KCL and the MPMC with considerable collective agency (i.e. the ability to act together). These material things have enabled farmers to make formal, 'skin in the game' commitments to each other, while retaining the autonomy of their individual property rights system, and to work for a wider benefit they could not achieve by themselves or solely from within their property boundaries. We have also shown how changes in the elements of management practices (e.g. monitoring technologies) created new possibilities (e.g. shifting from individual to collective management) and new meanings (e.g. good steward identities).

These are important findings because they draw attention away from the usual focus on knowledge (usually scientific) that is assumed to catalyse change (Duncan et al. 2018; Shove et al. 2012). Both social practice theory and the stewardship action framework recognise the importance of knowledge, but, as shown in Figure 1, it is conceived as only part of the picture. However, the research does highlight that the knowledge needed to foster collective action needs to go beyond scientific knowledge to include legal, accounting and relationship management expertise. These latter types of knowledge are not the standard fare of New Zealand's resource management system, but they could be.

8   Recommendations

All participants agreed that collective management of resources like water and pests resulted in environmental, social and economic outcomes that matched the needs of those sitting around the collective table. Local government and NGO participants also agreed that engaging with community collectives rather than individuals was a better use of limited resources and time, and helped to foster communities of practice where diverse knowledge, experience and values were more easily shared.

Farmer participants reiterated this and noted that collectives helped to build community relationships, facilitated a greater sense of local autonomy and stewardship, and were generally cheaper than applying for individual resource consents and managing pests in terms of consenting/regulatory costs. These findings suggest that further work could help operationalise the examples and good work already underway.

Recommendations for future work could include the following.

- Research to develop further case studies for use by councils to demonstrate the value of collective approaches when advising applicants/communities on resource management processes. For example, these case studies could include open-access information focused on the five key aspects of sustainable commons explained earlier that communities need to negotiate, namely: access, use, benefit, care and responsibility (Gibson-Graham 2013). While these kinds of examples are developing (particularly through irrigation companies in Canterbury, which are using Audited Self-Management; see McCorkindale 2019; Simpson 2015), there is a need for other examples and associated management structures at a range of scales that address water take, water quality, pest management, and landscape restoration, particularly when large assets such as irrigation infrastructure are not shared.

- Develop collective governance structures and processes that clarify how access, use, benefit, care and responsibility are enacted. While the exact form of these negotiations will always be specific to individual contexts, not having to reinvent the wheel every time would be useful.

- Conduct research that explores the size of collectives – not too large so that people do not know each other (unless there are really well-organised structures and a certain amount of professionalisation of roles and responsibilities), but large enough so that there are advantages of working together.

- Review whether and/or how existing RMA consenting processes can be amended to enable or encourage more collective approaches to water quality and pest management in particular. This could involve reviews of resource consent conditions granted to collectives/groups, or exploring how incentives could be incorporated into policy and regulation that foster collective approaches.

- Subsidise or waive resource consent fees for projects that collectives do for environmental outcomes, such as sediment traps, or creating wetlands.

- Explore catchment-wide resource consents for things like wetland creation, where, if applicants and groups meet certain conditions or do things in certain ways, these are permitted with associated monitoring and compliance.

- Conduct further research on how policy structures, auditing systems and technologies can either collectivise or individualise accountability and practice. Our examples suggest that on-the-ground practice change does not occur through regulatory processes alone. Regulation might be a matter of concern that people mobilise around, but setting regulations or requirements needs to be supported by other practices, systems and structures that help collectivise responsibility and care in transparent processes that prioritise people's agency. These support systems and processes appear to work best through face-to-face participatory ways – walking the land together rather than making assumptions about what people are doing, value, or aspire to.

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Appendix 1 – Information sheet and consent form

Date   13/11/2019

INTERVIEW INFORMATION SHEET

'Collaboration in resource management'

You are invited to take part in an *interview* about your involvement in community led actions in relation to either water management, pest control or landscape restoration projects.

Manaaki Whenua Landcare Research is conducting this research as part of a focus on how communities work together on resource management and shared environmental concerns in New Zealand. The research team comprises Dr Ronlyn Duncan and Dr Gradon Diprose, social geographers, who are part of the Landscape, Policy and Governance team. We are conducting research with the aim of understanding how positive environmental and social outcomes surrounding water, pest management and landscape restoration can be achieved through collaboration. We are interested to learn from key informants about their experiences of working with catchment irrigation user groups, collective pest management companies, and landscape restoration projects.

The interview will take between 60-90 minutes and can be at a time and in a place of your choosing. We would prefer to *audio* record the interview but this would only be done with your consent and the recorder can be turned off at any time. Data obtained from the *interviews* will be shared with Irrigation New Zealand, used for internal reports, presented at conferences, and may be used in journal articles that will be submitted for publication.

Due to the nature of the research we *cannot* guarantee your anonymity. While you can request not to be identified by name, due to the nature of the research others familiar with the Otago context may be able to identify you, or the organisation you are involved in. However, we will treat information with sensitivity and we will discuss this with you at the beginning of our interview.

If you agree to participate we will ask you to read and complete a consent form. Thank you very much for your time and help in making this study possible. If you have any queries or wish to know more please contact Ronlyn Duncan, (03) 321 9943, duncanr@landcareresearch.co.nz. You can contact the leader for this research portfolio, Suzie Greenhalgh, (09) 574 4132, greenhalghs@landcareresearch.co.nz.

Yours faithfully,

Ronlyn Duncan
Researcher Environmental Social Science
54 Gerald Street, Lincoln, 7608

This research received social ethics approval via Landcare Research *(SE #1920/13)*

Manaaki Whenua
Landcare Research

◢ *‖Collaboration in resource management'*
INTERVIEW CONSENT FORM

I have been given and have understood an explanation of this research project.

I have had an opportunity to ask questions and have them answered.

I understand that I may withdraw myself or any information traceable to me at any time up to 28 February 2020 without giving a reason.

- I agree to take part in this research.

- I agree to the **interview** being **audio** recorded.

- I wish to have a pseudonym used instead of my real name in all reporting of this research.

    Yes ☐   No ☐

Signed:

Name:
(please print clearly)

Date:

Social ethics code: 1920/13

◯ Manaaki Whenua
Landcare Research

Appendix 2 – Schedule of interview questions

Questions for farmers/landowners/members of community-led initiatives

Exploring place

- How long have you been living/farming in central Otago?
- What keeps you living and working here?
- Do you feel connected to this place? If yes, can you describe that connection?

Care, knowledge and agency

- How long have you been involved in [name of community organisation]?
- Why did you initially get involved in [name of community organisation]?
- What has your involvement required of you, and what kinds of things have you been doing?
- In your view, has the [name of community organisation] achieved anything?
- Have you learnt anything new since being involved with [name of community organisation]?
- Has being involved in [name of organisation] changed the way you do things on your own farm/land?

Negotiating collective stewardship

- Did you have any concerns about joining [name of community organisation]? If so, could you describe these, and how you have managed them?
- How do you communicate with others involved in [name of community organisation]?
- How do you and others involved in [name of community organisation] decide what to do?
- Do you personally do things that benefit your neighbours/others in the local community? Do your neighbours/others in the community do things that benefit you?
- How would you describe your level of trust in others in [name of community organisation] and the leadership of the group?
- Have there been certain things that help to build/undermine trust within the [name of community organisation], and outside of it? [Prompt – could be things like metering of water for transparency, regular meetings to build trust etc]
- Do you think the current decision-making structure of [name of community organisation] will be able to respond to predicted increases in weather extremes like rainfall and drought, or future landuse changes?

Community action and regulation

- Do you see any key advantages or disadvantages associated with community type actions like [name of community organisation]?

- Does the [name of community organisation] enable anything [could be social, economic, environmental] that wouldn't be possible with more individualised management approaches?
- Has being involved in [name of community organisation] changed the nature of your interactions with the Otago Regional Council?

Closing questions

- Do you plan on/hope to continue your involvement in community type actions in the future? If so, why?
- Is there anything else you'd like to tell us that we haven't asked about?

Questions for other stakeholders (council/NGO staff)

Exploring place

- Please describe the key aspects of your current role?
- How long have you been doing this kind of work?
- What keeps you living and working here?
- Do you feel connected to this place? If yes, can you describe that connection?

Care, knowledge and agency

- How long have you been involved with [name of community organisation]?
- Why did you/your organisation initially get involved in [name of community organisation]?
- What has involvement required of you/your organisation, and what kinds of things have you been doing?
- In your view, has [name of community organisation] achieved anything?
- What kinds of measures or indicators do you/your organisation use to evaluate the effectiveness of community initiatives like [name of community organisation]?
- Have you/your organisation learnt anything new, or changed the way you do things as a result of working with [name of community organisation]?

Negotiating collective stewardship

- Did you/your organisation have any concerns about [name of community organisation]? If so, how would you describe these, and how have you managed them?
- How do you/your organisation communicate with [name of community organisation]?
- How would you describe your level of trust in [name of community organisation] and the leadership of the group?

- Have there been certain things that help to build/undermine trust within [name of community organisation], and outside of it? [Prompt – could be things like metering of water for transparency, regular meetings to build trust etc]
- Do you think the current decision-making structure in [name of community organisation] will be able to respond to predicted increases in weather extremes like rainfall and drought, or future landuse changes?

Community action and regulation

- Do you see any key advantages or disadvantages associated with community type actions like [name of community organisation]?
- Does more collaborative/community type action enable anything that wouldn't be possible with more individualised management approaches?
- Do you think being involved with [name of community organisation] has changed the wider community's perception of your organisation, or the nature of your interactions?

Closing questions

- Do you plan on/hope to continue your involvement in community type actions in the future? If so, why?
- Is there anything else you'd like to tell us that we haven't asked about?

Appendix 3 - Extract from regional plan: water for Otago (ORC, 2018, pp. 6–12 – 6–13).

6.4.0B

To promote and support shared use and management of water that:

   (a) **Allows water users the flexibility to work together, with their own supply arrangements; or**

   (b) **Utilises shared water infrastructure which is fit for its purpose.**

Explanation

Shared consents to take and use water provide:

- Benefits for the water users, including making the best use of available water;
- Opportunities for shared investment in, and optimal use of, water transport and storage infrastructure;
- Economies of scale in managing use, maintaining infratructure and meeting consent and compliance requirements;
- A reduced need for involvement in water rationing by the Council, especially during periods of low flow; and
- Overall potential for greater economic and community prosperity.

Invidivual consent holders may choose to work together, so that they have the flexibility to meet day-to-day requirements from available water. Such arrangements could range from two individuals, to all water users and other interested parties within an area, working together.

Infrastructure is "fit for purpose" if it is working as it was designed to work, with no more than minor wastage of water.

Principal reasons for adopting

This policy is adopted to enable optimum benefit from the use of Otago's limited water resources and to support the development of infrasturcture that will achieve this. This policy enables management of consents for taking and use by groups of water users.