

Elizabeth Eppel

Improving New Zealand Water Governance challenges and recommendations

Water permeates ecosystems, jurisdictions, and communities, linking complex and emergent social, cultural, technological and economic systems.

– Russell, Frame and Lennox (2011), *Old Problems, New Solutions*

Our lives and our livelihoods depend on fresh water. Our cities and the appeal of our countryside to New Zealanders and tourists alike are based on plentiful supplies of fresh water. The overwhelming majority of New Zealand's exports – not least agricultural and horticultural – require water, and in large quantities. Indeed, in many respects water is New Zealand's largest export. Yet the management of our fresh water has not been ideal. We have over-allocated,

and badly polluted some of our water resources. Such problems point to significant weaknesses in the governance of fresh water in this country. This article explores these governance issues through a complex adaptive systems lens and outlines some possible solutions.

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What is water governance?

Water governance refers to the processes through which government and non-government actors and citizens interact repeatedly to produce a pattern of rules, practices and behaviours through which water is managed and outcomes are achieved (Russell, Frame and Lennox, 2011). Good governance and effective governance are not the same thing: good governance has its focus on doing particular things; effective governance has its focus on achieving the best outcomes for all over time (Perry, 2013). Effective and sustainable water governance needs to be purposeful and adaptive (Foerster, 2011) if it is to achieve the outcome of sustainable practices for use and conservation of fresh water for subsequent generations. It recognises that there are biophysical limits beyond which the natural systems cannot be self-sustaining. We seem to treat these limits as trivial matters, though there is not a ready replacement for our natural freshwater systems. Without fresh water life cannot exist – like a rubber band stretched till it breaks and is never again able to function as it did before, no matter how we try to mend it.

The following sections identify the components of New Zealand's water governance system and how well they are currently functioning. Using a complex system lens (Eppel, 2012, 2014), I note areas which need more attention from policy makers, implementers and all New Zealanders interested in the quality of our water now and for generations ahead. Our current rate of policy progress is too slow to keep up with the rate of change in water quality, which presents an effective water governance challenge. This article points to areas where accelerated efforts are needed.

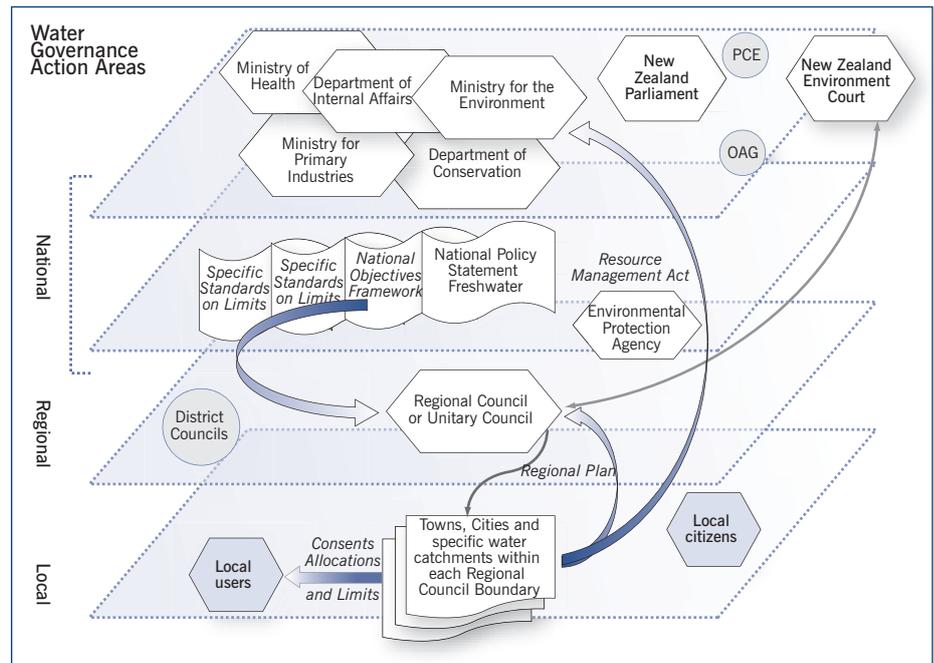
Components of the complex water governance system

The institutional context in which water governance takes place in New Zealand is complicated, having a number of action arenas, which I describe below and provisionally summarise in Figure 1.

Multi-layered and complex institutional arenas for decision-making

At the national level there are a number of organisational entities of diverse

Figure 1: New Zealand's water governance regime



types, each with a specific or general legal mandate conveying responsibility for some aspect of the regulatory regime applying to the governance of water. The New Zealand Parliament and government agencies such as the Ministry for the Environment, Department of Conservation, Ministry for Primary Industries, Ministry of Health and Department of Internal Affairs, set the policy frameworks within which governance of fresh water occurs. While Parliament has established the Resource Management Act 1991 (RMA) as the principal legislation for water governance, there are also requirements in other legislation.¹

The Environmental Protection Authority adjudicates on the application of the policy frameworks for national projects, and the Environment Court provides a forum in which decisions made might be challenged. The Parliamentary Commissioner for the Environment and the Office of the Auditor-General may investigate how well these arrangements are working and how effective (or not) other agencies are in carrying out their responsibilities under the act, and advise the Parliament. The former has explained the science which affects the quality of our fresh water (Parliamentary Commissioner for the Environment, 2012) and drawn attention to the implications of continuing intensification

of farming activities on the demand for fresh water and the negative effects on human health and livelihoods through increased nutrient run-off into our rivers and lakes (Parliamentary Commissioner for the Environment, 2013).

In specific regional geographic contexts, the prime responsibility for achieving the water governance outcomes specified by the RMA rests with regional councils. The auditor-general has called councils to account for their efficiency and effectiveness in executing this role over the life of the RMA (Controller and Auditor-General, 2005, 2011): an example is how they monitor the effectiveness of their policies. These elected councils must work with a variety of individual and organisational actors (users, those affected by use and regulators at various levels) to achieve a water governance regime which is consistent with the roles, purposes and limits specified by the act. The Environmental Protection Authority fulfils this consenting role in respect of what the minister deems 'nationally significant projects'. The RMA therefore shapes and constrains the interactions between the actors in the different arenas. Matters of contention between the various actors become the points on which the Environment Court may be asked to adjudicate, although clearly not all who are dissatisfied with decisions have deep enough pockets to pursue this

route. There is also a problem with access to expert technical advice because often this relatively scarce resource is tied to the action of the council or the better-resourced advocates for a particular decision.²

Water governance also has a Māori dimension, deriving from the articles of the Treaty of Waitangi which guaranteed the Māori chiefs 'full exclusive and undisturbed possession of their Lands and Estates Forests Fisheries and other properties which they may collectively or individually possess so long as it is their wish and desire to retain the same in their possession'.³ As well as the duty to protect and consult with Māori, the Crown has agreed as part of the settlement of

an integral part of this constraining and enabling environment. Each actor takes into account the institutional constraints and the actions of others, and how they will position themselves in the consumption of water.

This means that we need to understand the consequences of a complex adaptive system⁴ at work and the implications for how government agencies (and other actors) might work in such a system (Room, 2011). In this conceptualisation, the human actors are part of a series of nested systems that make up a governance regime. In a complex adaptive system the individual actors are constantly responding to each other and their institutional settings in

are consistently encountered in reviews of academic literature:

1. They adopt a *systemic perspective*: that is, the governance regime links ecological, social, economic, technical, legal, cultural and other aspects of the local or regional water system to assist understanding of the ubiquity and complexity of water resource challenges.
2. They *focus on the social actors*: in order to understand the governance system it is necessary to know who is causing or contributing to the problems and who is willing or ought to be doing what to mitigate and solve problems.
3. They encourage a *transparent and accessible discourse on values and goals*: the governance regime adopts processes to specify, reveal and negotiate tangible needs, preferences and visions among regional and local stakeholders and discover their implications for water systems governance.
4. They adopt a *comprehensive perspective*: the governance regime aims to account for social-ecological integrity, sufficient livelihoods, social justice, intergenerational equity, and any other factors which might affect the sustainability of the governance regime over time. (Wiek and Larson, 2012)

Therefore, to assess the sustainability of a water governance regime a comprehensive, dynamic picture is needed, built up from the above core information elements.

First, the boundaries of the social-ecological and hydrologic systems to be governed must be mapped in ways that do not lose sight of 'the interactions between political units of decision making, where power and authority to implement societal actions and policies typically resides, and the biophysical interfaces of hydro-ecological resources and processes' (ibid., p.3156).

Second, there needs to be a focus on people's actions and activities related to water resources: where water comes from; how supplies are accessed and managed; where water goes – i.e. how it is distributed to users, whether by

historical grievances that some tribes will have a more active guardianship role for rivers in their rohe (tribal area). For example, the Waikato–Tainui tribes now have a co-management role in respect of the Waikato River. Even where there is no specific agreement as in this instance, there is more general acceptance by government agencies that Māori tribal authorities and hapū will play a more active role in the governance of traditional water resources, and examples of this can be seen in various local water governance arrangements.

Interacting, interdependent complex systems

An institutional analysis alone is inadequate for understanding the complex interactions between individual actors and the institutional environment that constrains them (Room, 2011). In the multi-actor decision-making arenas New Zealand has created, the rational actions of individual actors (users, those affected by use and regulators) are constrained by the institutional rules and processes which shape the interactions between them (Ostrom, 2005; Room, 2011). Political and economic power in this analysis are

not completely predictable sequences of action, reaction and counteraction (see, for example, Innes and Booher, 2010).

Adaptive and sustainable

New Zealand's fresh water is largely a free good from which some can obtain significant private benefits without bearing the costs of their use, or the risks to the sustainability of freshwater systems for the use of others in the future. Internationally, people studying water governance agree that an effective water governance regime needs to be sustainable. That means it must be able to operate within environmental limits and deliver an environmentally self-sustaining result trajectory over time (Rau and Edmondson, 2013).

Given the complex interactions between people and natural systems, water governance also needs to be adaptive. This means that the governance process, in order to be able to produce an environmentally sustainable result over time, must be able to adjust in response to changes in the other nested systems (economic or social) affecting the water governance system. Four characteristics of sustainable water governance regimes

engineered or natural means, and how people use and conserve water for various purposes, 'including human, economic, and ecological needs and wants' (ibid., p.3157); outflows – i.e. what happens to water after it has been used; and cross-cutting activities that affect the former domains, such as planning, monitoring, deliberation and advocacy. The result of this activity would be a comprehensive water governance information system.

Third, a dynamic systems view of the interactions between the two sets of systems described above needs to be built. This would map the dynamic exchanges between the biophysical and human systems. It would include the interactions between actors and the rules that influence them, and the interfaces between these systems and any factors beyond the boundaries which influence the regional water system or its governance regime. Political power influences the regime through the rules that are set, although not always in the ways intended. This dynamic model represents the governance regime, and repeated iterations of interaction between the systems described are the mechanisms of the governance regime.

The information generated by such a model over time, as well as driving the day-to-day process of water management, might also be used to assess and evaluate the effectiveness of a particular governance regime through the longitudinal picture it forms. Analysis of a water governance regime in operation in a particular context along the lines outlined above would be accompanied by judgement about the sustainability of the regime by all who might have a stake in its effectiveness. I will return to who judges the effectiveness of a water governance regime in the next section.

Wiek and Larson (2012) suggest a set of seven principles as a starting point for judging a governance regime for its sustainability (see Figure 2). Their principles allow for multiple interests in water governance (see principles 4 and 5: socio-ecological civility and democratic governance, and inter- and intra-generational equity) and the changing risks to sustainability that arise from the impacts of the effects of climate change

on hydrological systems (principle 7: precaution, mitigation and adaptability), but do not emphasise these sufficiently in the light of emerging knowledge, such as the latest reports of the Intergovernmental Panel on Climate Change on mitigation and adaptation (see, for example, Hollis, 2014). The application of such a set of principles in practice would be dependent upon open access to a very rich information system, containing not just data about a few physical parameters but also relevant biological ecosystem, economic and social data, and visual tools for displaying that information in ways that might be understood easily by a large segment of the population. It also assumes that monitoring is active and

the Land and Water Forum (2010, 2012a, 2012b) has pointed to the need to improve the effectiveness of the water governance process to limit the decline in water quality. Modelling shows that the rate of nutrient addition from land use run-off, principally from dairy farming but from all forms of land use change, is increasing and can be expected to continue to do so (Parliamentary Commissioner for the Environment, 2013) – in some regions dramatically so. For instance, the nitrogen load in Canterbury, which has the highest increase in land use for dairying, is predicted to have increased by 50% between 1996 and 2020, resulting in increasing toxicity of many aquifers, rivers and streams in lowland areas.

Dramatic changes in land use in some regions and increasing population have brought about some rapid declines in fresh water quality in New Zealand.

continual and that the economic, social, regulatory and political systems are responsive, so that any lags in the system do not reward those abusing the consents granted under the regime.

Water governance in New Zealand now

Dramatic changes in land use in some regions and increasing population have brought about some rapid declines in fresh water quality in New Zealand. Voluntary agreements such as the Dairy and Clean Streams Accord (2003) and its successor, the Sustainable Dairying: Water Accord (2013), while recognising some aspects of the problem have been ineffective in bringing about change. They advocated voluntary mitigation strategies incumbent on individual farmers, which clearly have not worked because on the whole water quality in areas of intensive and increasing dairying has continued to decline. Expert scrutiny of water quality trends and the operation of current governance arrangements undertaken by the Parliamentary Commissioner for the Environment (2012, 2013), the Office of the Auditor-General (2005, 2011) and

Access to information about the state of water quality and changes in quality is improving. We have seen regional councils collaborate with each other, with research institutions and the Ministry for the Environment and invest in sophisticated water quality monitoring regimes, and make results from these monitoring sites available to the public.⁵ Recent policy progress, enabled in part by a more constructive dialogue among elite policy stakeholders⁶ through participation in the Land and Water Forum (see, for example, Eppel, 2013), includes two new policy instruments: the National Policy Statement for Fresh Water (2011), and a requirement for regional councils to set water quality standards to maintain or improve the quality of the freshwater bodies in their area. Both these steps were welcomed by most as long overdue. They address gaps in the policy framework that has been in place since 1991 by giving more national guidance to the work of regional councils. That only three of the 16 regional councils reported that they would be able to complete their implementation programme to give effect

Figure 2: Principles for assessment of sustainability (Wiek and Larson, 2012)

| Sustainability Principle | Key Features | Domain of Activities |
|--|--|------------------------|
| 1. Social-ecological system integrity | a. Maintain minimum flows in surface water | Supplies |
| | b. Maintain or enhance the quality of water resources | Deliveries |
| | c. Ensure aquifers are not over-taxed to points of instability | Supplies/Uses |
| | d. Recognize and co-ordinate resource uses and impacts within appropriate physical units | |
| 2. Resource efficiency and maintenance | a. Reduce water use or enhance water-use efficiency | Uses |
| | b. Reuse water or recycle wastewater for various uses | Uses/Outflows |
| | c. Eliminate water losses | Supplies/Deliveries |
| | d. The groundwater extraction rate should not exceed the groundwater regeneration and recharge rate | Supplies/Uses |
| 3. Livelihood Sufficiency and opportunity | a. All people pursuing livelihood activities have access to sufficient quality and quantity of water | Supplies/Uses |
| | b. All people pursuing activities enhancing their psycho-physical well-being have access to water | Supplies/Uses |
| | c. All people pursuing economic activities have access to sufficient quality and quantity of water | Supplies/Uses |
| 4. Socio-ecological civility and democratic governance | a. Involve all groups who affect or are affected by water governance efforts into decision making | Cross-cutting |
| | b. Elicit the full array of interests and perspectives through various stages of governance | Cross-cutting |
| | c. Establish collaborative endeavors for water governance | All/Cross-cutting |
| 5. Inter-generational and Intra-generational equity | a. Ensure a fair distribution of benefits and costs among all actors and stakeholders | All/Cross-cutting |
| | b. Facilitate stakeholder representation based on demography, geography, and interest | Cross-cutting |
| | c. Ensure representation of future generations (e.g., via guardians who defend their interests) | All/Cross-cutting |
| 6. Interconnectivity from local to regional to global scales | a. Reduce or eliminate negative impacts on other regions | Supplies/Uses/Outflows |
| | b. Plan within the watershed or groundwater basin context | Supplies/Uses |
| | c. Recognize and coordinate between local actors and broader scale stakeholders | All/Cross-cutting |
| 7. Precaution (mitigation) and adaptability | a. Anticipate potential water shortages and water quality problems | Cross-cutting |
| | b. Mitigate potential water shortages and water quality problems | All/Cross-cutting |
| | c. Adapt to water shortages and water quality problems | All |

to these changes by the end of 2014 speaks of how little real progress has been made on the ground under the current regime. The remainder have taken advantage of the very long timeline the National government allowed under the regulation: for example, Canterbury taking up to 2020 to set limits and publish data on quality. This step is also a long way short of actually meeting or exceeding a minimum quality standard which can maintain the natural ecosystems across the country.

In 2013 the government proposed an amendment to the National Policy Statement for Fresh Water to add a National Objectives Framework which would require councils to establish a set of values and objectives for each 'fresh water unit',⁷ consistent with national

objectives. The proposed amendment would also impose a set of national water quality 'bottom lines' which locally-set objectives cannot exceed. Two compulsory national values are proposed: Te Hauora o te Wai/the health and mauri of the water (ecosystem health) and Te Hauora o te Tangata/the health and mauri of the people (health risks to people boating or wading). A further eight national values are identified, which might be applied to a particular water unit, such as its natural form and character, food gathering, or swimming and recreational qualities. This remains a work in progress.⁸ Some experts view the quality standards the government proposes as not tough enough to preserve fresh water quality against a trend of intensifying agricultural activity, and

when these new proposed limits will be operative is currently unknown. They also leave a gap in areas where remediation might be required. The replacement of the elected Canterbury Regional Council (ECan) by appointed commissioners in 2010 because of 'lack of progress on a regional water plan', and the decision not to hold an election in 2013 despite progress in the meantime on the Canterbury Water Management Strategy under the collaborative leadership of the Canterbury Mayoral Forum,⁹ demonstrates how politicised water governance has become in some regions, and how difficult it might be to achieve real results in areas where likely bottom lines have in all likelihood already been exceeded.

Proposed amendments to the RMA to permit more collaborative and local approaches as envisaged and recommended by the Land and Water Forum have yet to be passed into law. This delay highlights one of the major tensions, between the sustainability of the natural biophysical systems and the desire for economic development, at the heart of the water governance problem. The government's proposal to also include changes to the principles of the RMA to prioritise economic development over environmental quality led to withdrawal of support from its minor party allies. In March 2014 the government introduced an Environmental Reporting Bill to establish more comprehensive, 'independent' environmental reporting every three years by Statistics New Zealand and the Ministry for the Environment. The bill was welcomed by most parties for its general intent, but was also criticised for undermining the stated objective of independent reporting by making it possible for the government to control through regulation the matters to be reported on. This much-needed legislation, allowing for true independence of reporting, will not be passed in this term of government.

Local water governance experiments

While policy on fresh water at the national level has at times been stalled or has been making very slow progress (Logan, 2013), some very interesting, and potentially informative, innovation in

water governance has been emerging in communities around New Zealand. These practices amount to 'experiments' (Eppel, 2014) in the sense that, in each instance, what is happening to bring about water governance is a highly contingent set of interactions between a large number of interdependent actors particular to the specific context. I have described six of these experiments in detail in a Policy Studies working paper (Eppel, 2014). The examples I draw from include the Land and Water Forum (Eppel, 2013), Lake Taupo, the Canterbury Water Management Strategy, Te Waihora/Lake Ellesmere, and Horizons Regional Council and the Manawatu River Leaders Accord. They are only five of the more prominent and better documented examples of water governance experimentation going on around the country.

Each experiment varies in the context of its initiation, the actors involved and the approach to water governance which has evolved. These practices are being designed largely from the ground up, or the middle out, rather than the top down, and are sometimes supported by government funding.¹⁰ They are drawing on practical and Māori cultural wisdom of local iwi or hapū and their knowledge of specific contexts, as well as traditional scientific knowledge, and are using processes that are outside, or are working around, the planning and consenting parameters of the RMA. They involve active collaboration between the actors involved to frame the governance problem and design the steps forward to some agreed improved outcome.

The Treaty of Waitangi and settlements made through the Waitangi Tribunal process have had an effect on the willingness of government and its various agencies to work with iwi and hapū in co-management arrangements. Māori involvement brings a diverse set of perspectives into play, which include traditional spiritual and cultural values but also, more recently, following historical Treaty settlements, values associated with ownership and economic development. Advocates for economic development, spanning interests in the maintenance or enhancement of natural water qualities such as for tourism and

water recreation and sporting activities, and those who would like to reshape the natural environment to suit a different economic purpose, such as more intensive agricultural and horticultural production, bring another set of perspectives. Scientists and technicians with knowledge of how natural systems function and remain self-sustaining remain an integral part of the mix. The collaborative process is requiring people with these diverse perspectives to learn more about what they each know and understand about the biophysical, social and economic systems affecting water governance, and to use the process to generate new understanding and workable governance solutions for both the shorter and longer term.

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In all of these experiments the natural, social and economic systems are constantly undergoing changes in response to each other, as well as to systems outside the current consideration, such as changes in local weather systems producing extreme weather events, the global climate system and the global financial system. Understanding the dynamics at work needs both hard factual knowledge from scientific monitoring programmes and softer social knowledge and values. Most of the areas involved are facing increasing economic use of water in agriculture, which is altering the natural system, and also altering societal patterns in the water use through changes in lifestyles and pressures for further intensification of economic activities which make high demands on fresh water. In each of these experimental sites there appears to be an acceptance that a government body alone cannot have sufficient knowledge or resources for the effective governance of fresh water and that a more participative process is needed.

The Canterbury Water Management Strategy (CWMS) is a particularly complex example because of the physical area it covers, the extensive changes being made to the natural water system and the magnitude of the changes in economic use (Canterbury Mayoral Forum, 2009; Russell, Frame and Lennox, 2011; Salmon, 2012; Eppel, 2014). The strategy came about through the collaborative efforts of a large number of stakeholders and all the local body mayors in the region covered by the regional council, Environment Canterbury (ECan), who saw that their collective and individual interests would be better served by a common strategy. As part of the implementation Ecan has appointed ten zone committees, one for

each water unit, overseen by a regional zone committee, as a way of introducing collaborative learning processes for understanding the complexity of the changes these local systems are undergoing and how they might best be accommodated by the regional council in its planning and management decisions. Ideally, the collaborative processes bring the knowledge, values and resources of all of the actors involved into play. Collaboration done well allows mutual learning (Emerson, Nabatchi and Balogh, 2011; Gerlak and Heikkila, 2011), adaptation and the emergence of creative and sustainable solutions to occur. Currently the recommendations of these zone committees are advisory only, and the regional council must take responsibility for the final decisions within their legal mandate.

While ECan and the CWMS have made good progress in setting up the zone committees, progress towards real results in terms of water management is slow and the success of this strategy to

date is therefore difficult to judge. The picture is further obscured by consents granted by ECan prior to the adoption of the CWMS and the establishment of the committees still being acted upon. The most important question ECan and the Mayoral Forum responsible for CWMS need to address is whether the zone processes can move speedily and effectively enough to keep up with intensifying agricultural activity and land use change in the fastest-changing area of the country, and begin to remediate it where necessary. And the country should demand more assurance on this question sooner rather than later.

While each of these experiments is at a different stage of maturity, it is clear

the country, and particularly in the most intensive-use areas such as Canterbury and Southland, is yet to be seen.

In a practical sense these experiments are providing new knowledge about alternative approaches to water governance which could prove effective in the locations where they occurring. At the national level we need a deliberate plan to evaluate these experiments for what we might learn about how to do effective water governance systemically in New Zealand. We need to ensure collection of and ready access to a rich data picture of the changes that are occurring and a developmental evaluation methodology (Patton, 2011) to tell us about how these processes are working and how

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that New Zealand is still learning how to do collaborative governance well. Also, we are not monitoring the product of these processes comprehensively at the national level to ensure that they do achieve a trajectory that New Zealanders think is desirable in terms of water quality for both current and future generations. The Environmental Reporting Bill, if and when it becomes law, might be too little and too late to stimulate the remediation needed. Research would suggest that we should focus on both the process outcomes and the substantive outcomes for the environment, the society and the economy (see, for example, Innes and Booher, 2010). Process outcomes are about the capacity and the capability of the processes to continue to deliver results. The substantive outcomes are much more incremental and long-term in their production and therefore difficult to detect initially. Whether these experimental practices are able to result in hard decisions to bring about long-term maintenance, and in some cases needed improvements, in water quality across

they might be improved. Thus far there is no Ministry for the Environment-led research of this breadth.

Towards an effective water governance regime

Returning to the distinction made between good governance and effective governance, a further distinction is to be made between what *must* be done (according to the law or policy) and what *ought* to be done (for the sustainability of the resource for future generations) (Perry, 2013). In New Zealand (and probably also in other jurisdictions) the incentives for governments to adequately weigh intergenerational trade-offs are weak. The multiple governmental agencies with jurisdictional responsibility also contribute to bounded, and not always consistent, institutional framings of the issues and solutions. We need, therefore, to work on how effectively the parts of the whole work together, because the sum of the parts, as for all complex systems, is less than the whole.

More accessible, transparent and comprehensive water quality information

Effective governance needs continuing sense-making (Weick, 1995; Weick and Sutcliffe, 2007) and adaption to changes in all of the systems that make up the water governance regime. I would argue that the more open and accessible are the information systems which tell us how effective the governance process has been in maintaining or improving water quality, the more inclusive and therefore sustainable and effective the governance regime. That is, a common resource like water is more likely to be governed effectively when it is also able to be monitored by all of us who make up the commons.

The accessibility and ease of interpretation of huge amounts of monitoring data is a necessary precursor to a wider segment of the population being in a position to assess the effectiveness of the governance regime and influence changes in it where necessary. The investment that the regional councils and their collaborators have made in Land, Air, Water Aotearoa (see note 5) is a good first step. Ongoing effort and investment is needed to create more data points and more accessible and visually-informative displays of increasingly sophisticated and complex data. We also need more information about who uses water and the effects of that use, and a truly independent Environmental Reporting Act.

Set bottom lines

The water governance regime operating today has resulted from the repeated interactions between complex human and natural systems during nearly 200 years since first European settlement, and in parts of the country there may well be patterns that persist from before that time. Most recently the processes and institutions imposed and used by the RMA have simply built on the processes that preceded them through the water catchment boards and their predecessors, and some will not have changed. Farming and land use practices, perceptions of water 'ownership' and our values concerning fresh water, all of which affect how the governance regime works in practice, have created today's pattern.

If we want to change the trajectory of the governance regime to get a different outcome we first need to be clear about what the outcome looks like, and then concentrate on how to change some of the patterns (feedback loops) that are supporting that current trajectory. The new National Policy Statement and the proposed National Objectives Framework and national standards for fresh water are small steps in the right direction because they set some boundaries and rules to guide the decisions made at the local level; but the bottom lines need to be high enough for ongoing ecosystem health.¹¹ They are also novel in their attempt to recognise a plurality of values which come into play in decisions about water allocation and use. While the government delays passing the necessary regulation to give effect to ecosystem-sustainable bottom lines, water quality in some areas, such as Canterbury and Southland, will continue to deteriorate. Also, without adequate monitoring of the application of limits and standards by councils, the public of New Zealand will have no way of judging their impact. Therefore, regional councils should be required to accelerate their programmes to set standards and introduce monitoring and remediation programmes where needed.

Facilitate more participatory water governance processes

Giving effect to the Land and Water Forum's recommendations in the way foreshadowed in the government's policy document *Fresh Water Reform 2013 and Beyond* (Ministry for the Environment, 2013), to allow a more collaborative process, seems desirable given the complex systems which interact to create water governance. Rather than the current top-down, council-led process of plan formation and approval, with disagreements resolved through the Environment Court, there is an opportunity to get a different result by bringing new information and currently unrecognised values about a particular water unit to bear.

Recognise and resource the need for changed capacities and capabilities in regional councils

Legislation to enable collaborative

processes would also change the repertoire of roles required from regional government actors. As well as planning, measurement and monitoring expertise, regional councils will need greater facilitative and collaborative leadership expertise, all rather more difficult to quantify and measure. Rather than measure, plan, command and control, regional councils will also need to be able to listen, communicate large amounts of technically-complicated information to a non-technical public, and interpret, reflect and translate what they hear into coherent planning and action that can deliver on expectations over time.

Councils will need to be stewards of

have perverse incentives should not be underestimated.¹²

Be clearer about what an effective water governance regime looks like

New Zealand is familiar with governance regimes that are top-down. When it comes to governance of complex systems, power and top-down decision-making do not have the direct and predictable outcome that some might expect. This is because other actors will adapt the rules as part of their implementation. The institutional capabilities in the current system are bounded within traditional, and artificially segmented roles. For example ministers influence by structural

Collaborative processes take time and there is not yet a history of successful collaborative governance in New Zealand, as is more typical of other jurisdictions, such as the Scandinavian countries ...

the longer-term trajectory and outcome. They will need to be energisers who facilitate the marshalling of information; encourage conversations with diverse stakeholders to understand the larger governance pattern and results; and obtain and shepherd resources (human and material) to monitor progress. Councils will also need to pay attention to the micro-changes that might signal changes in the feedback loops which are affecting the overall trajectory, and be able to identify tipping points at which small changes begin to manifest as something new or unexpected. This change of role is consistent with governing a complex system, but that does not make it any less challenging for human capability or for recognising when a governance regime is working well and when it is not.

One of the options for paying for this increase in the capacity and capability of regional councils is to ensure that the risks and benefits of water use are more fairly shared by those who stand to gain economically. This is not currently the case; but the difficulties of creating pricing schemes that do not

and instrumental rule changes. Regional councils have traditionally been decision-makers responsible for producing long-term plans which are promulgated for consultation before being put into practice. Stakeholders are consulted, and unresolved objections might end up in the Environment Court for further mediation or a ruling. Regional council expertise in that governance system has been in the information-gathering and synthesis tasks involved in planning, consultation and plan implementation.

A more collaborative, effective governance regime would require: new types of knowledge about water users, the effects of water use, values, and other information that regional councils do not currently have nor have the means and capability to generate; innovative, participatory processes to enable those with different knowledge and perspectives to share them; capability to facilitate collaborative engagement and learning processes; capability to make large amounts of water quality information accessible to the public; and capability to translate the outcome of collaborative processes into artifacts (documents,

process guidance and the like) that trigger wide ownership and selective action. The process has to be effective in preserving the quality of fresh water for future generations, in some places undoing the poor decisions of the current regime. That may require future decisions that will be highly unpopular with some who may seek political influence to overturn processes and decisions in order to maintain the status quo.

Given the variation in context and actors of each water governance site, centrally-prescribed and controlled processes are unlikely to lead to effective governance which is adaptive to changes taking place at the local level over time. In the experiments referred to above, a wide variety of governance structures and processes have brought about a series of new framings of water governance, which have advanced water outcomes in a positive way beyond the status quo (Lake Taupo and Te Waihora/Lake Ellesmere, for instance). The combination of clearer national expectations about the outcomes, bottom lines, and investment in improved information and monitoring systems and collaborative capability are effective ways in which government can influence the outcome from a governance approach, while leaving room for water-unit specific history, knowledge and values to play a part.

Learn from early adopters

Collaborative processes take time and there is not yet a history of successful collaborative governance in New Zealand, as is more typical of other jurisdictions, such as the Scandinavian countries (see, for example, Salmon, 2008). Each site needs to build its collaborative capacity for effective operation and understand what enables and blocks its effectiveness. A downside of collaborative processes is that they may not initially appear as quick or timely as more structured, segmented or closed processes, but the results in the longer term are likely to be more resilient and sustainable if they have been well conducted. A further consequence of the dynamism inherent in complex systems is that they will continue to change, and therefore any water governance solutions reached can only be an ongoing set of

approximations or clumsy solutions (Verweij and Thompson, 2006), which might nevertheless be effective. So there must also be ongoing adaptive learning which takes into account changes in the systems, especially those changes which might appear 'not to fit' the present understanding of how things are working. There must also be adaptive capacities built into the creation and execution of plans developed as part of water governance.

The temptation for central government to intervene in collaborative governance processes which, from the outside, may at first appear messy and inconclusive is strong, but such intervention comes at the price of lost collaborative capital, and also the loss of potentially more innovative, sustainable and lasting solutions. If the default response of central government, the media and the public is to compare what they see and experience with traditional, linear, top-down governance, there is potential for constant disruption of these processes and loss of the opportunities for more creative governance solutions. For this reason alone the current experiments need to be documented and learned from in a developmental way. They are creating new knowledge of how successful sustainable and adaptive water governance is done, and we need to systematically collect data from these experiments and search for the regularities that might lead to new understanding of the mechanisms through which effective governance of water occurs.

For New Zealanders to develop confidence in the effectiveness of the country's water governance regime we all need to see more information about the results from what is currently happening. We also need unequivocal bottom lines for all aspects of water quality affecting ecosystem sustainability, and shorter implementation timelines. And we need to have confidence that we are getting the right results. This means: more accessible, transparent and comprehensive data on water quality and more visually-communicative ways of displaying data trends; more participatory processes that engage with a wider range of values and perspectives on water quality; and new capacities and capabilities in the regional

councils to support these processes. While the plurality of values and perspectives on fresh water is what makes its governance inherently complex and difficult, ignoring these aspects has not delivered outcomes acceptable to many in the population. We need to accept that the fresh water problem demands governance processes compatible with its complexity.

- 1 For example, for drinking water quality in the Health Act administered by the Ministry of Health and the district health boards, and requirements in the Conservation Act and the Reserves Act administered by the Department of Conservation.
- 2 This appeared to be the case in the recent Ruataniwha dam application process.
- 3 For a description of the treaty and its articles in English and Māori see <http://www.waitangi-tribunal.govt.nz/treaty/default.asp>.
- 4 Complex adaptive systems consist of many interdependent parts which interact reflexively and nonlinearly over time to create patterns of change or stagnation, depending on whether the interactions between the parts reinforce each other or cancel each other out.
- 5 Land, Air, Water Aotearoa (LAWA) reports data in a comparative and trend format from water monitoring sites on rivers throughout New Zealand. It also has a facility for crowd-sourcing information from the public about water quality. See <http://www.lawa.org.nz/>.
- 6 Representatives of a core of 12 environmental, land and water use and conservation bodies, later expanded to a total of 58 such organisations with an interest in fresh water governance, made up the Land and Water Forum.
- 7 This unlovely term is used because of the different ways various regions have drawn boundaries around their natural water catchments and human-adapted freshwater systems.
- 8 See postscript.
- 9 A forum consisting of all the mayors of local bodies in the Canterbury region and Canterbury Regional Council.
- 10 Both the Ministry for the Environment and individual regional councils have supported these initiatives in a variety of ways.
- 11 See postscript.
- 12 The technical and social complexity of designing effective pricing regimes for fresh and waste water generation and use requires further exploration, but is beyond the scope of this article.

Postscript

On 4 July, after this article had been submitted, the government gazetted its amendment of the 2011 National Policy Statement for Freshwater New Policy. The 2014 regulation came into effect on 1 August 2014. Regional councils have until December 2025 to fully implement the requirements. As with the 2011 National Policy Statement, it can be expected that few councils will meet the earlier deadline of December 2015 and most will take advantage of implementation in stages out to 2025. The bottom lines the government has chosen are very low indeed, only slightly above that at which water is toxic to all life. In the words adopted in the regulation itself, the standards allow for a moderate impact on plant and animal life, and are only marginally above the level at which rivers and lakes will undergo a regime shift to a persistent degraded state.

The adoption of such low bottom lines will make it very difficult for regional councils and communities wanting to adopt higher standards against the will of deep-pocketed commercial interests who do not face the full social and economic costs of their water use.

Interestingly, the announcement of these changes came just days after the board appointed to provide the necessary

consents for the Tukituki Water Scheme (which includes the Ruataniwha dam proposal) agreed that the scheme could proceed only if the levels of nutrient run-off were managed so that in-stream dissolved inorganic nitrogen, as well as on-land leaching rates for nitrogen, which come from mainly from agricultural activity, would not rise above the level which endangers the water ecosystem.

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References

- Canterbury Mayoral Forum (2009) *Canterbury Water Management Strategy*, Environment Canterbury (ECan), <http://ecan.govt.nz/get-involved/canterburywater/Pages/Default.aspx>
- Controller and Auditor-General (2005) *Horizons and Otago Regional Councils: management of freshwater resources*, Wellington: Office of the Auditor-General
- Controller and Auditor-General (2011) *Managing Freshwater Quality: challenges for regional councils*, Wellington: Office of the Auditor-General
- Emerson, K., T. Nabatchi and S. Balogh (2011) 'An integrative framework for collaborative governance', *Journal of Public Administration Research and Theory*, 22 (1), pp.1-29
- Eppel, E. (2012) 'What does it take to make surprises less surprising? The contribution of complexity theory to anticipation in public management', *Public Management Review*, 14 (7), pp.881-902
- Eppel, E. (2013) *Collaborative Governance Case studies: the Land and Water Forum*, working paper 13/05, Wellington: Institute for Governance and Policy Studies, <http://igps.victoria.ac.nz/publications/publications/show/300>
- Eppel, E. (2014) *Governance of a Complex System: water*, working paper 14/01, Wellington: Institute for Governance and Policy Studies, <http://igps.victoria.ac.nz/publications/publications/show/351>
- Fenemor, A., D. Neilan, W. Allen and S. Russell (2011) 'Improving water governance in New Zealand: stakeholder views of catchment management processes and plans', *Policy Quarterly*, 7 (4), pp.10-19
- Foerster, A. (2011) 'Developing purposeful and adaptive institutions for effective environmental water governance', *Water Resources Management*, 25, pp.4005-18
- Gerlak, A.K. and T. Heikkila (2011) 'Building a theory of learning collaboratives: evidence from the Everglades restoration program', *Journal of Public Administration Research and Theory*, 21 (4), pp.619-44
- Hollis, M. (2014) *Climate Change. IPCC Fifth Assessment Report: New Zealand findings*, Wellington: New Zealand Centre for Climate Change, <http://www.nzclimatechangecentre.org/research/ipcc-fifth-assessment-report-new-zealand-findings>
- Innes, J.E. and D.E. Booher (2010) *Planning with Complexity*, Abingdon: Routledge
- Land and Water Forum (2010) *Report of the Land and Water Forum: a fresh start for freshwater*, Wellington: Land and Water Forum
- Land and Water Forum (2012a) *Second Report of the Land and Water Forum: setting limits for water quality and quantity a freshwater policy- and plan-making through collaboration*, Wellington: Land and Water Trust
- Land and Water Forum (2012b) *Third Report of the Land and Water Forum: managing water quality and allocating water cover*, Wellington: Land and Water Trust
- Logan, H. (2013) 'Inside the Black Box: the influence of Government executive forces on environmental policy effectiveness in New Zealand', PhD thesis, Lincoln University
- Ministry for the Environment (2013) *Freshwater Reform 2013 and Beyond*, Wellington: Ministry for the Environment
- Ostrom, E. (2005) *Understanding Institutional Diversity*, Princeton: Princeton University Press
- Parliamentary Commissioner for the Environment (2012) *Water Quality in New Zealand: understanding the science*, Wellington: Parliamentary Commissioner for the Environment, www.pce.parliament.nz
- Parliamentary Commissioner for the Environment (2013) *Water Quality in New Zealand: land use and nutrient pollution*, Wellington: Parliamentary Commissioner for the Environment, <http://www.pce.parliament.nz/assets/Uploads/PCE-Water-quality-land-use-website.pdf>
- Patton, M.Q. (2011) *Developmental Evaluation: applying complexity concepts to enhance innovation and use*, New York: Guilford Publications
- Perry, C. (2013) 'ABCDE+ F: A framework for thinking about water resources management', *Water International*, 38 (1), pp.95-107
- Rau, H. and R. Edmondson (2013) 'Time and sustainability', in F. Fahy and H. Rau (eds), *Methods of Sustainability Research in the Social Sciences*, Sage
- Room, G. (2011) *Complexity, Institutions and Public Policy*, Cheltenham: Edward Elgar
- Russell, S., B. Frame and J. Lennox (eds) (2011) *Old Problems, New Solutions: integrative research supporting natural governance*, Lincoln NZ: Manaaki Whenua Press
- Salmon, G. (2008) 'Governance of the rural environment: are existing approaches working?', paper presented at the Conflict in Paradise: the transformation of rural New Zealand conference, Environmental Defence Society, Auckland, 11-12 June
- Salmon, G. (2012) *Canterbury Water Management Strategy: a case study in collaborative governance*, Wellington: Ministry for the Environment
- Verweij, M. and M. Thompson (2006) *Clumsy Solutions for a Complex World: governance, politics and plural perceptions*, Houndmills: Palgrave
- Weick, K.E. (1995) *Sense Making in Organisations*, London: Sage
- Weick, K.E. and K.M. Sutcliffe (2007) *Managing the Unexpected: resilient performance in an age of uncertainty* (2nd edn), San Francisco: Jossey-Bass
- Wiek, A. and K.I. Larson (2012) 'Water, people and sustainability: a systems framework for analysing and assessing water governance regimes', *Water Resources Management*, 26, pp.3153-71