

Andrew Fenemor, Diarmuid Neilan,
Will Allen and Shona Russell

Improving Water Governance in New Zealand stakeholder views of catchment management processes and plans

Water governance refers to the institutions, legislation and decision-making processes applied to develop and manage water resources. As pressures on water resources increase there has been a realisation that technocratically-driven water management has not achieved desired

sustainability outcomes.

Attention must be focused not only on better scientific understanding of water and its values and uses, but also on what constitutes good water governance.

In this article we focus on the 'engine room' of water governance in New Zealand: water management planning by regional and unitary councils. We suggest six principles of good water governance relevant to New Zealand. These principles are evaluation criteria in our governance evaluation tool. The results of interviews

Andrew Fenemor is a hydrologist and water management researcher at Landcare Research in Nelson. From 2002 to 2011 he led the Integrated Catchment Management (ICM) research programme based in the Motueka catchment (see icm.landcareresearch.co.nz). Prior to that he was environmental manager at Tasman District Council. His research interests are at the interfaces between catchment science, policy and action. His present address for correspondence is: Private Bag 6, Nelson 7042; fenemora@landcareresearch.co.nz.

Diarmuid Neilan studied environmental science in Ireland before completing his MSc in water management from the universities of Duisburg Essen (Germany) and Radboud (Holland). The stakeholder survey and governance attributes in this paper are derived from his thesis. Diarmuid has taken to heart the benefits of community participation in governance and is working to develop more resilient communities in his home city of Limerick, Ireland.

Will Allen is an independent organisational development consultant and action researcher based in Christchurch. His primary interest is in supporting people to collaborate and develop innovative solutions to sustainability issues. For the past ten years he has managed the Learning for Sustainability website – <http://learningforsustainability.net> – an online guide providing annotated links to several hundred key international information sources that support the different facets of multi-stakeholder learning processes.

Shona Russell is a social researcher at Landcare Research, Lincoln. Shona's research interests are how people engage in environmental issues, particularly relating to water. Her recent work examines how social media can be used to engage in conversations about problems of national significance, how policy and planning practices engage with challenges of water resource management, and how people in New Zealand are responding to climate change.

with 56 stakeholders are synthesised using this tool to identify 14 attributes which, alongside innovations in collaboration and co-governance, would help improve New Zealand water governance.

As is the case in many other parts of the world, New Zealand is seeing growing evidence of stresses on its freshwater resources as land uses intensify and demands for water, especially for irrigation, reach limits of availability. Research and resource investigations have been undertaken on technical issues (e.g. Harding et al. (eds), 2004) such as recharge rates for aquifers, flow requirements for maintaining instream values of water bodies, leaching of contaminants from various land uses, and how to improve efficiency of irrigation watering. Physical, chemical, biological and engineering knowledge are certainly essential for environmental decision making. However, a widening range of stakeholders is being affected by water decisions and many questions of a less technical nature are being raised: questions such as how are decisions being made about who gets what water; whose voices and what values are influencing decision making; why are plans and strategies poor at delivering good environmental outcomes; and how could cumulative effects, especially between land use and water, be better managed?

In the light of those questions, resource managers are recognising that our inability to adequately manage freshwater stressors is not so much a deficiency of science as a deficiency in governance. From a resource management perspective, we can characterise two components of sustainable water management: the science and social process dimensions (Fenemor et al., 2011), the science dimension incorporating biophysical and economic understanding, and the social process dimension a fundamental element of good governance.

To address the New Zealand water governance challenges, this article is structured in three sections. Firstly we describe these six principles of good water governance: participation, transparency and accountability,

integration, efficiency, adaptiveness and competence. Secondly, we briefly summarise the history and current institutional and legislative settings for water resource management. Using the governance principles as a framework, we thirdly outline findings from a research project which sought to address how good governance principles could be implemented in improved decision making around water. This project surveyed the opinions of 56 stakeholders involved in one of five water management planning processes about the governance attributes which they believed affected their level of satisfaction with (a) the water management plan, and (b)

solutions are for management agencies to impose rules, such as full private property rights or regulation (Ostrom, 1990). However, as seen in New Zealand, effective environmental governance inevitably comprises a mix of mechanisms, such as combinations of regulations, water markets and co-management agreements. Ostrom's main conclusion is that people are capable of managing common property resources such as water through intelligent design of diverse multi-scale institutions. We suggest that there are New Zealand examples that are beginning to bear this out, and further opportunities for this approach.

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the planning process. The 14 good governance attributes synthesised from these stakeholder responses relate to planning processes, planning methods and plan outcomes.

Water governance principles

In the face of looming global water scarcity and conflict there is increased research interest in inclusive governance concepts (Gleick, 2003; Pearce, 2007; Pahl-Wostl et al., 2008) to the extent that the 2009 Nobel prize for economics was awarded to Elinor Ostrom for her work on polycentric (distributed) governance of common-pool resources (Ostrom, 2010). Her research is founded coincidentally on water management – water users who devised their own collective solutions to excessive groundwater withdrawals in Californian basins. It challenges the rational choice theory underpinning the 'tragedy of the commons' (Hardin, 1968) which suggests that users of common property resources are powerless in the face of self-interest and will exploit shared resources unsustainably. Conventional

Governance is therefore a fundamental contributor to the success or failure of water management initiatives, because decision making and implementation at the technical level are so dependent on the organisational, legal and policy context. Organisations involved in water and land management are sources of funding and technical and facilitation skills. The law dictates how resources are allocated and what limits apply to the use of water and land. Policy applies controls on water and land uses at more local and regional scales. But good governance is more than just having responsible institutions producing plans and strategies for water.

At its heart, the test of an effective system of water governance would seem to be whether it sets and delivers sustainable water management outcomes. However, there are other tests which should also apply, because water governance is also about the processes for achieving enduring and adaptive outcomes. Table 1 presents a synthesis of principles of good water governance

Table 1: Principles of good water governance

Principle	Description
Participatory	The different stakeholders involved need to be identified and included in policy and decision making. Inclusive processes build confidence in the resulting policies, and in the institutions. Two-way communication using engaging language creates trust and a sense of democracy.
Transparent and accountable	Information flows freely and steps taken in policy development are visible to all. This helps ensure legitimacy by being seen to be fair to all the parties. It implies the need to be seen to be ethical and equitable, for the roles and responsibilities of both institutions and stakeholders to be clear, and for the rule of law to apply.
Integrative	A holistic approach is taken to the primary influences within the water system, be they landscape components such as land use or river-groundwater connections, different community world views or diverse scientific interpretations. Integration recognises linkages within the management system; in turn, policies and action must be coherent and aligned – this requires political leadership and consistent approaches amongst institutions.
Efficient	Governance should not impede effective action. Transaction costs are minimised, including financial and time costs of decision making and compliance, administrative costs, complexity, and ease of understanding of how the system operates.
Adaptive	The system incorporates collaborative learning, is responsive to changing pressures and values, and anticipates and manages threats, opportunities and risks. It recognises that the system is complex and constantly in flux.
Competent	Decisions must be based on sound evidence. Competence requires development of capability at all levels: skills, leadership, experience, resources, knowledge, social learning, plans and systems to enable sustainable water management.

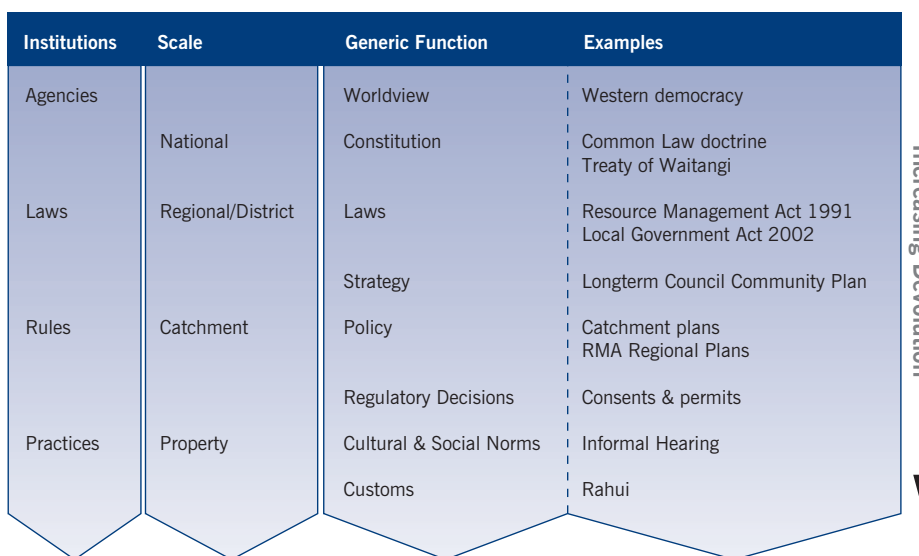
fact that water resources are just a part of a complex system, and in particular heavily influenced by land use and management practices. The principles recognise the need for efficiency and effectiveness, and that the system will need to adapt as social, economic and ecological systems continually co-evolve. Finally, they recognise that the management of such collaboratively-managed systems requires a number of skills and capacities. However, putting these principles into practice is not easy, and in a subsequent section of this paper we look more at how that can be done, looking specifically at the decision-making aspects of governance.

New Zealand water governance

In New Zealand, water governance is enacted through agencies (central government agencies and local authorities), laws (primarily the Resource Management Act 1991), rules (in regulations and in regional plans) and practices (e.g. administrative procedures), as shown conceptually in Figure 1. Collectively these operate across a range of scales, from the setting of national water management priorities through to landowner or business decisions about water (and land) use at the individual property level. Figure 1 also provides examples of the types of functional approaches which guide decision making across those scales.

Water management is undertaken through two key pieces of legislation: the Resource Management Act 1991 (RMA), which has a sustainable management focus, and the Local Government Act 2002 (LGA), which has a sustainable development focus. Those concepts overlap as both embody the idea of sustainability; consider intergenerational issues; involve participation of people and communities; and consider social, economic, environmental and cultural values (Richmond et al., in Harding et al. (eds), 2004). However, sustainable management can be seen as more of a balancing of values than sustainable development, which implies sustainability within a growth trajectory. The concepts of sustainable management and sustainable development are still

Figure 1: Conceptual view of water (and land) governance in New Zealand



from literature (Rogers and Hall, 2003; Lockwood et al., 2008; UNESCO, 2006) and of relevance to 21st-century water resource management in New Zealand. An agreed set of principles such as this can be used to evaluate, refine and improve the legislative, institutional and policy components of water governance.

Collectively these principles provide a high-level guide for good collective practice in how we manage our water resources. They point to the need to involve people in a transparent and accountable process. They require us to look at the bigger picture, and to strive to be integrative and mindful of the

evolving. Seen from the viewpoint of the four 'well-beings' needed to achieve sustainable development (LGA), sustainable management of water resources would logically involve balancing of not just environmental sustainability, but also social equity, economic efficiency and recognition of cultural values.

Agencies with freshwater management responsibilities

Although we have the full range of levels shown in Figure 1, New Zealand is unique in that more than in most other developed countries, water policy and decision making are devolved almost wholly to local authorities at regional level (Fenemor et al., 2006). This level of devolution has existed since catchment boards were formed in the 1940s to implement soil conservation and flood control measures, and their functions expanded under the 1967 Water and Soil Conservation Act to the allocation of water and management of water quality.

Replacing catchment boards and a plethora of other single purpose organisations in 1989, local authorities (regional councils, unitary authorities and territorial authorities) have varied responsibilities for sustainable management. The 16 regional/unitary councils have a much broader mandate under the RMA to develop region-wide policies, and specific plans for publicly-owned or -managed natural resources, and to issue consents for use of those resources, including water and discharge permits. Territorial authorities (district and city councils) develop policies and issue land use consents for development. Unitary authorities (Auckland, Gisborne, Marlborough, Nelson, Tasman) combine functions of regional and territorial authorities within one organisation.

At the next level up, central government can issue guiding national policy (e.g. national policy statements) and binding standards (e.g. national environmental standards), and also adjudicates through independent panels or the Environment Court when decisions at either level are contested. Successive central governments have devised programmes of work to improve water management, from the

National Agenda for Sustainable Water Management (1999) to the Sustainable Water Programme of Action (2003) and the New Start for Freshwater (2009). All cite the need to improve New Zealand's water allocation and water quality management.

The RMA also recognises the primary role accorded Māori under the Treaty of Waitangi. Māori have a special status as Treaty partners, beyond that of other stakeholders. Māori customary values and the guardianship concept of kaitiakitanga are to be recognised in decision making around water. Some iwi have been seeking co-governance with government of water bodies including the Whanganui and Waikato rivers. The Waikato-Tainui Raupatu Claims (Waikato River) Settlement Act 2010 established in 2011 the

democratically elected institutions have in dealing with environmental issues. It is moot whether an alternative institutional governance structure could do any better. However, we would suggest that globally this challenge has proven difficult, and the environment must be seen as a collective responsibility, rather than solely an agency responsibility.

Water management plans

Most of the regional councils and unitary authorities have developed statutory plans for the management of fresh water. Catchment and water management planning is not a new activity, but the RMA did provide a statutory basis for these as 'regional plans'. Water and soil management plans were previously prepared by many catchment boards

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first co-governance body, the joint iwi/Crown-governed Waikato River Authority. The government has committed \$210m funding over 30 years to restore this river, New Zealand's largest.

Performance of regional councils

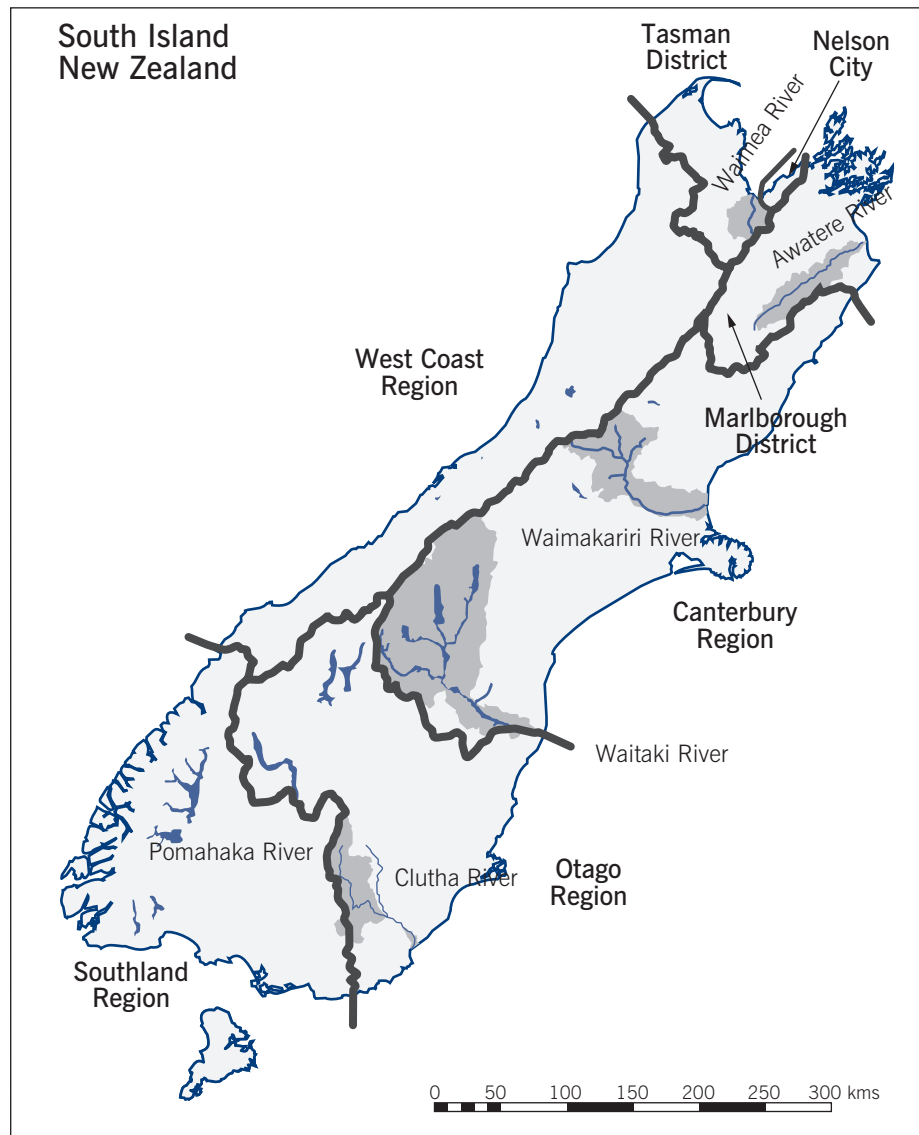
As agencies with major responsibilities for water resource management, regional councils' performance has come under the spotlight, perhaps best illustrated by the minister for the environment's action in March 2010 to replace the elected council at Environment Canterbury with non-elected commissioners McNeill (2008) points to regional councils having failed to prevent declines in environmental quality, the primary concern being declining water quality resulting from land use intensification. He identifies among regional councils' shortcomings their low public profile, potential political capture by sector interests, a variability in capability to deliver, lack of uniformity in managing common issues across regional boundaries, and the difficulties

as non-statutory planning instruments under the former 1967 Water and Soil Conservation Act. The scope of current freshwater management plans is commonly water allocation and water quality management, and their spatial scales range from catchment-scale to regional. The plans demonstrate a regional variance according to regional pressures on water use, as would be expected (Bright et al., 2008). These plans are in varying states of implementation, with some fully operative, some still in the hearing phase, and some being reviewed or rewritten. Arguably, the emphasis on integrated and catchment-based planning has been weakened by the broader RMA mandates and more regional focus of regional and unitary council planning than earlier catchment-based water and soil plans.

Criticisms of planning

New Zealand's water governance has been subject to criticism. For example, the legalistic statutory hearing processes imposed by the RMA and the time

Figure 2: Case study catchments



required to make plans operative have attracted criticism (e.g. Ericksen, 2004), as has the perception that both planning and consent decision making is dominated by ‘technocratist legal formalism’ (Jackson and Dixon, 2007) – a reliance on legal and statutory planning processes. New Zealand water management processes have also lacked strategic planning from central and local government (Painter and Memon, 2008), despite provision for strategic planning instruments in the RMA. Memon and Skelton (2007) characterise this as ‘institutional inertia’. Despite the recognition of Māori culture and traditions in the RMA, Māori also view the act as insufficient for fully recognising Māori values and interests in water (Durette et al., 2009).

However, there have been notable advances in water planning. The first

water allocation limits were set in catchment plans in the 1980s, for example for the Waimea Basin in Tasman, the Opihi in Canterbury and the Omaha in Auckland, with the waters of the Waimea Basin all deemed fully allocated by 1996. More recently, Horizons Regional Council (Manawatu–Wanganui) has pioneered the idea of a single consent for farms as a method for controlling sediment and nutrient contamination under their ‘One Plan’. Waikato Regional Council has implemented ‘cap and trade’ for controlling nutrient losses to Lake Taupo, and the Bay of Plenty Regional Council through its ‘Rule 11’ has set limits for nutrient losses to protect the Rotorua lakes from eutrophication.

Innovations for water governance and management in New Zealand

Against this governance background we now turn to looking at how the broad governance principles referred to earlier could improve water governance at the decision-making level. We present results of stakeholder interviews about current and potential New Zealand water governance, focused at the regional planning level. This research evaluated and compared stakeholder opinions about water management planning and implementation processes across five case-study catchments in the South Island. These were the Waimea catchment in Tasman; the Awatere catchment in Marlborough; the Waimakariri catchment in North Canterbury; the Waitaki catchment in South Canterbury; and the Pomahaka catchment in Otago (see Figure 2). A summary of the geography and catchment management issues for each catchment is provided in Table 2.

Stakeholders were broadly categorised into local government (policy makers and resource scientists from regional councils); environmental government (agencies with statutory involvement in water management, including the Department of Conservation and Fish & Game New Zealand); iwi (Māori engaged in resource management); water users (groups and individuals using water under resource consents, such as irrigators, hydroelectricity generators and their consultants); and in-stream stakeholders (members of interest groups such as Forest & Bird and recreational groups). Some sectors were less represented in catchments than others, and some stakeholders did not fit solely into one sector but were assigned to their primary category.

The research was conducted in 2008–2009 in two phases. Firstly, council staff involved in each catchment planning process responded via a questionnaire for a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis of the likely effectiveness of their water management planning process achieving the anticipated outcomes for the environment through the plans’ objectives, policies and rules. Examples of anticipated outcomes are achieving swimming water quality

Table 2: Description of the five catchments

Catchment region	Waimea, Tasman ¹	Awatere, Marlborough ²	Waimakariri, Canterbury ³	Waitaki, Canterbury ⁴	Pomahaka, Otago ⁵
Regional council	Tasman District Council	Marlborough District Council	Canterbury Regional Council (Environment Canterbury)	Canterbury Regional Council & Otago Regional Council	Otago Regional Council
Catchment area	722 sq km	1,600 sq km	3,654 sq km	7,340 sq km	2,060 sq km
Length of river	50km	110km	151km	110km	98km
Land use	Indigenous forests Horticulture Urban & lifestyle blocks	Viticulture Pine plantations Cropping	Dryland grazing Cropping Increased dairying	Dryland grazing Cropping Increased dairying	Intensification of sheep, beef, dairy farming
Importance of catchment	Swimming, kayaking Waimea Inlet internationally valued for breeding seabirds	Important habitat for native fish species Molesworth Station in headwaters	Recreation, tourism Indigenous ecosystems in the upper catchment	Fishing, canoeing, kayaking, rafting, boating, skiing, mountain biking, tramping Hydroelectricity generation	Trout fishery Game bird hunting Other recreation
Water uses (surface and ground water)	Irrigation and domestic use Municipal use	Irrigation for viticulture	Municipal use Irrigation for agriculture	Domestic water supply Hydroelectricity generation Irrigation for agriculture	Municipal use
Pressures	Low reliability of water supply in summer Low flows affect ecological health of waterways	Increasing demand for irrigation water	Increasing demand for irrigation water Discharges and land use affect groundwater quality	Demands exceed availability Discharges and land use affect groundwater quality	Increased dairy conversions Declining water quality
Proposals (past/current)	Lee Valley Community Water Augmentation Dam proposal by the Waimea Water Augmentation Committee	Awatere Irrigation Ltd scheme opened 2009	Central Plains Water proposal to draw water from Rakaia and Waimakariri Rivers to irrigate 60,000 hectares	Existing power and irrigation schemes Hunter Downs proposal Project Aqua hydroelectricity proposal, abandoned in 2004	Irrigation developments
Relevant regional plans	Tasman Resource Management Plan	Wairau Awatere Resource Management Plan	Waimakariri River Regional Plan	Waitaki Catchment Water Allocation Regional Plan	Regional Plan, Water for Otago

1 Young et al., 2010

2 Marlborough District Council, 2009

3 Environment Canterbury, 2011

4 Ministry for the Environment, 2006

5 Otago Regional Council, 2010

in specified water bodies, no decline in existing water quality, and limiting water taken so that water bodies maintain their life-supporting capacity and natural character.

The second phase comprised semi-structured interviews with individuals from the wider stakeholder group about the barriers to achieving outcomes and about factors they thought could assist the achievement of better outcomes through both the planning and implementation phases of the relevant plan. Interviews were conducted with individuals representing or connected to stakeholder groups, and covered water allocation and water quality management. To enable

comparison of stakeholder responses, each interviewee scored their particular catchment plan and planning process against the good governance principles outlined in Table 1, on a poor (1) to very good (4) scale.

The three-dimensional governance evaluation tool shown in Figure 3 was developed to interpret these stakeholder scores. Stakeholder scores for each of the governance criteria (principles) are arrayed along the Z axis. In this way, the average score for each sector could be averaged again across each plan on the X axis to determine the degree of overall satisfaction with each plan. The average score for each sector could be averaged

again across all plans to determine each sector's degree of satisfaction with the planning process.

Results

As an example of results of this analysis, Figures 4 and 5 show the relative level of satisfaction with plans and their implementation and with the planning process by sector respectively. Stakeholders involved in the Waimea plan were the most satisfied, while those involved with the Waimakariri plan were least satisfied. Interviewees from the local government and water user sectors were more satisfied with the catchment water planning process than those from the

Figure 3: Governance evaluation tool to assess stakeholder satisfaction

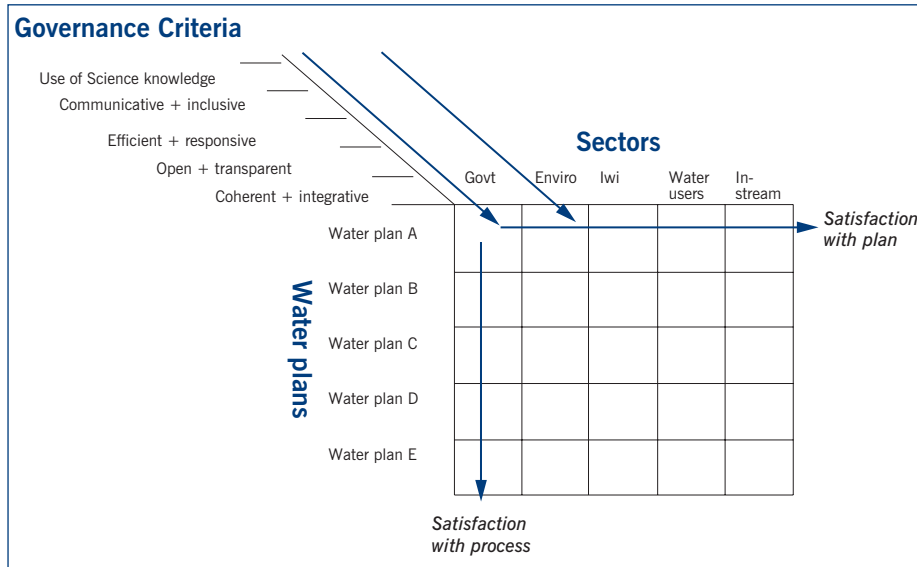


Figure 4: Overall level of satisfaction with plans and implementation, including standard deviations

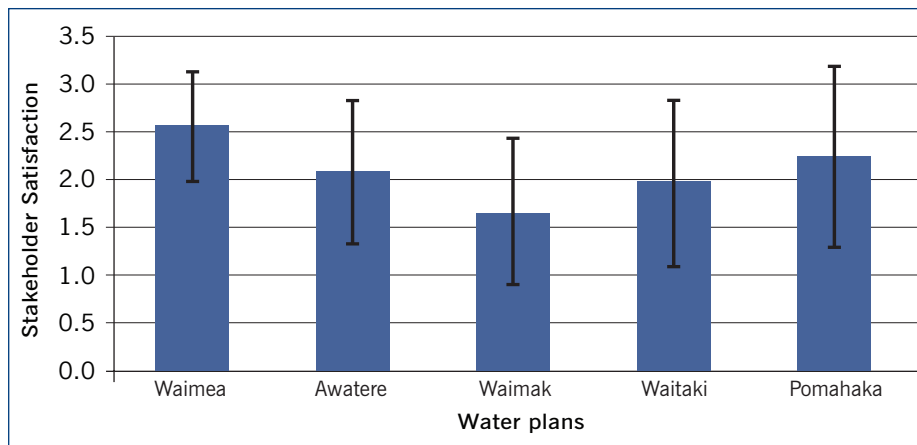
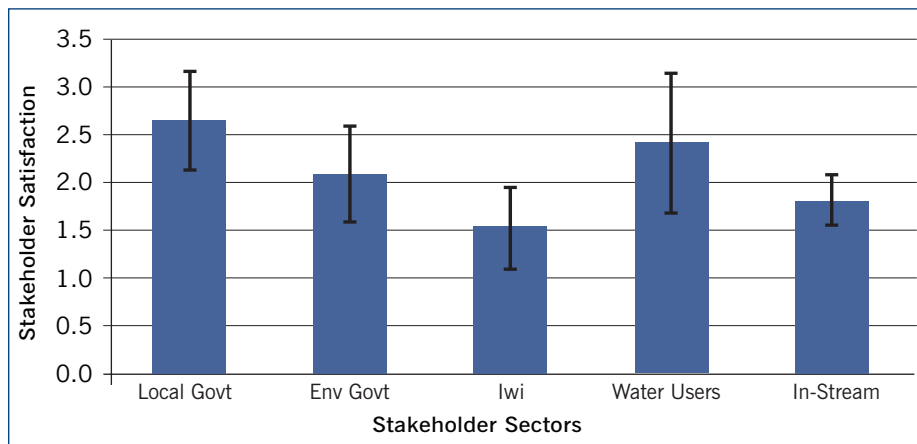


Figure 5: Overall level of satisfaction with planning processes across sectors, including standard deviations



environmental government, in-stream and iwi sectors, in that order. It should be remembered that the interviewees were at different stages of the various planning processes, which will have affected the opinions being expressed.

Attributes of improved water governance

Stakeholder views about why they were satisfied and their views about what changes would make them more satisfied with the plans and planning processes were synthesised into the 14 good governance attributes presented in

Table 3. The attributes for improved water governance in Table 3 reflect stakeholder concerns about deficiencies in current practices in regional water planning. The synthesis covers the main themes raised by stakeholders, but does not imply deficiencies in every one of the five catchments. Rather, it is based on the most persistent issues raised in the interviews, which also included observations about successful attributes of current water management. For purposes of discussion below, we have categorised the attributes as relating to either (1) the planning process, (2) the methods employed in the plan, or (3) the outcomes achieved through the plan.

Planning process attributes

Among the planning process attributes, the need to improve engagement and involvement of stakeholders was emphasised, not just in the plan development phase but also to improve implementation of the completed plan. Planning was seen as more successful in cases where community-based catchment groups or water user groups have a role in implementation – for example, of water sharing – and act as a forum for continued consultation with the regional council. This collaborative approach may reduce the frustration felt by those in some stakeholder sectors who felt that some politically-favoured issues (e.g. irrigation) were taking precedence and undermining their values for the catchment.

A common concern was the need for the staff group developing a plan and those in consent and compliance roles charged with implementing the plan to work in a more collaborative mode. The research has indicated that a ‘think tank’ approach to water management at council level may create a more integrative approach to problem solving, in which consents staff, policy staff and resource scientists meet regularly, especially at consent renewal time, to discuss decisions. Stakeholders also feel more comfortable when they are dealing with council staff with whom they are familiar rather than people they do not know. One suggestion to address high staff turnover was ‘plan induction’ courses, which could be open to the wider stakeholder group.

A consistent theme was the need for more integrative planning, such as integrated catchment management plans. Stakeholders sought not only better planning of land use and land management practices, recognising their impacts on water, but also a more holistic planning process recognising the spectrum of community values for water: examples cited of neglected values were landscape, spiritual and amenity values. These views were strongly held by iwi and environmental stakeholders.

The RMA is effects-based and many stakeholders were unhappy with the slow response of plans to emerging water issues such as land use intensification. Examples were cited of existing consents with long-term expiry dates constraining the ability of the council to adjust plan rules – for example to change allocation limits or environmental flows. Stakeholders saw the benefit of having catchment groups involved in monitoring and advocacy so that emerging issues can be addressed more quickly, and of having reviews of consents (RMA, s128) linked to plan review dates (e.g. ten-yearly). However, water user stakeholders also wanted consent renewals to be made less bureaucratic.

Planning methods attributes

A consistent view among stakeholders was the need to share knowledge about planning methods which have worked well. This particularly included water allocation frameworks (e.g. Bright et al., 2008) and the science supporting good management practices from landowner up to policy levels. Two challenges were posed for science: the need for better mechanisms by which science knowledge can inform planning processes, and how to facilitate access to expert knowledge by all stakeholders, not just those able to compete financially for limited science expertise. One suggestion was for science to be peer reviewed by a non-political national science organisation, where expert intellectual knowledge could be collectively owned and shared.

Involving stakeholders in monitoring was considered likely to increase their sense of ownership of the plan, especially if they can see how the monitoring benefits them

Table 3: Good governance attributes for improved New Zealand water management planning, synthesised from stakeholder interviews

Planning process	
1.	Design and implement an engagement strategy, especially in the planning process through to implementation of early stages
2.	Avoid bias, particularly political
3.	Plan the transition from design to implementation phases, especially having a team approach within council
4.	Facilitate buy-in, both within council and from all stakeholders
5.	Be holistic (integrated planning)
6.	Build in flexibility to respond and adapt to new pressures (e.g. land use intensification, changing climate) while providing sufficient certainty for investment
Planning methods	
7.	Base planning methods on science and monitoring, including improved sharing and peer review of all science
8.	Devolve monitoring to water users and stakeholders (e.g. through audited self-management), and include methods for regular reviews of plan effectiveness
9.	Be explicit about methodology: e.g. for effective water allocation by defining environmental flow needs, allocation caps and sharing; for water quality management, ensuring water quality targets influence land use planning
10.	Spread water management costs more fairly among users
Plan outcomes	
11.	State the vision of the plan, supported by clearer national priorities for sustainable water management
12.	Ensure policies, methods and rules in the plan adequately connect to and deliver the agreed plan objectives
13.	Specify limits ('carrying capacity') based on existing and desired community outcomes
14.	Improve accountability for delivering outcomes (e.g. of regional councils to national level)

and how the data they collect are used for decision making. If target outcomes have been adequately defined in the planning phase, stakeholders mostly wanted to be involved in monitoring those targets and considered this would assist in adaptive management.

Stakeholders acknowledged the benefits of working with a well-defined allocation framework from the early stages of planning. This framework could consist of an environmental flow or limit regime which considers in-stream values and other water uses, an allocation limit capping total extraction (which could vary with water availability), and rate-of-use limits to encourage efficiency and limit water quality and other impacts. Environmental and iwi stakeholders

also particularly sought better tools for tackling diffuse pollution. Methods raised included integrated catchment management; the EU approach, combining 'emission limit values' and environmental quality standards; and inclusion of hydromorphological (river condition) parameters into planning.

With only 30–50% of council water planning and management costs commonly met by consent holders, funding for water management was also a consistent issue. Some stakeholders favoured applying volumetric or flow-based levies on water users to support science and monitoring, including devolved monitoring approaches such as audited self management.

Planning outcomes attributes

Finally, among the outcomes-related attributes the primary areas which stakeholders felt needed improvement were establishing national priorities for sustainable water management, more consistent setting of resource limits in plans, and a mechanism for holding regional and unitary councils more accountable for good water management. We note that since this research was completed, the National Policy Statement for Freshwater Management (Ministry for the Environment, 2011) sets some process targets to address these concerns.

Aligned with concerns about lack of

fresh water management. The forum reached consensus on a package of 53 recommendations, ranging across policy, legislation, institutions, research and infrastructure (Land and Water Forum, 2010). Collaborative governance, which is central to much of Table 3, is now being widely promoted as an inclusive process for managing contested resources like water, examples being Canterbury's Water Management Strategy, led by its local authorities' Mayoral Forum, and various irrigation scheme proposals led by broad-based community groups (see Lennox et al., 2011).

and plan outcomes appear to correlate with the level of influence of the various stakeholder groups. The observations derived from the survey of stakeholder opinions are priority governance issues relating to catchment planning processes in New Zealand. However, they are a subset of a much wider range of views, many documented more recently through the collaborative processes of the Land and Water Forum, about what makes successful and sustainable water management. Common to both is the need to engage with, and where possible devolve responsibility for monitoring and management, with appropriate auditing, to those creating the pressures on water resources: land and water users and interested parties.

This work highlights that governance has not received the same attention as technical and infrastructure development in the water sector. Governance systems need to be able to allocate water and manage water quality to meet environmental, agricultural and urban goals, but they must also be able to justify the choices made, and what values are taken into account. Identifying principles and attributes of good water management planning helps in evaluating how to improve our water governance. Discussions of governance regimes are not divorced from technological and infrastructure decisions; rather these are intertwined. As Tropp (2007) notes, water decision makers and managers have yet to realise the full potential of new forms of governance, such as facilitating inclusive decision-making processes, coordination and negotiated outcomes.

Identifying principles and attributes of good water management planning helps in evaluating how to improve our water governance.

national direction were some stakeholder views that water management plans need a more explicit vision statement, describing how stakeholder values (e.g. iwi values) are being addressed and what trade-offs are being made. Stakeholders expressed frustration about objectives in some plans which had broad narratives with little connection to what was actually going on at ground level. They wanted a plan in which objectives, policies and methods are clearly defined so that the 'rules of the game' are clearly outlined, including limits on water allocation and water quality.

On the question of accountability, some stakeholders supported the idea of a national regulatory authority (the Environmental Protection Agency) having a role in benchmarking the effectiveness and efficiency of regional plans and providing guidance on meeting national objectives on a local level.

We note that after this research was completed, the New Zealand government commissioned a Land and Water Forum to conduct a stakeholder-led collaborative governance process to recommend reform of New Zealand's

Conclusions

Water management has for decades relied upon improving technical understanding of water resource occurrence and behaviour, then designing management systems to keep exploitation of those resources, and associated land uses, within biophysical limits. Those management systems have often proven unable to deliver sustainable water management, because of lack of buy-in by stakeholders and poorly-supported sociopolitical and administrative systems. Technical understanding of our water resources is vital, but the design of good governance is also fundamental to sustainable water management. Water governance has been defined broadly for the purposes of this article as encompassing the institutional, legislative and decision-making processes for managing water, and good water governance as being founded on the six principles described in Table 1.

The governance principles can be used in a governance evaluation tool such as we have devised to rank stakeholders' levels of satisfaction. In this study we observe that the levels of satisfaction with planning processes

Acknowledgements

This work was supported by the FRST/MSI research programmes Integrated Catchment Management (ICM) and Values, Monitoring and Outcomes (VMO). The stakeholder survey was carried out by Diarmuid Neilan for his MSc thesis in transnational water management (Neilan, 2008). We are grateful to participants for their insights, and to Valentina Dinica and our colleagues for their suggested improvements to the manuscript.

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