

BOUNDARY CRITIQUE AS A MEANS FOR IMPROVING THE EFFECTIVENESS OF WATER CONSERVATION CAMPAIGNS AND COMMUNITY INVOLVEMENT IN SMALL WATERSHED MANAGEMENT

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Introduction

This is a practitioner's account of challenging science and technology through a research programme designed to explore values, interests, and ethics in decision-making. The research is sited in the urban water sector, with a key aim being the development of collaborative tools for improved water management. This paper gives a critical evaluation of a project where boundary critique was used as a means to (i) improve community involvement in decision-making, and (ii) evaluate a ten-year water supply strategy, including a water conservation campaign, for a small seaside community facing ongoing water shortages.

ESR (Institute for Environmental Science and Research Ltd) is one of nine Crown Research Institutes in New Zealand. Predominantly it provides scientific services to the N.Z. Police and the Ministry of Health in forensics, toxicology, and public health laboratory analysis (including surveillance of infectious diseases, and food and drinking water quality). Challenges to science, often through media and public debate, have required ESR to shift from routine laboratory work and engage with increasingly complex and 'unruly' socio-technical problems (Emery & Thorsrud, 1969; 1976). Confronted with debates on scientific interpretation, moral, ethical, and value based uncertainty, and increasing community distrust (Howden-Chapman & Chapman, 1998; Policansky, 1998; Latour, 1999), senior managers sought to 'bring method to the madness' by building social science capacity. The aim was to improve the understanding of broader social and political concerns within specific projects, thereby helping scientists ensure that their work is more appropriately driven and applied.

This paper introduces work done in ESR's water group within a FRSTⁱ (Foundation for Research, Science and Technology) funded research project; 'Tools for Managing Urban Water Decision-making'. FRST's visionⁱⁱ is that research ought to enhance governance, institutional decision-making, community participation and empowerment, healthy ecosystems, and the health and well being of the wider community. In pursuit of this, a multi-disciplinary and multi-methodological approach was chosen to enable understanding as well as intervention. Expertise in sociology, systems thinking, Maori environmental management, management science, education and resource management inform a focus on 'systemic intervention' (Midgley, 2000). Additionally, a representative from Ngai Tahu is involved in the design and steering team to make sure the research is useful and ethical from a Maori cultural perspective; furthers the status of Maori as the Crown's Treaty partners; and respects tikanga and Maori cultural beliefs, values and uses of freshwater. Currently, the main focus of the research is to develop tools to assist local government to work with communities to reach robust decisions around the management of drinking and waste water. Research in a small rural seaside community explores how this mandate has worked in practice; the value of the methods selected; the outcomes; and critical success factors.

Water management and surety of supply is often taken for granted to the point of seeming almost invisible, yet even in a small rural community there are complex environmental and political considerations. The urban water cycle (Figure 1) encompasses both urban and natural environments, comprising water resources, drinking water infrastructure, waste and storm water disposal, and the receiving environment.

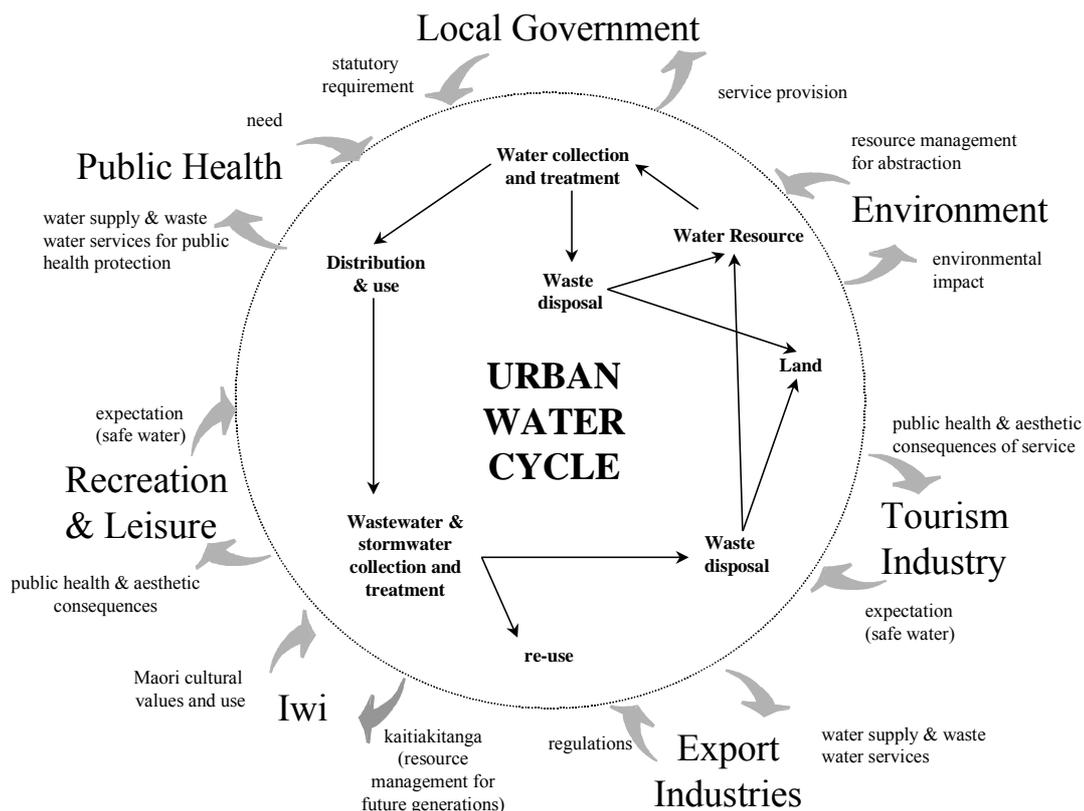


Figure 1. The urban water cycle. The arrows going into the urban water cycle reflect pressures or performance expectations, whilst the arrows going out reflect outcomes.

New Zealand’s drinking, waste and storm water treatment is a multi-million dollar industry guided by complex central and local government regulation. Numerous government agenciesⁱⁱⁱ control or monitor various activities, with an estimated 130 pieces of legislation affecting urban water systems and services (Parliamentary Commission for the Environment [PCE], 2000; 8). Decisions relating to one component have considerable potential to cause undesirable effects on others, but in current decision-making, the linkages between different institutions, activities, and the environment tend to be poorly understood. Furthermore, local communities and iwi (the Maori tribes) are affected, but often not meaningfully involved in decision-making. Hence, decisions are often contested, resulting in Environment Court hearings and disrupted projects.

The research site is a seaside township, a small but popular tourist destination in New Zealand. It has a permanent population of just 800 people that swells to an estimated 5000 with an influx of non-permanent residents and tourists during peak holiday seasons. The land pattern in the harbour catchment area is steeply sloping and relatively barren. Unlike other New Zealand cities and towns that have access to major rivers or underground aquifers, only three small streams supply water to the township. Rainfall patterns make the stream volumes highly variable and greatly reduced in the summer months or times of drought, which can last several months. Drought conditions tend to coincide with the greatest influx of holidaymakers to the area.

Whilst the township has long been a popular tourist destination, the decline of the agricultural sector since the 1980s has seen its survival increasingly depend upon economic contributions made by growing numbers of non-resident ratepayers and tourists.

The limited rating base and limited access to water sources, puts the District Council^{iv} in a challenging position to provide the community with a constant high quality water supply at an acceptable cost. Furthermore, issues around water scarcity and conservation have been a long-standing point of contention between the District Council and the permanent resident community. In response to growing concerns, the District Council has adopted (in principle) a ten-year water supply strategy. This consists of long-term infrastructure upgrades, as well as short-term water

conservation initiatives (including universal water metering), which are intended as a stopgap and are seen as instrumental in reducing the likely cost of the planned infrastructure upgrades.

Anticipating a particularly dry summer, in 2001 the District Council initiated a save-water campaign building on existing water restrictions including alternative day hosing bans, and bylaws requiring the installation of water efficient appliances in new property developments. Save-water initiatives ranging from door-to-door visits to poster displays of water conservation measures were proposed, with advice from a public relations company. However, budgetary pressures meant the only initiatives actually implemented were newspaper advertising to raise residents' awareness of water scarcity and conservation, and signs to inform residents and tourists that water restrictions were in force. Initial scoping discussions between the ESR research team and the District Council's project manager clarified three main aims to the water conservation campaign. These were to raise community awareness of the need for water conservation in order to minimise the severity of a water restriction regime; to demonstrate to the Regional Council that the township could responsibly take water from the three small streams, whilst maintaining the streams as viable habitats for native fish; and thirdly to defer and minimise investments required for the planned water infrastructure upgrades.

The District Council selected permanent and non-permanent residents as key water conservation audiences on the basis that the business community (which might have been a third audience) had already contributed significant water savings since water meters were introduced to commercial premises. There was also concern that promoting water conservation to tourists may deter them from choosing the township as a holiday destination, so tourists were not identified as a key audience either.

Water conservation is a key aspect of watershed management and is broadly concerned with demand management, including cost-reflective pricing, universal water metering, leak detection and correction, as well as save-water campaigns (White, 1998). Typical water conservation campaigns try to encourage voluntary reductions in water consumption by providing water users with information about water use and the extent to which their activities contribute to water shortages. Water metering may also be used to reinforce water conservation messages (Fiander & White, 1998). Whilst attempts to encourage water conservation are valuable for the environment, their effectiveness remains questionable (Van Vugt & Samuelson 1999; Beecher et. al., 2001). In a review of a number of save-water campaigns, Syme (2000) concludes that campaigns might result in significant water savings in crisis situations, but little is known about either their long-term effectiveness or factors governing their success. Indeed, various researchers have raised questions about cost-effectiveness, sustainability, political acceptability and the ability of water conservation initiatives to save significant volumes of water (Syme, 2000; Beecher et. al. 2001). Existing conflicts in the watershed can also impinge on the effectiveness of a water conservation campaign. "Water management means very often the management of conflicts" (Lesouëf, 1996; 92), but perplexingly the broader conflicts that may characterise watershed management are all too often excluded from analyses. Furthermore, water conservation is usually treated in the literature as an end in its own right, leaving a number of important questions around fairness and equity unanswered including, whose interests and values are served by the water conservation campaign, and who bears the burden of responsibility for complying with restrictions?

With these concerns in mind, the ESR research team began working with the District Council's Water Supply Committee to evaluate the water conservation campaign. ESR wanted to work with real communities to trial methods for improving decision-making, and the District Council was keen to adopt a systemic intervention approach to engage with the community over the issue of water scarcity, in recognition that the effectiveness of the water conservation campaign depended on the participation of all users in the watershed. Engagement with the community was problematic for the District Council. Firstly, it lacked expertise and resources for in-depth consultation; secondly, it was unsure how to best negotiate competing social, economic, environmental and cultural concerns; and thirdly, the community, frustrated with previous consultation exercises (which were seen as either pre-determined, or evidence of the District Council's inability to reach a decision), were deemed 'difficult' to work with. ESR's ability to intervene as an 'independent' third party was highly valued.

The evaluation was planned in three parts, each shaped by aspects of systemic intervention (Midgley, 2000), including boundary critique, methodological pluralism, and reflections on various meanings of improvement in the local situation (the meanings of these terms will be explained shortly). Firstly, the research team would interview a variety of stakeholders in order to surface issues relating to water conservation. Secondly, the water conservation campaign would be evaluated, although just how this was to be done was left open pending the findings from the

interviews. Finally, the research team would facilitate a stakeholder workshop to assist the District Council to involve the community and improve the water conservation campaign for the summer of 2002.

Boundary Critique: a means for evaluation and intervention

Boundary critique, an aspect of systemic intervention, highlights the need to reflect on, and choose between, different boundaries of analysis that shape how problematic situations like water shortages are defined and managed (Ulrich, 1996; Midgley, 2000; 2002). The District Council's water conservation campaign was critically evaluated by drawing on a range of viewpoints held by permanent and non-permanent residents in order to test the adequacy of its boundaries. The following sections describe how boundary critique provided a theory-based intervention to assist the District Council to better consider the community concerns as part of developing the strategy.

As far as we are aware, the term boundary critique was first coined by Ulrich (1996) and then used by Midgley et al (1998) to consolidate other work on the process of making value and boundary judgements (Churchman, 1970; Ulrich, 1983; Midgley, 1992). Churchman (1970) notes that where the boundaries of analysis are placed has important consequences given that these boundaries determine how improvement is defined and problems are managed. Boundaries indicate what information is considered relevant and what is considered superfluous, and are the result of value judgements. Churchman (1970) recommends that the boundaries of an analysis should be pushed out to 'sweep in' as much information as possible (without making the analysis incomprehensible) in order to test the adequacy of the intended improvement in the light of alternative perspectives. Similarly, Ulrich (1983) discusses how the exploration and setting of boundaries can be undertaken through dialogue between stakeholders, making boundary judgements more 'rational' and robust than if simply imposed by planners or external researchers in the absence of meaningful community participation.

In the case of initiatives such as water conservation, which depend on the consent of all users in the watershed, if the boundaries are perceived to be too narrow then the initiative is likely to be problematic. Indeed, if different watershed users employ quite different boundaries, some of which frame water conservation in a negative light, then it is probable that these users will actively subvert the intentions of the water conservation campaign.

Evaluation methods

The District Council agreed to sponsor the research with the understanding that a diverse range of people would be interviewed, including those not considered key audiences in the District Council's water conservation campaign (property developers and the indigenous population). Interviewees were asked to recommend others with different viewpoints to their own^{vi}, as well as those that might be involved in or affected by the water conservation strategy. The boundaries of the evaluation were finalised when interviewees stopped suggesting new names and conceptual saturation occurred, indicating that most (if not all) key issues were surfaced.

In total, 40 individuals including councillors, council staff, business owners, permanent and non-permanent residents were interviewed over a two month period from October to November 2001. The interviews explored perceptions about water scarcity and comment was specifically sought on the District Council's ten-year water supply strategy. Interviews were tape-recorded for later transcription and analysed using the Grounded Theory procedures of open and axial coding (Strauss & Corbin, 1999). This approach helped to identify and develop emerging concepts that accounted for stakeholder viewpoints, building a rich description of the issues characterising the management of the watershed. Given difficulties in recruiting a sufficient number of non-permanent resident interviewees, and the risk of marginalising these perspectives, a survey was sent out to 600 of the township's 724 non-resident ratepayers. A total of 326 responses were received and analysed using simple exploratory data analysis techniques including descriptive statistics and box-plots (Erickson & Nosanchuk, 1979). The analysis of the 40 stakeholder interviews and survey data surfaced a variety of issues.

Research Findings:

Permanent and non-permanent resident viewpoints

Resident rate payers were generally supportive of the water conservation messages, but opinion was split amongst the permanent and non-permanent residents over which group was responsible for excessive demands made on the water supply, and accordingly, who should bear the burden of responsibility for curtailing water-dependent activities.

Non-permanent residents were critical of permanent residents with flourishing flower and vegetable gardens. However, these permanent residents regarded themselves as conservation minded. Many were senior citizens and depended on their vegetable gardens to subsidise limited incomes, and thus they felt they only broke the water restrictions out of necessity. By contrast they thought the non-permanent residents knowingly ignored the water restrictions while flushing out speedboat motors and watering flower gardens and lawns. Some permanent residents expressed concern that the township had become a 'playground' for non-permanent residents and tourists who engaged in water-dependent activities at times when the water shortages were the most acute. Indeed, some permanent residents were adamant that the existing water supply was sufficient to support the town's 800 permanent residents, if only the non-permanent residents would go away. The non-permanent residents tended to respond to these criticisms by arguing that they paid the same rates as permanent residents yet used less water in total per annum than their permanent neighbours. For this reason many non-permanent residents reasoned that they had a right to use as much water as they wanted, irrespective that the town's reservoir could only hold two to three days worth of treated drinking water. It is interesting to note that the permanent residents found it difficult at times to differentiate between long time and recent non-permanent residents.

Permanent and non-permanent residents both agreed that having to connect new properties to the town's water supply served to aggravate the existing water shortages. In this sense a number of residents expressed a reluctance to conserve water, perceiving that any individual effort to save water was a poor guarantee of future surety for the town's supply, given the perception that any individual savings would be negated by the impacts of further housing developments.

Iwi / Runanga viewpoints

Local runanga were interviewed, but chose not to be part of the planned intervention workshop. They did not perceive themselves to be key stakeholders in the urban water supply dilemma being investigated, as the marae had its own stream supply and was not dependent on the council water supply. However, a strong view was expressed that development in the area needs to be slowed, and that greater consideration needs to be given to the impacts of development on the tangata whenua and the environment, especially in relation to wāhi tapu (sacred restricted areas such as burial sites).

Business viewpoints

Businesses in the area depend on tourists and non-permanent residents. Business owners were interested in solving the water issue because water is crucial to their industry and survival. Businesses have been water metered since 1998, and whilst most accepted this, some felt it unjust that they were metered, yet 'bed and breakfasts' and rental properties were not. As well as the fairness and equity issues, there were concerns that the District Council did not consult or plan with the already established businesses about further developments.

'If we conserve water, will the total savings of that conservation equal the new usage of the seven or eight buildings they are going to build?'
(Business Owner)

This challenged the usual assumption that businesses are pro-development, and that the District Council acts in the interests of business in adopting a development stance. Whilst agreeing to conservation in principle, businesses were concerned about how visible the crisis ought to be. Many thought the prominent water restriction sign on entering the township was inappropriate, feeling that a positive image was important for the tourism industry, and that it was 'not good for tourists to be reminded of all the negative things' (Business Promoter). Overall this group expressed a strong preference that the crisis be managed 'invisibly' so as not to impinge on the activities of the transient visitors.

District Council viewpoints

A zoning decision made some twenty years ago meant that the District Council had little option but to connect new households to the town water supply. If they failed to do so, the District Council risked litigation from landowners wanting to subdivide existing properties.

'Our position is that the district plan, which was established through a consultation process, sets the town boundary, and the market forces determine what happens within the town boundary in regards to development.... Legally we are bound by the district plan.' (Council Engineer)

A number of councillors, real estate owners and business owners saw further development as having an important part to play in funding future infrastructure upgrades, given the District Council's small rating base. For these reasons, the District Council had resisted the attempts of permanent and non-permanent residents to reframe the water scarcity problem in terms of the consequences of development.

Underlying tensions and conflicts in the water conservation strategy

Van Vugt (2002) identifies a number of factors that undermine the effectiveness of water conservation initiatives. Namely, people are unlikely to conserve water if they (i) perceive the cause of the water scarcity to be the result of self-interested individuals; (ii) perceive a lack of personal benefit; or (iii) have questions over the efficacy of water conserving actions. The themes identified through the interviews suggest that *all* these conditions were present, indicating a number of weaknesses with the District Council's short-term water conservation campaign that would also be likely to undermine the ten-year water supply strategy.

In addition, it was discovered that underlying the visible water scarcity debate was a conflict between two values: a limited or anti-development value which sought to preserve the heritage and integrity of the township, and a pro-development value where residential expansion and the promotion of tourism were perceived to be vital to building the township's economic and rating base. This conflict is depicted in Figure 2^{vii}.

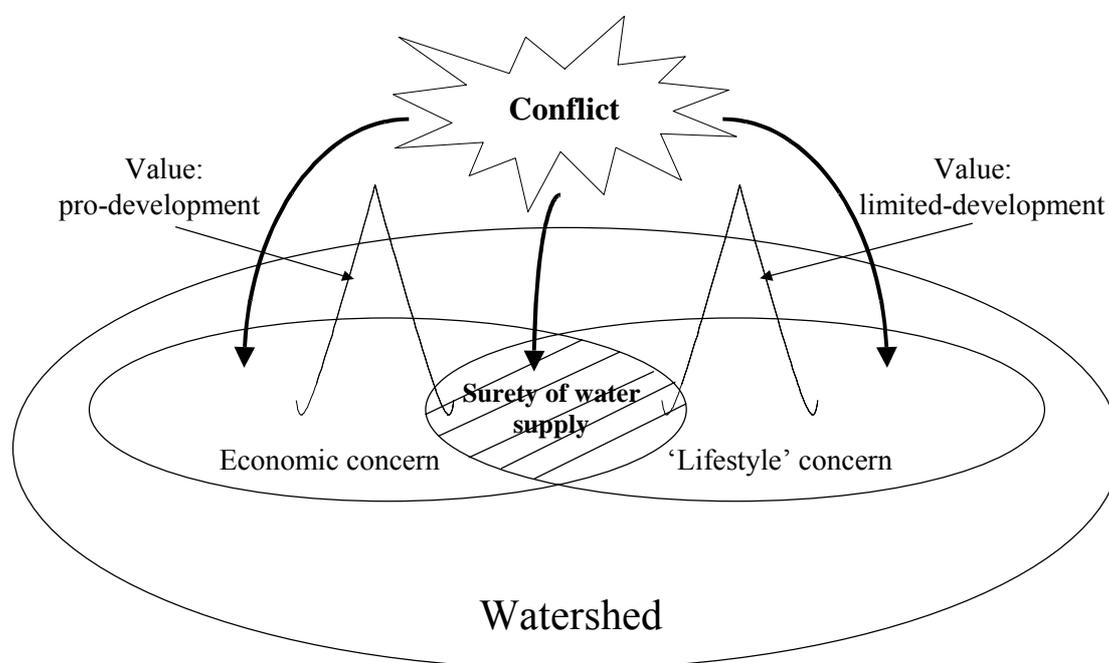


Figure 2. Conflict in the watershed (the diagramming technique is adapted from Midgley, 2000, and Yolles, 2001)

Whilst both groups with different values shared an interest in maintaining the integrity of the township's water supply, the conflicts over strategy remained highly charged. At the time of the research, primacy was afforded to economic development, but the District Council had nonetheless found itself in a precarious position in attempting to balance competing economic, environmental and social concerns. In this respect it is significant that the save-water campaign targeted existing residents, and not tourists or future residents. Addressing concerns about subdivisions and increased tourist numbers would require a political solution; that is, the transcendence of some existing interests, and a widening of the boundaries to include discussion about the nature and role of development within the township. Indeed, the focus of the save-water campaign on providing individual households with water conservation information depoliticises the water scarcity issue and decouples the save-water campaign from the debate about economic development. Given the inherent difficulty in ensuring a secure water supply in light of ongoing development, the save-water campaign can be viewed from this perspective as an attempt to *contain* the conflict generated by the two values (to stabilise it), rather than provide any sustainable resolution.

While conflicts like this can indeed be stabilised rather than resolved, this is often achieved by processes of marginalisation where some people and/or issues are devalued and derogated (regarded as profane) by those who work in, or can command the support of, the key institutions of authority (Midgley, 1992; 1994; 2000). The result is likely to be a dismissive attitude toward alternative perspectives, leading to mutual distrust. Constructive dialogue becomes difficult and strategic battles ensue where each side uses whatever means it has at its disposal to either enforce its own preferred strategy (in the case of an institution of authority), or to resist this enforcement (in the case of people who find themselves marginalised). In the case of a water conservation campaign, where the acceptance and involvement of the population is crucial to success, strategic battles of this kind will most likely fatally undermine the campaign.

From this analysis, ESR challenged the District Council's position that water conservation should be decoupled from the broader debate on the desirability of economic development. This was problematic for a number of people. From the perspective of the Council project manager, the issue of economic development frustrated his attempts to gain feedback on a proposed strategy to reduce ongoing water shortages. While the District Council saw merit in involving the community, previous attempts at consultation had proved problematic for all parties. Community members who had attended Council workshops saw the consultation as either too prescriptive, or evidence of the District Council's inability to reach a decision and display strong leadership. The council engineers also found the workshops unhelpful. In their view, some community members hijacked the process by raising issues beyond the remit of the water supply strategy (concerning economic development), meaning that incorporating community feedback into the strategy was difficult at best. The result was a situation characterised by ill feeling and mistrust. The District Council therefore perceived consultation as 'high risk', holding the potential to cloud the main issues with what were perceived as 'extraneous' concerns, and creating a vicious cycle where existing interests would become further entrenched, making the resolution of the ongoing water shortages unlikely.

A community workshop to renegotiate the boundaries

Despite these reservations, the District Council decided to invite our research team to present the findings from the evaluation of the water conservation campaign at a community workshop where the council engineers and their technical consultants planned to consult with the community over the ten-year water supply strategy. Wanting to avoid a repetition of some of the problems mentioned above, the District Council asked the ESR research team for further facilitative assistance.

It was explained to the council engineers that decoupling the water scarcity problem from issues of economic development only served to frustrate attempts to manage the ongoing water shortages. For this reason, community concerns about economic development should be regarded as valid and useful feedback for improving the effectiveness of the water conservation strategy. Unless some existing interests could be transcended, and fora organised to constructively debate the desirability of economic development, the water supply strategy would most likely continue to be undermined by the clash between pro- and anti-development values.

The council engineers and the Water Supply Committee initially disagreed. Since the District Plan governed housing and subdivisions, the District Council saw the issue of economic development more appropriately debated as part of the district planning process, and not during consultation about the water supply strategy.

This continuing reluctance to include the development issue in the workshop agenda posed an ethical dilemma for our research team. Would it be better to accept the constraint being imposed on us, or withdraw our services? ESR clearly had credibility as an independent third party, so to accept the constraint could have further marginalised community perspectives, making the workshop little more than a sophisticated public relations exercise. However, if we could continue our engagements, we might be able to reintroduce the development issue at a later date, enabling more meaningful community involvement. Eventually, we decided to proceed on the grounds that we could do more of value in staying engaged with the Council than by withdrawing. We had three reasons for making this judgement. First, all the stakeholders agreed that the ongoing water shortages were undesirable and needed to be managed, although existing residents expressed concern that property developers and/or future residents needed to take more responsibility for managing the water scarcity problem. Second, the District Council and council engineers saw community ownership as critical: a ten year plan would cut across approximately four council terms, making it important that community support was robust and enduring. Third, from an activity theory perspective (Engeström, 2000), contradictions can act as springboards to generate new tools and understandings, which can

shift existing patterns of control, expertise and legitimacy. It was therefore hoped that, when the District Council learned more about the issues, they would see the value of allowing economic development to be put on the agenda.

The workshop design departed from the traditional format of expert presentations followed by community question-and-answer sessions. The expressed purpose was to update the community on developments concerning the water supply since the last workshop, and to seek feedback and guidance on future development plans. The research team focused on how community viewpoints, which often expressed wider concerns about the management of the watershed, could be incorporated into the water supply strategy design.

Approximately 50 permanent and non-permanent residents, the Mayor, the Water Supply Committee, council engineers and their technical consultants attended the workshop. It began with the research team presenting the findings from the evaluation of the water conservation campaign along with community impressions about the ten-year water supply strategy. Community concerns were mirrored back to the District Council using quotations from our interviews. This process helped the workshop participants to distance themselves from the conflicts expressed, and to recognise community concerns as evidence of contradictions in how the watershed was managed rather than seeing them as personal faults (Engeström, 2000). For the council engineers, engagement with the quotations and responses of the workshop participants helped them to understand that the water scarcity issue existed in a broader social and political context, and that this needed to be taken into account before the community could commit to the water supply strategy.

The council engineers and their technical consultants then made presentations about the ten-year water supply strategy. Following this, the ESR research team facilitated a scenario building exercise in order to draw out the community expectations and concerns surrounding the implementation of various elements of the strategy. Workshop participants broke into six small groups and were instructed to construct either a best case or worse case scenario associated with the water conservation, universal water metering, and planned infrastructure upgrade projects. Each scenario was captured in the form of a 'rich picture' (Checkland, 1981; Checkland & Scholes, 1990; Daellenbach, 1999; 2002), a qualitative model of the key issues, which was then presented back to the wider group. Rich pictures usually take the form of cartoon-like drawings with arrows denoting interactions and relationships.

Each group was also asked to identify a key positive expectation and a concern for comment or response in the workshop. The positive expectations were used to define performance measures, while the community concerns signalled possible implementation barriers that would need to be addressed as part of the strategy development process. With consent from the workshop participants, the discussion was tape-recorded.

While previous workshop discussions between the District Council and the community were often polarised, the quotations and scenario building exercise helped mediate between the diverse viewpoints held by the District Council and the workshop participants. In a second workshop with the Water Supply Committee, the community's concerns and expectations were further deliberated with a recommendation made to full council that the universal water-metering project should stay in the council budget, and the council engineers should continue with the implementation of universal water meters. Community concern over the fairness and equity of the charging regime prompted the Water Supply Committee to recommend that a representative group of water users in the community should help develop a water metering policy and charging regime using data from a full year of 'dummy' meter readings. Possibilities for the charging regime would include that each property be allocated a daily water allowance (attracting a uniform annual charge), and that monthly meter readings would be taken during times of water scarcity.

Outcomes

A key outcome from the workshop was community support or 'buy in' for the water conservation strategy and water metering, provided that the charging regime could be accepted as equitable. Additionally feedback from the workshop attendees was very positive with one long time community activist commenting in the discussion session that in 'six years of meetings' with the council on the water issue, this is 'one of the more positive'. Council engineers also found the meeting 'fun', in contrast to some previous exchanges with the community. Other council members noted that the workshop forum generated 'worthwhile discussion without getting at each other's throats' and achieved 'good results'.

For both ESR and the community, the workshop was successful in allowing the broader concerns around development to be articulated and acknowledged by the District Council. The facilitated forum was equally valuable for the District Council in that they were able (despite their initial reservations) to link the concerns over development and equitable charging to their immediate agenda, thereby ensuring that the ten year supply and water conservation strategy achieved community consent.

Discussion

Overall, the systemic intervention resulted in good local outcomes as perceived by the various people involved, to the extent that the District Council invited ESR to do further work. There was also significant learning, exchange of ideas and increased understanding amongst the various stakeholders of other stakeholder positions and values. Factors contributing to the success of this work included the intersecting interests of the District Council and the research team; the FRST funding which enabled the creation of a space where issues could be surfaced and explored in-depth without concerns of hourly charge out rates; and the status of ESR as an ‘independent’ third party. The third party involvement was important for legitimacy, and also because the council engineers were not comfortable using these intervention tools on their own. The ability of the research team to negotiate on behalf of the community, explore community dynamics with the council working team, and broker the diverse stakeholder interests both informally and in the formal workshop was also an important factor in making the intervention successful.

In our view, the methods outlined above could also be used for improving relationships between government and communities in other types of controversial science and technology decision-making scenarios. However, some cautionary points are worth noting.

First, ESR was able to intervene legitimately as an ‘independent’ third party. As well as being new on the local scene, ESR has the more general advantage of being a relatively new player in the social intervention game, so it is not perceived as having any obvious biases. However, the potentially volatile mix of science, technology and competing social, economic and political interests encountered in our project suggest that this advantage may have limited currency. In a short but poignant piece, Beck (1997) introduces the metaphor of a dirty football:

‘Memory, then, is not a stack of facts that is fluidly passed on untainted. It is more like a ball that is bounced around among players, accumulating dirt and scars, bruises and patches. It can be lost, even forgotten, only to be rediscovered and kicked about yet again’ (Beck, 1997; 17).

Paradoxically then, an unsullied record can contain the seeds of its own undoing. As experience and a successful track record is built up, requests for involvement in more complex and intractable cases are likely, with the ensuing controversy and publicity having the potential to easily undermine a good reputation.

Additionally, this type of work can establish sound process, but it cannot *guarantee* win-win outcomes for all. Ultimately, transcending narrow interests is dependent on the willingness of key players to participate. Pressure for participation can be exerted by building strategic alliances (see Midgley, 2000, chapter 17, for an example), and by encouraging mutual learning, but there can never be iron clad guarantees. In our view, however, this should not be regarded as a weakness of systemic intervention. The days when researchers tried to engage in social engineering, believing that they had the ability (and the right) to produce pre-planned outcomes are long gone. Today, a more realistic understanding pervades that researchers are players in the game, not observers transcending and manipulating it (Midgley, 2000).

Reputation is tenuous, and research opportunities also come with inherent risks of client capture. Were it not for the eventual willingness of the District Council to genuinely explore and address the community’s concerns, our final workshop could easily have become a slickly managed package to soften up the community and smooth the implementation of technical solutions (i.e., water metering) within a strategy that remained contentious. In this instance the District Council was the key client and, as manager of the problem, was also the gatekeeper. Criticism could be levelled that the intervention left many aspects of the underlying economic tension unchallenged due to the need for continued access to the research site, the scope of the research being on decision-making for water, and the need for ESR to build its reputation and signal to other potential clients that it is a useful rather than unruly agent. From this position, a reading of the intervention is that it was overly instrumental, taking for granted the pre-defined end of addressing the water scarcity issue. Indeed, it is possible that some community members secretly

welcomed ongoing water shortages since this placed physical limits on housing, subdivisions and tourist numbers, and reminded the District Council that the desirability of economic development is contested:

‘If we were terribly successful [in addressing the water scarcity issue] then we may get even more development here and tourists may overrun us.... We would destroy the nature, the character and the very fabric of the community - the things we love about the place.’ (Comment from the Community Workshop)

The possibility of such a future consequence raises the issue of whether the research team had been captured by the District Council. This is a matter for judgement. Ours is that we were *not* captured: firstly, because the integrity of the water supply was recognised as an issue by all the stakeholders, including those opposed to further development; and secondly, because we sought to overcome the Council’s resistance to incorporating people’s concerns about economic development. Whilst there was more to the development issue than was dealt with in our project, it was at least put on the agenda in a meaningful way.

Related to this, a further power dynamic is noted. In this situation, runanga decided not to be actively involved in the community workshop on the grounds that they had a separate water supply to the township. Due to the characteristics and interdependencies within a watershed or catchment area, this position could change in future. The invitation to be involved in the evaluation of the District Council’s ten-year water supply strategy may have been too narrow, with issues significant to the urban water cycle that might have engaged runanga in ongoing dialogue remaining outside the scope of inquiry. That is something for us (and others seeking to engage tanagata whenua in research projects) to bear in mind for the future.

These concerns noted, this paper has focused on how boundary critique was used as a means for theoretical reflection to successfully build greater understanding and dialogue between a District Council and the wider community it serves, as well as to enhance the effectiveness of a ten year water supply strategy. We conclude that the systemic intervention approach can be useful to unravel and work with stakeholder concerns, and can enable decision makers to make robust policy choices that are more inclusive of political, social, environmental and economic concerns than they might otherwise be.

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Endnotes

ⁱ The Foundation for Science Research and Technology is responsible for allocating public good science funding in New Zealand.

ⁱⁱ This is elaborated in the FRST Sustainable Cities portfolio, under which ESR's 'Tools for urban water decision-making' research programme is funded.

ⁱⁱⁱ Agencies with an interest in urban water decision-making include the Ministry for the Environment, the Ministry of Health, (including central policy makers and district health boards), the Parliamentary Commission for the Environment, the Department of Conservation, the Ministry of Agriculture and Fisheries, Regional Councils, and some sixty four District Councils (Territorial Local Authorities).

^{iv} District Councils are local government bodies that represent local communities in defined geographical regions with responsibilities in planning, policy development and service provision (Drage, 2002). 85% of New Zealander's get their water supplied by local government (PCE, 2000;8).

^v A Regional Council is a local government body representing the interests of catchment areas relevant to communities in its jurisdictional boundary.

^{vi} This worked well in a small community setting, but may not be effective in larger urban areas where people may be less likely to know their neighbours.

^{vii} It should be noted that Figure 2 represents just one of the many possible conflicts in the watershed.