

Tabled at Hearing 01/10/14.

**Land and Water Regional Plan Variation 1
Selwyn Waihora Zone**

Submission from Ronlyn Duncan

Dear Commissioners,

The purpose of my submission today is to provide background on the reasoning behind my original submission and the issues it raises.

To assist the Commissioners, I've identified three overarching themes that arise from my original submission:

1. transparency of the links between the catchment and farm scale limits
2. capability in linking modelled load limits and in-stream concentrations
3. the workability of the proposed limit setting regime given the shifts in Overseer (i.e. on-farm as well as in re-calculations).

In preparation for my submission today, I find that these themes can be categorised as concerns about the unintended consequences (i.e. social, economic, cultural and environmental) of Variation 1 and it is this issue that I address today.

I'm going to start with some personal background and then I'll provide an overview of my research to explain what leads me to be raising these issues. I'll then close with a proposal for you to consider.

Background:

I live and work in Lincoln. My family recreate around Te Waihora. For example, we often ride the rail trail, an outing we enjoy very much. We live near Liffey Stream and almost daily walk or ride along it. Living near and having close access to this waterway was the reason for us purchasing our home where we did in Lincoln.

I hold the position of Lecturer in Water Management in the Department of Environmental Management at Lincoln University. I'm examiner and lecturer of the following undergraduate and postgraduate courses:

ERST203 Environmental Monitoring and Resource Assessment
ERST311 Monitoring and Management of River Systems
ERST631 Environmental Sciences in Environmental Policy

Through my undergraduate teaching, twice a year my classes either directly obtain and analyse water samples taken from waterways in this area or we analyse long-term data obtained from Environment Canterbury. The waterways we've looked at include the Selwyn River at Coes Ford, various sites along Liffey Stream and the LII and this year, the Halswell River. Hence, I'm well aware of the nutrient, sediment and pathogen issues facing these waterways and Te Waihora.

I've also seen on a regular basis how far in-stream concentrations of waterways are from the concentration standards set out in the Land and Water Regional Plan and how far the limits set out in Variation 1's Table 11(k) are from Land and Water Regional Plan standards.

I have Bachelor Degrees in Science (Geographical Ecology major), and Arts (Science and Technology Studies major) with First Class Honours, from the University of New South Wales (completed in 1997). I also have a PhD in Environmental Studies (awarded without amendment) from the University of Tasmania (completed in 2004). My PhD research applied social theories of knowledge production to evaluate the role and use of science and predictive modelling in environmental policy.

My Research:

My current research in the field of water policy, governance and management has been examining the challenges for science and policy in regulating diffuse pollution from agricultural land use. This research opens questions about how and where knowledge is produced, the credibility, transparency and legitimacy of processes and tools that produce and validate knowledge for policy, how we grapple with uncertainty and indeterminacy inherent in the knowledge we use for policy, and how lay people encounter and respond to science and its conclusions. The aim of this research is to develop new models of knowledge governance and approaches to engagement to link science, policy and practice.

Since arriving in New Zealand in early 2011 I've been observing what has been occurring in the Hurunui Waiau region in the development and implementation of its regional plan. In 2012 I contributed to a preliminary review of that process for Environment Canterbury. I've also had two papers published in international journals that apply social theory to evaluate New Zealand and Canterbury's approach to setting resource limits to manage water quality and diffuse pollution.

During 2013 I conducted 23 interviews with farmers in and around the Culverden Basin to examine how they were conceiving the water quality issue in their area. My findings fed back into the CWMS process to help the Hurunui Waiau Zone Committee understand the disconnection between what they were expecting in terms of creating headroom for new irrigation and how farmers were seeing and understanding the water quality issue.

In Selwyn Waihora I was involved in a number of Environment Canterbury's limit-setting focus group meetings as part of the education group. Also, earlier this year I was involved in research that brought together some community focus groups to assess the legitimacy of the Selwyn Waihora Zone Committee and the CWMS collaborative approach to decision-making.

The Issues:

As noted, the themes of transparency, capability and workability raised in my original submission reflect my concerns about the unintended consequences of Variation 1.

1. The nitrogen load limits and farm scale nitrogen loss reductions set out in Variation 1 are derived from predictive models and data analysis tools that are, by necessity, simplified representations of the real world. Hence, the derived understandings of land-water interactions and connections are limited by current understanding and methods of inquiry, as well as the resources invested in expertise, obtaining monitoring data and model development.
2. Model outputs are also limited by the time horizon over which nitrogen losses and impacts can be credibly predicted – the longer the time frame the less tenable are the predictions.
3. As is well known, the outputs of modelling are conditional upon a range of factors, for example, the quality of input data as well as the realisation of input assumptions and extrapolations that are necessary to overcome data gaps and empirical unknowns. These limitations and uncertainties embedded in the modelling and the derived conclusions are well-documented in Environment Canterbury's scientific and technical reports and supporting documents to this process.
4. Importantly, beyond the scientific and technical uncertainties inherent in predictive modelling, and in this context you would add the uncertainties that are generated and perpetuated when multiple models representing different parts of an ecosystem are bolted together, further complications arise when conclusions derived from models (i.e. simplified systems) are placed in social, economic and cultural contexts (i.e. the real world).
5. Given these circumstances, and notwithstanding the apparent precision of the numbers contained in Variation 1, I submit that it needs to be accepted that the environmental, cultural, social and economic outcomes of Variation 1 are indeterminate.
6. This does not mean that we cannot and should not proceed. Using predictive modelling and grappling with uncertainty have become the *status quo* for management of complex social-ecological systems that rely on predictions into the future to regulate current practice and allocate resources. However, in going down this path we need to ask questions about how to proceed, such as:
 - a. how should and could planners respond to the uncertainties that are disclosed to them?
 - b. how should and could planners address the inevitable indeterminacy that arises when plans and rules based on predictions into the future are unleashed into the real world?

7. Recognition of the indeterminacy of outcomes (and the irresolvable gaps in understanding embodied in our predictions) can move decision-making beyond notions of 'manageable uncertainty', which stakeholders are, intuitively, reluctant to accept, to instigate the foreshadowing of unintended consequences (i.e. cultural, environmental, social and economic). It also leads to the realisation that steps should be taken to be ready should such unintended or problematic issues arise.
8. Given the level of uncertainties and the indeterminacy we are dealing with here, what is required, in my view, is proceeding in a step-wise cautionary way. In the words of Robert Gibson and colleagues, who have written on sustainability assessment, in the context of so many unknowns and unknowables, we need to "plan to learn, design for surprise and manage for adaptation" (Gibson et al. 2005, p. 111).
9. While I think these are the philosophical underpinnings of the regional council's approach, which aligns with notions of adaptive management, important questions remain about how the limits and the required reductions can be operationalised within the effects-based RMA that requires precision in terms of enforcement and compliance and the broader economic context which requires certainty into the future of resource allocation and regulation.
10. Importantly, these are not issues that can be addressed simply by the disclosure of scientific uncertainty or solely by scientists. In my view, they are issues that have to be addressed in conjunction with science but led by planners working with stakeholders and those subject to the rules to develop transparent, flexible and adaptive systems of monitoring, reporting and compliance. For example, as I understand, it is still not known how updates to Overseer will be addressed in a transparent and credible way.

Proposal for consideration:

It is my submission that as a minimum the following should be required of Council:

- a) To work with stakeholders, biophysical and social scientists to establish a monitoring programme that collects data on an agreed set of social, cultural, environmental and economic parameters into the future;
- b) With stakeholders, develop and implement an agreed set of waypoints, triggers and plans for evaluation and action to respond to the monitoring programme over time;
- c) Develop stakeholder-agreed public reporting tools and mechanisms for the Selwyn Waihora zone; and
- d) Establish an independent appeals process to hear and, if possible, resolve reported issues that could feed in and out of a) – c) above.

These requirements would:

- signal to stakeholders that it is safe to proceed with Variation 1
- provide transparent and agreed pathways for recourse inside the existing five-year review period and Environment Canterbury's work schedule
- provide the data needed for the 5-year review
- accord with Section 35 of the Resource Management Act, 1991 which requires the regional council to undertake monitoring to assess policy effectiveness
- engender legitimacy for the rules and confidence in the regional council

Lastly, it would put in place in a transparent, credible and formal way the adaptive management approach that has been advocated by the regional council.

Thank you for your consideration.

Yours sincerely,



Ronlyn Duncan

Relevant publications:

Duncan, R. 2014. Regulating agricultural land use to manage water quality: the challenges for science and policy in enforcing limits on non-point source pollution in New Zealand, *Land Use Policy*, 41, pp. 378-387.

Duncan, R. 2013. Converting community knowledge into catchment nutrient limits: a constructivist analysis of a New Zealand collaborative approach to water management. *Nature and Culture* 8(2), pp. 205-225

Duncan, R. 2013. Opening new institutional spaces for grappling with uncertainty: a constructivist perspective. *Environmental Impact Assessment Review*, 38, pp. 151-154.

Memon, A., Duncan, R., Spicer, A. 2012. The Hurunui Waiau Zone Implementation Programme as a Collaborative Planning Process: A Preliminary Review. Environment Canterbury: Christchurch.

Duncan, R. 2008. Problematic practice in integrated impact assessment: the role of consultants and predictive computer models in burying uncertainty. *Impact Assessment and Project Appraisal* 26(1), pp. 53-66.

Duncan, R. 2006. The use of predictive modelling in impact assessment: implications for environmental legislation and regulation. *Australian Journal of Public Administration*, 65(1), pp. 75-88.

Reference:

Gibson, R., Hassan, S., Holtz, S. Tansey, J. and Whitelaw, G. 2005. *Sustainability Assessment: Criteria and Processes*. London: Earthscan.

