



# **'Lag-effect' politics and the politicisation of New Zealand farmers: Where to from here?**

Ronlyn DUNCAN

*Department of Environmental Management, Lincoln University, New Zealand*

---

## **ABSTRACT**

*Responding to diffuse agricultural pollution is plagued by the considerable period of time it can take before ecological thresholds are breached and the impacts of actions on land become evident in water. Reflecting on the recent election campaign and the findings of research conducted in 2013 to understand farmers' perspectives on media claims that agriculture is diminishing New Zealand's '100% Pure' brand, this paper examines the social and political dimensions of this lag-effect and argues that the politicisation of New Zealand farmers has gone too far. The paper examines the implications of lag-effect politics for farmers and the new government that has inherited an already fraught implementation phase of the National Policy Statement for Freshwater Management.*

---

## **1. INTRODUCTION**

The media spotlight became firmly fixed on dairy farmers and the impact of dairy farming on New Zealand's waterways in 2002 when Fish and Game launched its 'dirty dairying' campaign (Holland, 2014). Fast-forward a decade-and-a-half, while there has been considerable change in farm management practices, gains have been overwhelmed by a convergence of the legacy of past management practices (e.g. excessive fertilizer, deforestation, grazing on erosive slopes) and more recent effects of high levels of water abstraction and nutrient losses from intensified land use (MfE and Stats NZ, 2015, 2017; PCE, 2012, 2103). Nutrients, sediment and pathogens that might be considered minor in isolation can be significant when they move overland and/or through groundwater to accumulate in rivers, lakes, streams, estuaries and off-shore marine areas (Goolsby et al. 2001; Howard-Williams et al., 2010; Howden et al. 2013; Sanford and Pope, 2013). In terms of

nitrate, the present state of water quality reflects what has occurred in the past and depending on biophysical, geological and management factors, movement into waterways can take decades. Often referred to as the 'lag-effect', this means it can take some time before the effects of land use intensification make their way through the groundwater system (Howard-Williams et al., 2010; LAWF, 2010, 2012; PCE, 2012; Sanford and Pope, 2013). Importantly, the same delay applies to improvements in water quality due to better farm practices and the implementation of stricter rules and regulations. Hence, the issue of concern in this paper is that the lag-effect can have potentially unforeseen social and political consequences.

## **2. LAG-EFFECT POLITICS**

Arguably, lag-effect politics played a role in the outcome of the recent New Zealand election. While there is much to question of the previous government's water policy reforms (e.g. see Duncan, 2013, 2014a, 2014b,

2017; LAWF, 2017a, 2017b; MfE, 2017), one could be forgiven for taking from the election campaign that little had been done by the previous government on water quality. In contrast, while some regional councils had moved before 2011 to address water quality through setting limits (e.g. Canterbury, Horizons, Waikato), rafts of limits and rules now exist in regional plans and consents across New Zealand to regulate farming with the intention to address water quality. The problem is, the limits and rules are not yet showing results and decision-makers have maintained that things are likely to get worse before they get better (e.g. Skelton and Caygill, 2013). Notably, water policy reforms have been occurring in the midst of a central government push to significantly increase agricultural production through expanding irrigation. The balancing act of aligning existing social, cultural, economic and environmental values and rights *as well as* squeezing as much as possible out of the resource seeks to force increases in agricultural production through innovation and resource efficiency while delivering environmental outcomes (MBIE, 2015) – otherwise known as ‘sustainable management’ as mandated under the *Resource Management Act, 1991*.

### **3. THE REALITIES OF SETTING RESOURCE LIMITS**

Important for understanding the context for policy implementation, this ‘expand within limits’ philosophy that is now embedded in New Zealand’s National Policy Statement for Freshwater Management has been creating winners and losers across farm sectors. For example, in locations where grandparenting nitrate discharge allocations has occurred, setting limits has had equity implications for sheep and beef farmers with the potential property value of conversion to dairy no longer an option. This is because their nitrogen loss rates have been retained at low levels (albeit with some small room for movement in some sub-regions in Canterbury) while dairy farmers retain significantly higher loss rate allocations to reflect sunk investment. Arguably, these are the highly fraught, complex and sometimes unforeseen realities and consequences of

setting limits on a resource that is so intricately woven into national and regional economies. Setting limits is also pitting existing irrigators against new with irrigation schemes needing command area discharge allowance loads to proceed. This has meant the former see themselves mitigating nutrient losses to make way for the latter which could endanger everyone’s right to farm (e.g. see Duncan, 2014a, 2014b, 2017). Setting limits has also meant that opportunities for future conversions to dairy have been curtailed in many areas and irrigation schemes have been scaled back (e.g. North Canterbury’s Hurunui Water Project).

### **4. BEWILDERED FARMERS AND DISBELIEVING PUBLICS**

Given the years of meetings, forums, hearings, submissions and so much more required of farmers and many others under the Canterbury Water Management Strategy and elsewhere across New Zealand to establish limits and rules that are now law in regional plans (see Memon et al. 2012 for a preliminary review; see also Duncan, 2014a, 2017), farmers were appearing understandably bewildered by accusations in the media during the 2017 election campaign that continually insinuated nothing was being done to address water quality. With evidence and the media appearing to confirm the worst and with reverberations of the dirty dairying campaign continuing and government policy promoting further intensification through irrigation expansion, claims that government and farmers were taking action fell on profoundly deaf ears. Such actions were deemed insignificant and claims that things would eventually get better were simply not believed.

### **5. POLICY IMPLEMENTATION – THE CHALLENGES**

Blackstock et al. (2010, p. 5634), drawing on an international literature review of the influence on farmer behaviour of information provision, maintain that ‘well-reasoned, data based and logical messages should be effective in persuading farmers to adopt certain preventative measures or ‘best management practice’, so long as farmers are convinced that

there is a problem and that their actions can solve it'. These authors identify gaps in our understanding of the socio-cultural aspects of how farmers 'interpret, translate and respond to measures designed to mitigate diffuse pollution' (p. 5632) and how advice 'interacts with farmers' identities and cultures' (2010, p. 5635). These are important issues for the implementation of improved farm practices. Given how contentious dairy farming has become in New Zealand and the policy trajectories that are now in place that are creating turmoil across rural New Zealand, I focus on farmers' responses to media claims that agriculture is diminishing New Zealand's '100% Pure' brand and ask if the deepening politicisation of farmers in New Zealand has gone too far?

## 6. METHODS

Face-to-face semi-structured interviews were conducted during 2013 with 12 dairy farmers and 8 farmers who owned a mix of sheep/beef/arable farms. Situated across what is known as the Culverden Basin in North Canterbury, all farms were irrigated. The 8 mixed farms provided dairy support with cows grazing over winter with one farmer providing dairy support by only growing stock feed. Hence, all farms were involved in the dairy industry one way or another. Interviews of between 60-90 minutes duration were conducted in farmers' homes. Data was analysed using an initial coding process with analytical themes derived from the coded data (Cope, 2005). Interviews have been accompanied by the ongoing review of central government water policy reform documents and reports, regional council planning documents including public submissions, hearings evidence and scientific reports related to water quality limit-setting processes in Canterbury's Hurunui Waiau and Selwyn Waihora zones. Findings have also been informed by regular attendance at public meetings and regional plan hearings for these zones.

## 7. RESULTS

### 7.1 Lack of recognition

Being accused of ruining the New Zealand brand was very hard to take for the farmers interviewed given that all of them had been making changes on-farm for some time, often requiring considerable time and expense. For example, farmers had invested in improved irrigation systems (e.g. converting from flood to spray irrigation or improving how water was applied); they had changed fertiliser application systems and adopted a more frequent lower application fertiliser regime (which had cost implications); they were building up their soil to soak up nutrients; fencing stock from waterways and planting riparian margins. Dairy farmers had improved on-farm effluent management systems including making their holding dams much larger so they can apply effluent to land when it is suitable and to avoid ponding. Farmers felt these actions (that they had been told to take) were not being recognised by critics.

### 7.2 Media misrepresentation

Farmers were concerned that the media focuses on bad stories and, indeed, would take an isolated incident to paint the whole industry in a negative way. For example, 'the worst thing about the media is they'll take one or two examples and portray it as that's what New Zealand's all about – the water quality's *all* stuffed' (dairy farmer, respondent 6). Other farmers stated:

*we record the news so we can bypass the rubbish, the sensationalistic rubbish ... they're very one sided and they only pick bad stories, they have to go for ratings I suppose but they're certainly not balanced reports if you ask my opinion. ... and then also you see pictures in the newspaper and they're just a picture they've picked up out of some picture file, it doesn't relate to anything (dairy farmer, respondent 10).*

*I don't mind objective journalism about the facts but there's so much bullshit it's just unreal – like this swimming hole thing, the number ... swimming areas that are not what they were a couple of years ago – well I saw some stats on them and most of them are urban, but yet the media or the politicians, the Greens and that will just, not necessarily directly accuse dairying but they'll insinuate it (dairy farmer, respondent 15).*

The media was described as irresponsible, selective, biased, and a scaremonger.

### **7.3 A minority of farmers**

Respondents acknowledged that there were farmers that were not following the rules. They were cast as ruining things for everyone and 'letting the side down'. I was told that there are 'bad farmers' just like there are 'bad reporters' and 'bad accountants' and that 'bad farmers' should be dealt with by authorities as they were tarnishing the whole industry and this was not fair to those doing the right thing.

### **7.4 Town folk**

Farmers expressed disappointment and surprise that 'town folk' would get 'sucked in' by media reports and stories on the television that were clearly misrepresenting and exaggerating the link between agriculture and water quality. The point here was not that there are no negative stories, as the participants acknowledged there are problems. The concern was that all farmers were assumed 'bad'.

*the [newspaper] editor was obviously anti-dairying there for a while and probably still is – every second page, every time you opened the paper there was an anti-dairying thing, well if the people read that eventually they'll believe it, it's called indoctrination, people just keep reading about dirty dairying, dirty*

*dairying, dirty dairying (dairy farmer, respondent 14).*

Several farmers expressed disappointment that people would take what the media presented at face value. Some farmers attributed this problem to an ongoing disconnection between people in towns and farm life that had been far more interconnected in the past. The introduction of regulations around occupational health and safety were mentioned as now keeping people away from farms. Participants also talked about degraded urban waterways. Several participants were perplexed as to why people living with (and contributing to) degraded rivers in towns and cities expected rivers in agricultural areas, their workplace, to be pristine. They felt these were unrealistic expectations.

### **7.5 New Zealand's lifeblood**

Representations of agriculture diminishing New Zealand's 'clean green' brand stood in stark contrast to the image farmers had of agriculture as underpinning not only the national economy over a very long period of time but also rural towns and the livelihoods of many. The question was raised: 'what would New Zealand do without farming?' with the observation that there was not much else going on. It was maintained by many farmers that New Zealand needed agriculture. It was also characterised as part of New Zealand's 'DNA'. 'I think they've [the media] got to be reasonably careful what they report on really. Agriculture, it's our life blood, that's what we do, that's what we've always done' (sheep farmer, respondent 18).

*For all the years that I've been here and my father's been here, agriculture has been pretty important for this country, to keep it running ... there's obviously a dairy boom going on at the moment and they're all doing really well. I think the spin offs are for the whole population of New Zealand are pretty good through that; if we didn't have that at the moment as a country we might be*

*looking reasonably sick. I think farmers in general are pretty responsible and they do care about their land and what they put into it. Perhaps there would be a small minority that don't (sheep farmer, respondent 18).*

## **7.6 Farmers by nature**

The discussion opened topics about how farmers respond to the media claims and criticism. I was told that farmers prefer to avoid politics, were weak at answering back and probably sit back too much. I was also told that farmers are sick of the 'waffle' and just want to get on with their work. Farmers conceived themselves as responsible and caring about their land and waterways. They saw themselves as custodians and 'greenies' at heart. Indeed, one farmer maintained he did far more for conservation in terms of planting hundreds of trees and removing willows than the environmentalists he had encountered complaining about the rivers.

*It makes me really cross because it's really one-sided and people say well why don't you stand up and argue but farmers are notorious for heads down bums up and to be fair, whose keeping the country afloat? (dairy farmer, respondent 10).*

## **7.7 Invalidation of social identity – criticism beyond the media**

Discussions with farmers also revealed some were encountering broader criticism than that of the media. A dairy farmer talked about being at a wedding when he announced to the group at his table that he was a dairy farmer. He said the tone of the conversation seriously changed at that point which made him feel like he should go and sit elsewhere because he felt he was making everyone feel uncomfortable. He said this had happened on other occasions. Further illustrating tensions, the wife of farmer expressed feelings of conflict:

*friends, when they hear you've got an irrigator, you just feel that they think you're sucking the water out, you're ruining it ... I worry about those things ... but on the other hand, to survive in this world [you need water to farm] ... I always feel torn (wife of sheep and beef farmer, respondent 1).*

This participant also made the point that in the past a family could live on a small piece of land and make a living without irrigation but this was no longer possible. Another sheep and beef farmer talked about the research his teenage daughter had felt compelled to do to educate her teachers and fellow students on the impact of farming and its contribution to the country. This participant had also encountered the opinions of 'town people':

*you go out to a dinner with town people and they all say oh, you're from Culverden, oh is there much dairy farming up there? ... oh you're not one of those are you? Oh, it's bad this dairy farming and those horizontal pylons – they hate those – oh it's all just so bad what the farmers are doing. And I say well only 3% of New Zealand's water is used and 97% goes out to sea and 2% of it is used for irrigation. They think we're using all the water (sheep and beef farmer, respondent 8).*

Another sheep and beef farmer explained that he had been subjected to verbal abuse by passers-by when shepherding his stock down a road near his home.

A dairy farmer maintained he was being subjected to unwarranted scrutiny and criticism because although he had fenced his stock from waterways, beef cattle that were not subject to the same rules were still getting into waterways and their owners were not being held to account:

*we've got a beef farmer next door to us - well there's sheep and beef guys all around here and a lot of their cows at the moment are all in the rivers [due to watercourses in hills drying up]. ... if they were black and white the greenies would be jumping up and down and there'd be helicopters flying around here and screaming but because they're red and white or black they don't seem to – there just doesn't seem to be the same worry (dairy farmer, respondent 6).*

One participant, the wife of a dairy farmer, explained with much sadness how the trees they had planted on their farm over several generations had to be cut down to make way for the new spray irrigation system and the removal of the border-dyke flood irrigation system:

*all those trees along those roadside paddocks have been pulled out so that's really sad. We are sad about them and a lot of people – man, the comments we get from people, everybody's got an opinion but nobody's got a wallet [to pay for a system to avoid removing trees and the staff to run it] – you know, so we were forced into it I'd say (wife of dairy farmer, respondent 10).*

The trees provided shelter, shade and habitat but the wipe-off water from the flood irrigation system (which relied on gravity not electricity so ran at much lower cost) contributed contaminants, in particular phosphorus and pathogens, to waterways. Although a very large holding pond had been installed as a measure to stay within the border-dyke system and to avoid losing the trees and the use of electricity to irrigate, the system was no longer meeting efficiency requirements.

## 7.8 Pride

While there were negative emotions of disappointment, frustration, anger, unhappiness, hopelessness, surprise, feeling torn and feeling hurt, there was also an overriding sense of pride – pride in running a successful business, pride in being a farmer and making a contribution to the community and the national economy, and pride in being a New Zealander. Upon asking if he was embarrassed to say he was a dairy farmer, one respondent stated:

*no, I'm absolutely proud of what I do. We've got kids that'll want to grow up in a rural environment and I think at the end of the day, most of us are greenies anyway. ... the history of farming is that there is a family element to it and a succession element and a feeling of being custodians of the land. Farmers aren't in farming for a one off, one year cash hit. You can erode a resource as much as you like for a one year cash hit but farmers are in it for the long haul. There are very few farmers that rape the land as such for profit and pull out, although there is a lot of negative publicity out there - I think a lot of it is ill-founded - and there is a bit of a tail end in the industry too that don't do us any favours (dairy farmer, respondent 3).*

## 8. DISCUSSION

Given that farmers are key to addressing water quality, the research set out above sought to understand the socio-cultural context into which water policy reforms seek to intervene. Three key themes were identified: injustice, invalidation of social identity and pride. The results show that because farmers were making changes to their farm practices they felt wrongly targeted by the relentless criticism in newspapers and on the television and that town people had become indoctrinated by the 'dirty dairying' campaign. They also felt that justifiable

criticism of a few was resulting in the representation of all farmers as bad and all water quality 'stuffed'. Many felt powerless to refute such claims which they believed were untrue and misrepresentations of the situation they were seeing on their farm and in their local area. Farmers felt their positive actions were being overlooked or dismissed due to gross media misrepresentation and unrealistic expectations of '100% Pure'. A number of farmers characterised the media in terms of a 'machine' that constantly perpetuated misconceptions and untruths, in particular the 'dirty dairying' slogan. Invoking the 'machine' metaphor reflected concerns about the uncontrollability of the media and the futility of fighting back. This concern was exacerbated by the difficulty in shifting public opinion once it had been established, thus revealing feelings of hopelessness, anger, frustration, disappointment, unhappiness and confusion. Farmers believed strongly that they were making an important contribution to national and regional economies and could not see what else could fill the economic void if farming was gone which is what they thought many people wanted. Several participants maintained it was not usually in the nature of farmers to argue and rejected claims they do not care about the environment. They were concerned they were taking action but nobody was listening and it appeared nobody wanted to listen. It is also important to note that the interviews were undertaken before the myriad of implementation and equity issues set out earlier were known about.

Farmers are well aware of their portrayal in the media as the water quality problem. It is evident that they resist this framing for a range of reasons, for example, the contribution of agriculture to national and regional economies, day-to-day survival, what they see as unrealistic expectations and the extent to which media portrayals take reality out of context. Of course, it is important to acknowledge that the negative feelings and emotions expressed by farmers are similar to those expressed at public meetings and through social media by those who believe the water they drink and use for recreation has been (or will be) sullied by dairy farming.

While it is unknown, as yet, if the limits and rules that are currently being locked into place around farming across New Zealand will be enough to address water quality to everyone's satisfaction, farmers are confronting high costs to obtain and retain the right to farm and mitigate to meet required limits. The task of translating what can easily be described as a quagmire of rules and regulations into on-ground action to deliver the outcomes everyone wants is only just beginning. Implementation challenges in addressing diffuse pollution are not isolated to New Zealand. Across the world and for some time governments have been developing a range of policies to address the diffuse pollution of agricultural production (OECD, 2017) (e.g. the Water Framework Directive in Europe and the Total Maximum Daily Load regime in the United States) with varying levels of success and much disappointment (Barnes et al. 2013; Buelow, 2017; Copeland, 2014; Sims and Volk, 2013; Voulvoulis et al. 2017). New Zealand's property-scale regulatory and precautionary approach is unique and, as we have seen, not without its problems (see Duncan, 2014b).

## 9. CONCLUSIONS

It is evident that Fish and Game's dirty dairying campaign continues to reverberate through rural New Zealand and many would argue for good reason. However, the growing stigma around farming and farmers is not helping anyone. Has the politicisation of New Zealand farmers gone too far? I believe it has. Given that the new government has inherited a profoundly fraught and complex policy implementation phase under the National Policy Statement for Freshwater Management that has already created rifts within rural communities and across farm sectors, as well as cultivated defiance, uncertainty and frustration, ongoing work to address water quality will require considerable relationship building. There are no quick fixes to setting limits.

It would appear we are seeing the brutal effect of narrow depictions of apparently badly behaved farmers. Yet, farmers have to be part of the water quality solution. What farmers do on their farms is influenced by a range of social,

institutional and economic factors (e.g. family succession plans, new technologies, government investment, tax policy and incentives, land prices and values, availability of contractors, immigration rules, staffing issues, occupational health and safety regulations, enthusiasm, trust in leadership) and knowing what they are doing will make a difference (Blackstock et al. 2010; Morton and Brown, 2011). Evaluating how all these factors play out and intersect could provide useful insights for going forward. My observations from the discussions I had with farmers during the research reported here show that there is enormous capability and potential willingness that could be harnessed to go beyond the current approach which, for good reason, focuses individual farmers on property-scale limits. While addressing a cumulative effects problem at the individual farm scale has its merits from a policy and planning perspective, the impacts are not tangible at this scale and the required responses, just like the effects, are easily deemed insignificant. Hence, the current approach of zooming down from the catchment to the farm requires zooming back up a bit to a more appropriate scale, for example, that of a tributary where collective arrangements can be used to optimise on-ground actions, which really could make a difference. Furthermore, the social and political fallout of the 'expand within limits' philosophy that underpins the National Policy Statement for Freshwater Management requires a thorough examination and re-evaluation. Will the new government be punished by lag-effect politics as appears to have been the case for the last? Time will tell.

## 10. REFERENCES

- Barnes, A.P., Toma, L., Willock, J. and Hall, C. (2013). Comparing a 'budge' to a 'nudge': Farmer responses to voluntary and compulsory compliance in a water quality management regime. *Journal of Rural Studies* 32: pp.448-459
- Blackstock, K.L., Ingram, J., Burton, R., Brown, K.M. and Slee, B. (2010). *Understanding and influencing behaviour change by farmers to improve water quality. Science of the Total Environment*, 408: pp.5631-5638
- Buelow, F.A. (2017). *Do everything you can, but not (yet) getting it right: Challenges to Brussels' great expectations for water quality. Case Studies in the Environment*, January
- Cope, M. (2005). *Coding qualitative data In Hay, I. (ed). Qualitative Research Methods in Human Geography, Second Edition. Oxford University Press: South Melbourne*
- Copeland, C. (2014). *Clean Water Act and Pollutant Total Maximum Daily Loads (TMDLs). CRS Report to Congress 7-5700. Washington: Congressional Research Service*  
<http://nationalaglawcenter.org/wp-content/uploads/assets/crs/R42752.pdf> (accessed 1 February, 2015)
- 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. 2014a. *A view from the farm-gate: farmers' perspectives on water quality. Lincoln Planning Review* 6(1-2): pp.18-24
- Duncan, R. (2014b). *Regulating agricultural land use to managing 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. (2017). *Rescaling knowledge and governance and enrolling the future in New Zealand: a co-production analysis of Canterbury's water management reforms to regulate diffuse pollution. Society and Natural Resources*, 30(4): pp.436-452
- Goolsby, D.A., Battaglin, W.A., Aulenbach, B.T. and Hooper, R.P. (2001). *Nitrogen Input to the Gulf of Mexico. Journal of Environmental Quality*. 30: pp.329-336

- Holland, P. (2014). *The Dirty Dairying Campaign and the Clean Streams Accord*. *Lincoln Planning Review*, 6(1-2): pp.63-69
- Howard-Williams, C., Davies-Colley, R., Rutherford, K. and Wilcock, R. (2010). *Diffuse pollution and freshwater degradation: New Zealand Perspectives*. Selected paper from the 14th International Conference of the IWA Diffuse Pollution Specialist Group, DIPCON 2010
- Howden, N.J.K., Burt, T.P., Worrall, F., Mathias, S.A. and Whelan, M.J. (2013). *Farming for Water Quality: Balancing Food Security and Nitrate Pollution in UK River Basins*. *Annals of the Association of American Geographers* 103(2): pp.397-407
- Land and Water Forum. (2010). *Report of the Land and Water Forum: A Fresh Start for Freshwater*.  
<http://www.landandwater.org.nz> (accessed 30 March, 2011)
- Land and Water Forum. (2012). *Second Report of the Land and Water Forum: Setting Limits for Water Quality and Quantity Freshwater Policy- and Plan-Making Through Collaboration*.  
<http://www.landandwater.org.nz/>(accessed 1 February, 2013)
- Land and Water Forum. (2017a). *Land and Water Forum Commentary on Implementation of the NPS-FM*. Available from  
<http://www.landandwater.org.nz/Site/Resources.aspx#H126743-1> (accessed 30 October, 2017)
- Land and Water Forum. (2017b). *Submission on the Clean Water Consultation*. Available from  
<http://www.landandwater.org.nz/Site/Resources.aspx#H126743-1> (accessed 30 October, 2017)
- MBIE (Ministry for Business, Innovation and Employment), (2015). *Business Growth Agenda 2015*.  
<http://www.mbie.govt.nz/info-services/business/business-growth-agenda/towards-2025> (accessed 2 February, 2016)
- Memon, A., Duncan, R. and Spicer, A. (2012). *The Hurunui Waiau Zone Implementation Programme as a Collaborative Planning Process: A Preliminary Review*. Christchurch, Environment Canterbury Regional Council. Available from  
<http://ecan.govt.nz/publications/Repos/hurunui-waiiau-zip-collaborative-planning-process.pdf>
- MfE and Stats NZ (Ministry for the Environment & Statistics New Zealand) (2015). *New Zealand's Environmental Reporting Series: Environment Aotearoa 2015*. Available from [www.mfe.govt.nz](http://www.mfe.govt.nz) and [www.stats.govt.nz](http://www.stats.govt.nz)
- MfE and Stats NZ (Ministry for the Environment & Stats NZ). (2017). *New Zealand's Environmental Reporting Series: Our freshwater 2017*. Retrieved from [www.mfe.govt.nz](http://www.mfe.govt.nz) and [www.stats.govt.nz](http://www.stats.govt.nz). (accessed 1 June, 2017)
- MfE (Ministry for the Environment). (2017). *National Policy Statement for Freshwater Management Implementation Review: National Themes Report*. Wellington: Ministry for the Environment
- Morton, L.W. and Brown, S.S. (eds). (2011). *Pathways for Getting to Better Water Quality: The Citizen Effect*. Springer: Dordrech
- OECD. (2017). *Diffuse pollution, degraded waters: emerging policy solutions*. OECD Studies on Water. OECD Publishing: Paris
- PCE (Parliamentary Commissioner for the Environment). (2012). *Water quality in New Zealand: Understanding the Science*. Wellington: PCE. Available at [www.pce.parliament.nz](http://www.pce.parliament.nz)
- PCE (Parliamentary Commissioner for the Environment). (2013). *Water quality in New Zealand: Land Use and Nutrient Pollution*. Wellington: PCE. Available at [www.pce.parliament.nz](http://www.pce.parliament.nz)
- Sanford, W.E. and Pope, J.P. (2013). *Quantifying Groundwater's Role in Delaying Improvements to*

- Chesapeake Bay Water Quality. Environmental Science & Technology, 47, pp. 13330-13338*
- Sims, J.T. and Volk, J. (2013). Nutrient Management Strategies for the Chesapeake Bay Watershed, USA: In: Accurate and efficient use of nutrients on farms. (Eds L.D. Currie and C L. Christensen)*
- Occasional Report No. 26. Fertilizer and Lime Research Centre, Massey University, Palmerston North, New Zealand. [http://www.massey.ac.nz/~flrc/works\\_hops/13/paperlist13.htm](http://www.massey.ac.nz/~flrc/works_hops/13/paperlist13.htm) (accessed 10 November 2013)*
- Skelton, P. and Caygill, D. (2013). Plan to set water quality standards. Media Report. The Press. Monday 2 December. Christchurch, The Press, p. A13*
- Voulvoulis, N., Arpon, K.D. and Gikoumis, T. (2017). The EU Water Framework Directive: From great expectations to problems with implementation. Science of the Total Environment, 575: pp.358-366*