The Government's Fresh Water Policy

24 July 2014

REVISITED

The Morgan Foundation

The Government recently released its policy on water quality. It stated “More than 60 freshwater scientists from public, private and academic sectors across New Zealand have come up with numeric values proposed for the national standards.”

In an effort to understand the issues ourselves and validate the Government’s conclusions we revisited the process with our own invited science panel.

Our Rationale for the Revisit

Reports in the media hinted that the scientists’ views were not as aligned as the Government implied. We approached 16 eminent experts and offered them an opportunity to take part in a related process, one that was focused on informing the public of the state of the science. The offer was well received.

In the interest of the public getting full information we have created an opportunity for experts to share what they know about the current state of our freshwater resource. This was the same approach we took in determining the balance of scientific views around human-induced climate change in the book, Poles Apart. We set out to identify what the experts agreed on and separate those from the issues where a science-based perspective is more equivocal. With this information the public can act as a jury in forming a reasonable layperson’s view from the evidence presented.

Contrary to what the Government implied in releasing their fresh water policy, no policy process is left completely up to the experts. Experts can only tell us the best way to achieve the objectives that the public (through the government of the day) set out to achieve. This is not a problem in itself – we can’t leave it all up to the experts as they can’t make value judgements on our behalf. That is what the political process is for – decisions have to be made that are acceptable to the public.

The problem is that during the policymaking process the expert input gets jumbled together with the views of Ministers, stakeholders and policy advisers, and it is impossible to tell which points are based on science. In our view, wrapping this all up as one output is flawed – the public should be presented with the expert input in its unfiltered state so it is clear what choices Ministers and policy advisers have made in reaching their decision. Only then can members of the public can make up their own mind in an informed way, about whether to accept the Government’s proposal.

That is what we have tried to do with our panel process – to tease out the science from the value judgements. In doing this our objective is to inform the public and allow them to make a reasonable assessment of the policies being proposed.

One of the objectives settled upon by the policymakers was to protect the public from becoming ill when boating or wading (in other words, have “secondary contact”). Surveys suggest this does not represent the values of the New Zealand public, who overwhelmingly want to swim in their rivers,[1] and rate fresh water quality as the most important environmental issue facing the country.[2]

Secondly, in our opinion there is a large “fudge” embedded in the current policy objectives. While the government has signed up for water quality to be “maintained or improved” this must only be true “across a region”. Now what does that mean, how do you measure it, how do you compare one waterway's degradation to another's improvement? As loosely specified as this, it is unworkable.

It was within the context of these objectives that the experts involved in the government process had to work. In our exercise the scientists were free from any such constraints.

Our process

We assembled a panel of 16 experts from across industry, universities, consultants and public sector. The selection criterion was that all were leaders in their fields (as indicated by their publication records and peer reviews). In contrast to the government process we were not concerned to have representation from all the users of our waterways. We wanted experts picked on the merits of their freshwater expertise only. Our aim was to understand the state of the science, not as the government process was designed, to make policy decisions based upon a collaborative consensus from all the stakeholders – industry, scientists, iwi, NGOs, and policy advisers.

It was felt that the scientists must be free to talk science and not be at all constrained by the interests of their employers. As a result, all views were kept anonymous throughout the entire process – while participants knew who else was involved, no participant knew what views other particular participants were expressing. By mutual agreement we operated under the Chatham House rule – any view expressed by an expert was strictly confidential and there was no attribution of specific views to any particular scientist when reports were circulated.

We gathered the views of the experts across a range of issues and used them to stimulate debate across the group. Examples of the reports we circulated among the experts are available at http://garethsworld.com/myriver

We listened to the debate, and then just as a jury of reasonable laypeople would, we came up with an assessment of the recently announced policies.

The following conclusions are ours. They are reached as a result of the discussions, they are not attributable to any one of the participants.

Our Conclusions

1. The framework for setting government policy on freshwater as it stands is incomplete. Broader measures of ecosystem health and overall pollution impacts need to be added with urgency, such as the Macroinvertebrate Community Index. There needs to be greater national guidance for regions on setting algae limits, and what that means for appropriate nitrogen levels in that region or water catchment.

2. Further investment is needed in understanding and monitoring water quality. Until this happens we need to take the precautionary (least risky) approach to water management – not carry on with business as usual until a calamity befalls a waterway.

3. The Government policy to maintain or improve water quality 'across a region' is ambiguous and impossible to implement. This means it may not constrain, let alone halt degradation of waterways. Instead, in our view, the default option should be that every waterway should be maintained or improved, effective immediately. This should be measured through trends in the MCI (Macroinvertebrate Community Index) as a baseline of ecosystem health for that river.

4. With the national objective on each and every waterway set unconditionally as "maintain or improve", enabling an individual waterway's health to decline needs to be sanctioned by the local community. This is best achieved by the developer presenting to the community their evidence that the degradation their proposal will cause is worth the economic benefit.

What is the way forward?

Get involved with your local river and make your views known to our politicians.

As always, activism from a well-informed public is often the key to progress. A knowledgeable public can put enormous pressure on politicians to make changes for the better. So we recommend you read this document, become informed about the science and come to your own view on how the national objectives for managing fresh water should be set. Then let the politicians know what you think.

One aspect of the Government's policy that we support is the idea of community engagement – that communities can decide what they want from and for their rivers. It is great that people can get involved in their local water committees and decide the appropriate trade-off between water quality and economic development for their area.

We think the values of Kiwis would be better reflected if the national standards were set high and communities had to agree to lower them if they were desperate to chase more economic growth. This would put the onus of proof on developers to convince the local community that the economic benefits outweigh the environmental costs. The default option would be that we could swim in our waterways, rather than having to fight for that right.

OUR FINDINGS

The Value of Water

1. The value of water is different for different people – depending on what they use it for. However, for water to retain its value for future generations, we must make sure we don't push the ecosystems in our waterways past the point of no return. That is a non-negotiable responsibility to future generations that we believe we must accept.

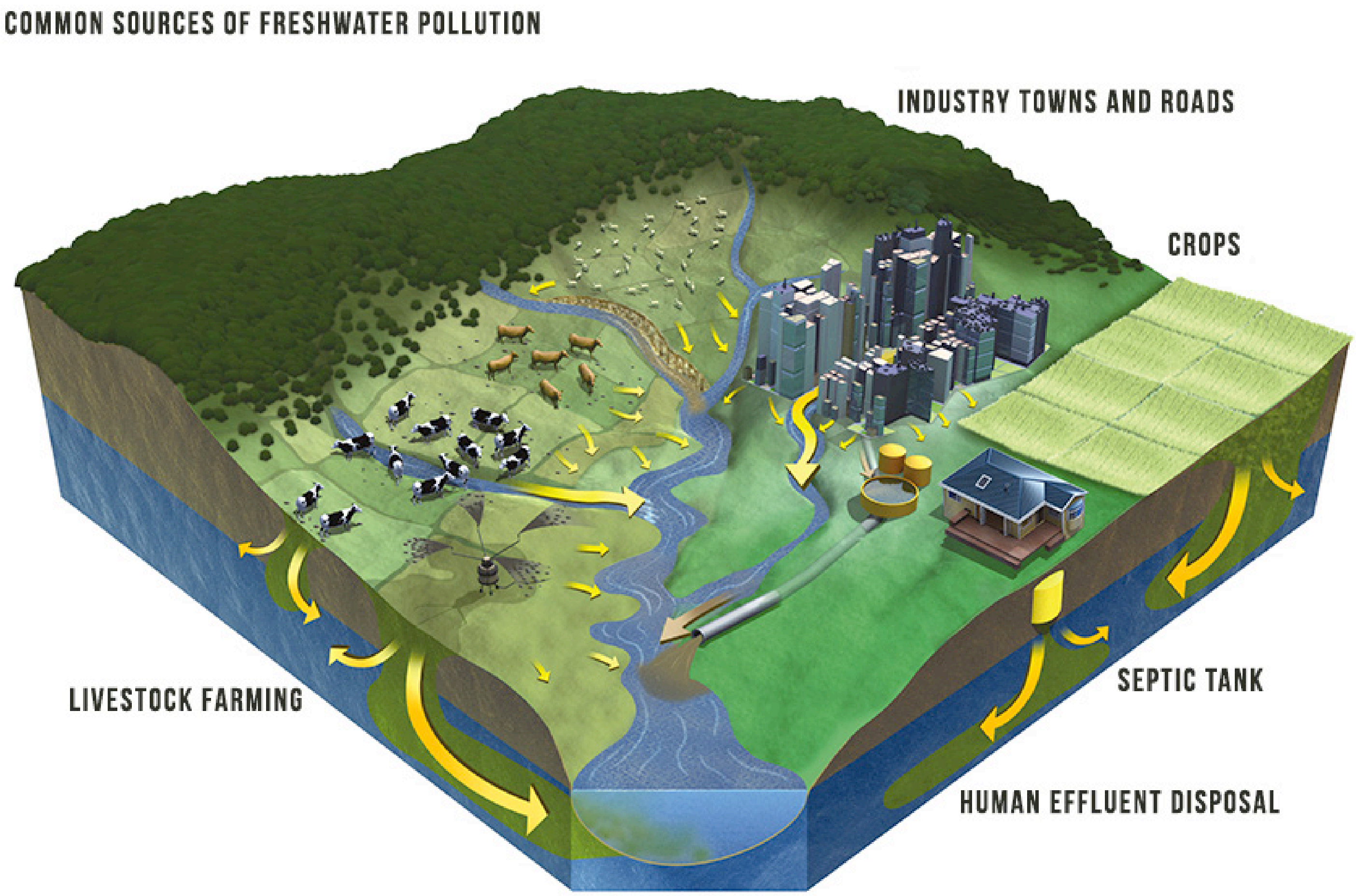
2. For rivers, the Macroinvertebrate Community Index (MCI) is the best single indicator we have of ecosystem health. We should use the MCI to assess whether or not we are protecting our waterways adequately for future generations.

The MCI is a measure of the stream life that can be found in a waterway. It's not simple to compare the MCI across different waterways because of natural variations. However, changes in a waterway's MCI are a pretty good guide of whether that particular waterway is getting healthier or sicker.

While invertebrates are included as an 'attribute' to be 'managed' in the Government's freshwater management policy, MCI is not specified as the indicator and there is no guidance on what population levels must be maintained as a 'bottom line'.

Historical Causes of Water Problems

3. Throughout our history many human actions have damaged our waterways. That is why water quality is poorer in areas developed for settlement and agriculture.



Source: Ministry for the Environment (2007)[5]

New Zealand has lost more than 90% of its wetlands[3]

New Zealand has lost more than 70% of its forest cover[4]

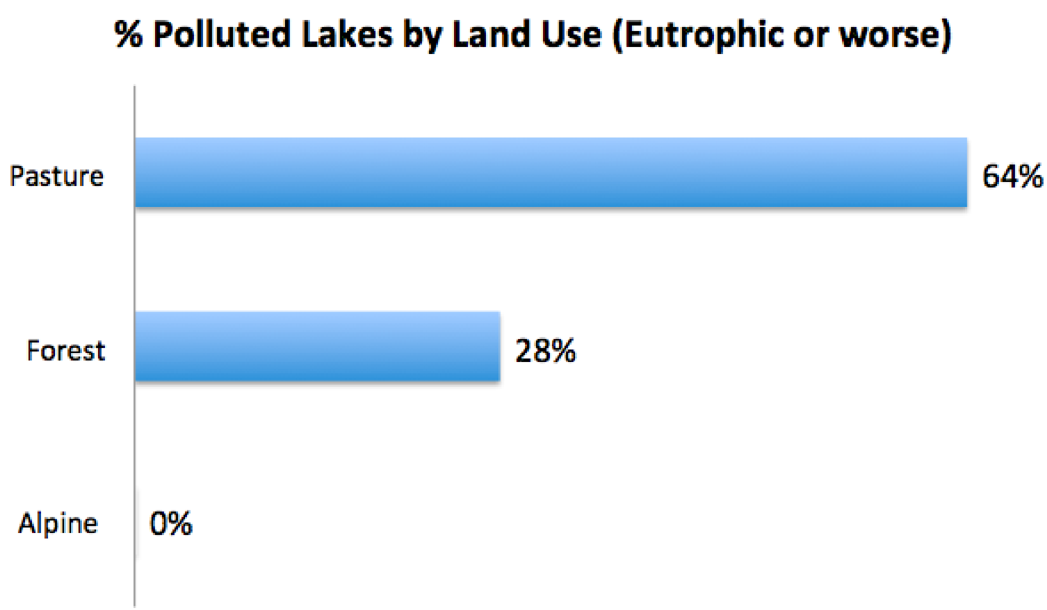
Source: Martin Wegmann, Mark Olive Dittrich, Donovan Govan

Water Quality Problems

4. There are many different kinds of water quality problems

    a. Soil can wash into waterways from land. Too much can block light in the water, harming life and making swimming unpleasant.
    b. Pathogens (of which E. coli, a bacteria in poo, is used as an indicator) can wash into the waterways, increasing the risk of infection to humans and animals in the water.
    c. Chemical contaminants can wash into waterways, poisoning creatures in the water.
    d. Altering the flow of the river can make life more difficult for creatures in the water.
    e. Removing plants on the side of rivers reduces shade (and increases the water temperature), and means there is nothing to filter the water entering the river or lake.
    f. Excess nutrients can wash off the land into waterways. Together with warmth and light, they can cause algal blooms that suck the oxygen out of water, killing the creatures there. Sometimes these algal blooms can include poisonous bacteria.
    g. In extreme levels nitrogen can also be toxic.

32% of lakes in New Zealand are polluted. This figure doubles if we exclude lakes in forested or alpine lakes and only include the areas impacted by human activity - farming or urban areas. [6]



In areas of intensive farming, nitrate levels are rising in our groundwater. In some places they are already above the WHO drinking standard (e.g. 9% of sites in the Waikato). [7,8,9,10]

Are Our Rivers Getting Better or Worse?

According to National Institute of Water and Atmospheric Research (NIWA) water quality of rivers is generally declining.[10] Again if we exclude alpine or forested region the biggest declines in water quality have been in areas of urban settlement and pastoral agriculture.

This is at odds with statements from the Ministry for the Environment (MFE)[11] : "Overall, concentrations of the nutrients and bacteria we monitor are either stable or improving at most monitored sites". These differing messages are made on the basis of slightly different datasets (the NIWA one is better), but still seem contradictory. We took a closer look.

MFE's phrase 'stable or improving' is misleading - the majority of rivers have no significant trend. That is not the same as stable, it may simply be that the data isn't robust enough to show a trend. Using their logic it would equally possible to claim "Overall, concentrations of the nutrients and bacteria we monitor are either stable or deteriorating at most monitored sites". This is an example of how policy advisors' interpretation can colour the evidence.

MFE data show positive trends in ammonia, phosphate and E. coli, which are reducing in more rivers than they are increasing. This may be due to better farming practices in someareas (such as fencing and planting river banks). However it should be noted that more rivers overall are still deteriorating than improving according to the crucial measure of ecosystem health: MCI.

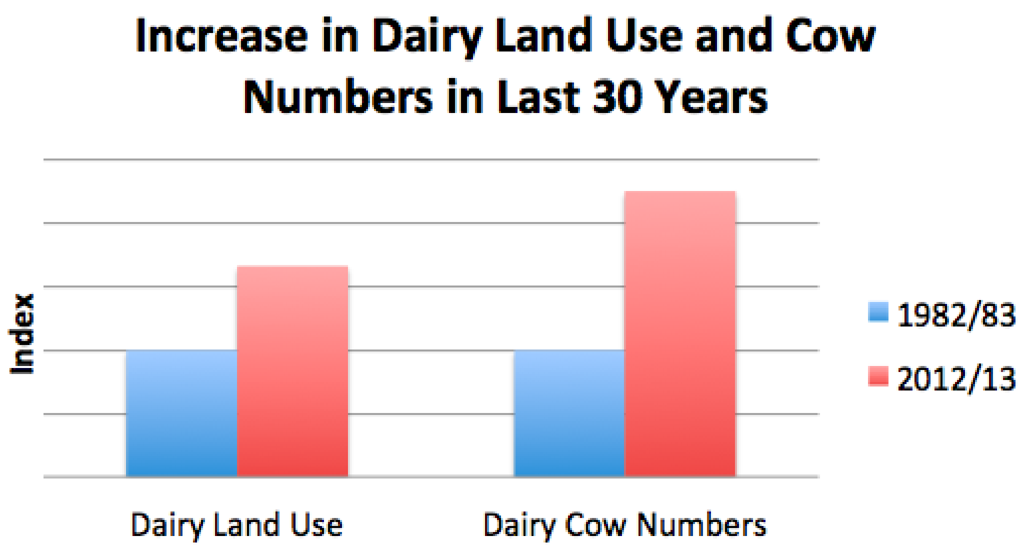
Source: BrewBooks Flickr

Current Causes of Water Quality Problems

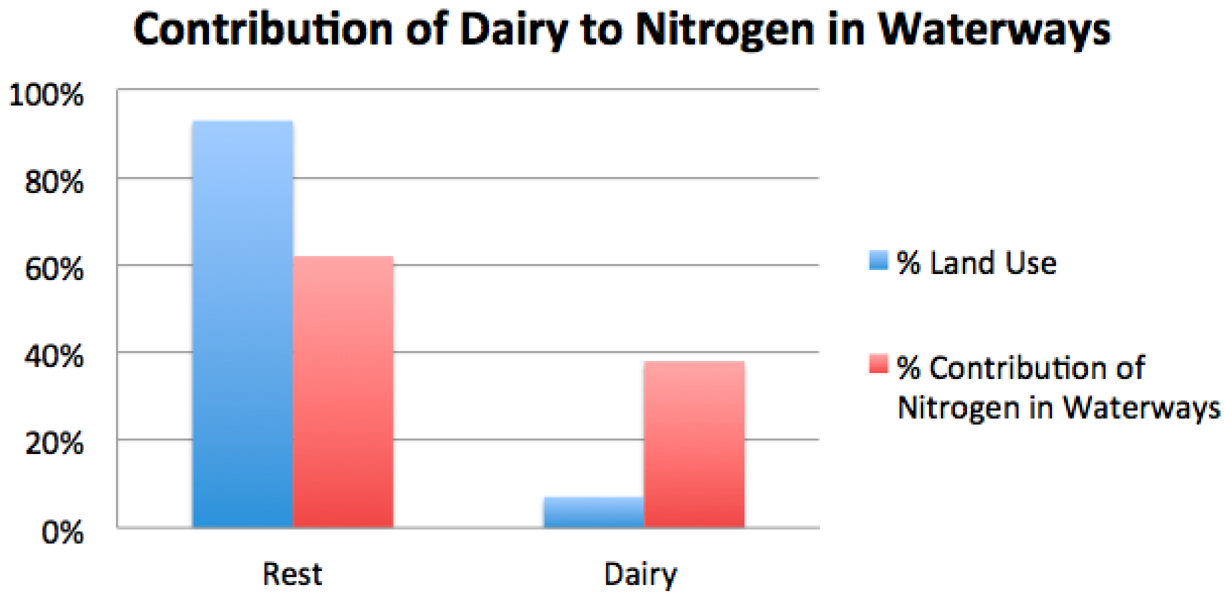
5. Given that the treatment of sewage and industrial discharges has improved in much of the country, the increased intensity of farming is the most likely cause of recent water quality deterioration. This is due to raised nutrient levels (particularly nitrogen), sediment and faecal bacteria in waterways, and the loss of habitat on riverbanks and within streams. More intensive farming has been made possible by the higher returns available from the big increase in global milk solid prices. These have made it rational to invest in irrigation, more fertilizer, and supplementary food for livestock. It may take years or decades to see the impact of current practices on water quality. [12] This is because nitrogen takes time to move through the soil and into waterways.

In the past thirty years dairy land use has risen by 66%, cow numbers 125%.

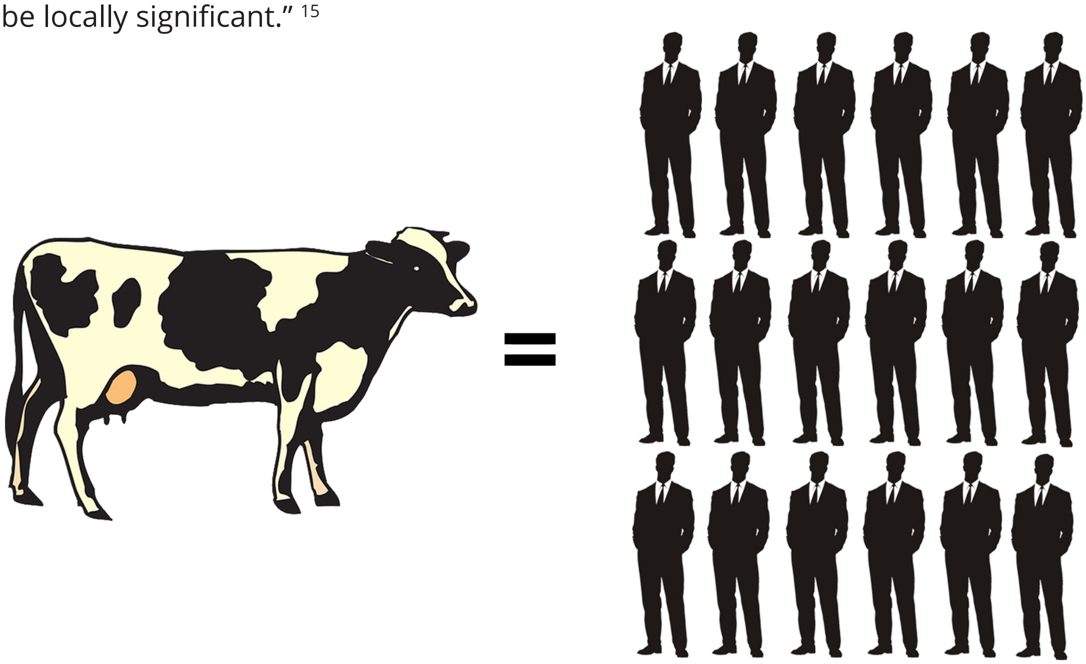
Between 1996 and 2008, dairy land use in Canterbury increased by 170%. This increased nitrogen leaching by 27%. [13]



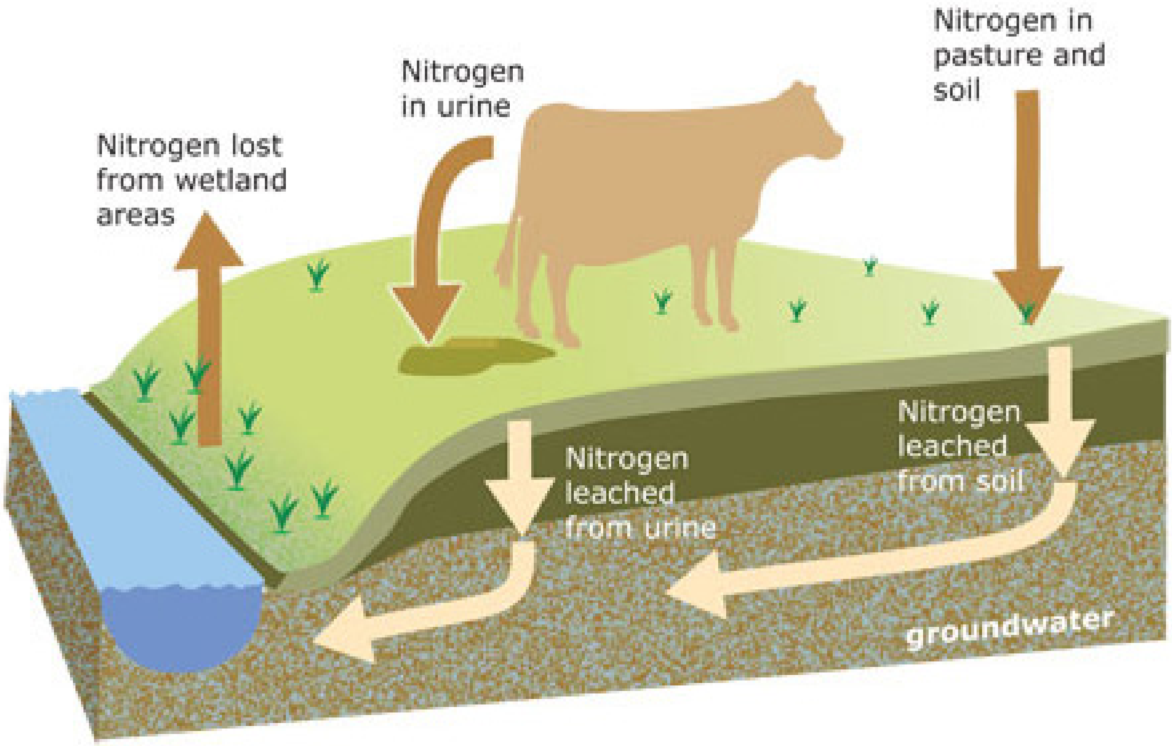
Dairy occupies about 7% of land area but contributes about 38% of nitrogen to waterways.[14]



Modeling by the Parliamentary Commissioner for the Environment 's office found: "diffuse sources (e.g. agriculture) now account for more than 95% of the nutrients that end up in fresh water, although discharge from 'point sources' – such as factories and town sewage – can be locally significant." [15]



Cows excrete about 18 times the amount of urine as humans, so [1] 6.4 million cows are the urine equivalent of 116 million humans – and this urine goes directly on the land untreated.



Source: Environment Waikato [16]

[1] Dairy cows excrete some 25 litres of urine per day, [1] while the amount for humans is about 1.37 litres on average. [1]

Farming Can be Sustainable and Profitable

6. There are ways to reduce the impact of farming on water quality, sometimes with little or no cost. [17] Using nutrients more efficiently can even improve profit and help the enviroment at the same time. Reducing the intensity of farming reduces production but also cuts cost, which means profits may not fall. It's also possible to reduce the impact of intensive farming, for example by using stand-off pads to collect effluent while cattle are resting.

Nutrients are valuable to farmers – they help grow grass. So letting nutrients leach into rivers is literally letting money go down the drain. Smart farmers are realising this and are doing everything they can to reduce the amount of nutrient loss. Improved management practices are reducing nutrient leaching and saving farmers' money. There is scope for improvement.[18]

With the substantial rise in the price of milk solids, revenue and even profits from more intensive farming have been stellar. However, increased intensity of farming greatly increases the potential for nutrient loss, and environmental damage, which only careful management and mitigation strategies can mitigate. The challenge is to limit that damage while still allowing for growth.

Setting limits to pollution in every catchment can help farmers achieve this. Farmers that want to increase production will have to find ways operate more efficiently, or offset any damage by making improvements elsewhere in the catchment. We can't eliminate the impact of farming on the environment, but if we are smart we can reduce it and continue to grow our economy.

New Zealand has a huge opportunity to be the world leader on this issue. Not only could we protect our '100% Pure' image and reputation for high quality food, but we have an opportunity to find innovative ways to farm sustainably. Our farmers led the world in phasing out subsidies, we could do the same again with farming in a manner that doesn't wreck water quality.

Government Policy Needs More Work

7. The Government's freshwater policy is a step forward. Until now there were no national bottom lines. However, more work is needed if we are going to successfully protect the quality of freshwater for future generations.

The indicators of water quality (proposed by the Government) are incomplete and need further development. This needs to be done as a matter of urgency. We must have the tools to confidently protect against further degradation of water quality in the areas where agriculture and industry operate and where almost all of us live.

The Government's recently defined bottom lines don't take account of some of the combined effects of different indicators. It's these combined effects that can spell trouble for a particular waterway.

It is also difficult to set limits across connected water bodies – for example rivers can connect lakes, wetlands, groundwater and estuaries. A certain limit may protect a river, but may not be enough to protect the lake it flows into. This is particularly a problem when water flows across regional council boundaries.

Example: Nitrogen

Nitrogen is a good example of combined impacts.

On its own, it's only nitrogen in high quantities that causes problems. This is known as nitrogen toxicity – when the nitrogen levels in water start to affect the animals living in it. The proposed upper limit (known confusingly as the "bottom line") of 6.9mg/L relates to the point where nitrogen toxicity stunts growth among the most sensitive 20% of species. Some scientists suggest this is too high a bar to define as toxicity, because nitrogen may have an impact on animals at lower levels. The analogy used is that an alcoholic is sick long before their liver fails. The WHO guideline for human drinking water is 11.3mg/L.

However, nitrogen is also a problem when it combines with other nutrients and produces algal blooms, which rob waterways of oxygen. In certain conditions (if phosphorus and light/warmth are present) nitrogen will contribute to algal blooms at much lower levels than toxicity.

It can be very difficult to know whether adding nitrogen to a waterway (by increasing dairy farming in the catchment for example) will result in algal blooms or not. By the time the results are clear in practice, it would be impossible to stop.

Where we got to: Broader ecosystem measures need to be added to the Government policy with urgency. There also needs to be greater national guidance for regions on setting algae limits, and what that means for appropriate nitrogen levels.

Monitoring and Managing Under Uncertainty

8. Managing our waterways is not easy; we need more investment in information and monitoring so that we know what is going on in the environment. Until we have good monitoring in place, we need to be more cautious in our approach.

As with climate science, there's broad agreement over the laboratory science of freshwater. However, out in the field measurement can be difficult, ecosystems have natural variation, and there can be time lags and uncertainties. More investment in information is required to manage water quality well. This includes for example comprehensive and timely monitoring of water quality, land use, off-takes and discharges and a reliable understanding of the ecological processes at work within catchments.

Top quality information will not always be available. This raises the issue of how to manage water in the absence of good quality data and uncertainty about ecological processes.

The precautionary principle is the international best practice approach to dealing with uncertainty, first recognised in the 1982 United Nations World Charter for Nature. It means that when we are faced with uncertainty, we should err on the side of protecting the environment. This recognizes that degrading the environment raises the risk of sudden, irreversible collapses of the ecosystem. The environment sometimes enters a new, altered state from which it cannot recover. This is the standard science argument for protecting biodiversity – because it is the best protection against shocks that is available.

Given the uncertainties in water management – time lags, measurement problems and the difficulties in getting a community consensus – the precautionary approach is appropriate. From a science perspective it is not appropriate to continue a business as usual approach in the face of deteriorating measures of water quality. However it is unclear whether precautionary approach should be embedded in the national bottom lines, or applied on a case-by-case basis.

Where we got to: From our 2011 review of fish resource management, http://garethsworld.com/blinkers/, we found that NZ's approach would have benefitted from being more precautionary from the outset. Given the degradation of our waterways it seems a logical approach for water management and should be integrated into national guidance on how to apply bottom lines.

Maintain or Improve Every Waterway?

9. The Government policy to maintain or improve 'across a region' is unclear and removes clarity from the challenge facing regional councils.

The current wording in Government policy ("overall quality of fresh water within a region is maintained or improved") is confusing. It implies that improvements in one river could be used to offset deterioration in another. However, it gives no guidance on how to measure any such offsets. It follows that the politicians and their advisers need to define precisely what "maintain or improve across a region means" and how it will be measured.

Without this clarity, waterways are set to continue to decline until they hit the current bottom lines. In our view we are seeing this now in Canterbury, where the catchments with the most serious water quality problems have now set limits, but development continues loosely checked if at all, in other catchments.

It is cheaper to keep the good waterways that we have than to fix the ones we have already degraded. This makes it important that the public can hold councils to account on the pledge to 'maintain or improve'.

Where we got to: ***Maintain or improve should be enforced for every waterway, effective immediately.*** *This would be measured through the MCI (Macroinvertebrate Community Index) as a baseline of ecosystem health for that river. Exceptions (enabling degradation of a waterway) can be countenanced but it needs to be explicitly sanctioned by the local community.*

What Do Our Findings Imply for the Future?

Given the need to maintain or improve all waterways, the necessity to adopt the precautionary approach and the uncertainties around combined effects of different nutrients, we need to be wary about further dairy conversions. It isn't enough for new dairy farms to simply use "good practice" (such as fencing and planting waterways) – they also need to offset the increased leaching of nutrients which is implied by an expansion of dairy land use.

This doesn't mean that further conversions are impossible. Dairy conversions would be less of a risk if all farms (including sheep/beef) in a catchment have fenced and planted waterways and have implemented soil conservation plans. This would reduce phosphorus and temperature levels in the waterways, which reduces the risk of increasing nitrogen levels (remember all three contribute to algal blooms). If nutrient trading schemes are put in place, farm profitability would become significantly more aligned with environmental protection.

Conversions

The PCE report projects that by 2020 another 370,300ha will be added to the dairy estate, that's a 25% increase. Canterbury will be a big part of that with 100,000ha likely to be converted to dairying between 2008 and 2020. Based on these projections, nitrogen loads in New Zealand rivers would increase by 6% by 2020, and in Canterbury by a further 15%.[20]

This modelling doesn't take into account the recent Government policy changes –this is down to how quickly Regional Councils react and how, if at all, communities are able to apply 'maintain or improve'.

The members of our panel were:

Dr Bob Wilcock— NIWA
Dr Roger Young – Cawthron Institute
Dr Rick Pridmore – Dairy NZ
Dr Mike Joy, Massey University
Dr Phil Mladenov – Fertiliser Manufacturers Association
Dr Alison Dewes – Agricultural consultant
Graham Sevicke-Jones – Greater Wellington Regional Council
Professor Jon Harding – University of Canterbury
Professor David Hamilton – University of Waikato
Dr Marc Schallenburg – University of Otago
Dr Rich McDowell – Agresearch
Shirley Hayward – Dairy NZ
Dr Clive Howard-Williams – NIWA
Professor Gillian Lewis, Auckland University
Ken Taylor – Environment Canterbury
Dr Mike Scarsbrook – Dairy NZ

Endnotes

1. Horizon Research (2014) Farming and the Environment. Conducted for Fish and Game New Zealand.
2. http://researcharchive.lincoln.ac.nz/bitstream/10182/5744/3/Perceptions_2013.pdf
3. http://www.teara.govt.nz/en/photograph/14612/wetland-restoration
4. http://www.teara.govt.nz/en/interactive/11674/deforestation-of-new-zealand
5. http://www.oag.govt.nz/2011/freshwater/part2.htm
6. Verburg, P., K. hamill, et al. (2010). Lake Water Quality in New Zealand 2010: Status and Trends. NIWA, Ministry for the Environment.
7. Daughney, C.J. & Wall, M. (2007). Groundwater quality in New Zealand: State and trends 1995-2006. GNS Science Consultancy Report 2007/23.
8. http://www.waikatoregion.govt.nz/Environment/Environmental-information/Environ mental-indicators/Freshwater/Groundwater/gw1-report/
9. http://ecan.govt.nz/publications/Reports/R0217.pdf
10. Ballantine, D. J. and R. J. Davies-Colley. 2009. Water quality trends at NRWQN sites for 1989-2007. Report, National Institute of Water & Atmospheric Research Ltd. Hamilton.
11. http://www.mfe.govt.nz/environmental-reporting/fresh-water/river-condition-indica tor/questions-and-answers.html
12. http://www.niwa.co.nz/publications/wa/water-atmosphere-1-july-2010/how-clean-are-our-rivers
13. Parliamentary Commissioner for the Environment (2013) Water quality in New Zea land: Land use and nutrient pollution. Report November 2013. http://www.pce.parlia ment.nz/publications/all-publications/water-quality-in-new-zealand-land-use-and-nu trient-pollution
14. McDowell, R.W., et al (2013) Assessment of Strategies to Mitigate the Impact or Loss of Contaminants from Agricultural Land to Fresh Waters. Report Prepared for MFE. RE500/2013/066.
15. Parliamentary Commissioner for the Environment (2013) Water quality in New Zea land: Land use and nutrient pollution. Report November 2013. http://www.pce.parlia ment.nz/publications/all-publications/water-quality-in-new-zealand-land-use-and-nu trient-pollution
16. http://www.waikatoregion.govt.nz/PageFiles/10480/Soil%20and%20water%20is sues.pdf
17. http://www.sciencedirect.com/science/article/pii/S1364815210001866
18. http://www.dairynz.co.nz/media/566864/economic_survey_2012-13.pdf
19. http://motu-www.motu.org.nz/wpapers/13_11.pdf
20. Parliamentary Commissioner for the Environment (2013) Water quality in New Zea land: Land use and nutrient pollution. Report November 2013. http://www.pce.parlia ment.nz/publications/all-publications/water-quality-in-new-zealand-land-use-and-nu trient-pollution