Parliamentary Commissioner for the Environment
Te Kaitiaki Taiao a Te Whare Pāremata

2018 River Awards

Numbers, numbers everywhere, but what are we to think?

Understanding the health of our freshwater environments

13 November 2018

- Dr Morgan Williams' brief for my comments this evening was: "We're collecting all sorts of data but are we making any progress?"

- This raises a number of questions for me:
  - What are we managing freshwater for in the first place?
  - What do we need to think about when thinking about freshwater systems?
  - How do we know how things are going?

- Let me start with what it is we are managing the environment *for*. If we were clear about that, it would presumably affect the research, monitoring and data collection that we do.

- There is a legislated explanation for why we manage fresh water. Councils have responsibilities under the RMA to manage natural and physical resources in a way or at a rate that sustains "the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations and safeguards the life-supporting capacity of air, water, soil, and ecosystems.

- Since I effectively wrote section 5, I should know what it means. Twenty-five years on I am less bullish about high level, sweeping statutory purpose clauses. They certainly can't resolve every policy or planning debate. But the RMA's purpose clause is not vacuous. I would argue that the overwhelming thrust of section 5 and its supporting definitions is about interconnected systems, ecosystems. It is all about the *whole* being more than the sum of its *parts*. Fine-grained policies relying on fine-grained monitoring could easily miss the mark.

- It seems to me that at the core of understanding and managing the natural environment are ideas about the resilience of natural systems so that they can provide the services and values on which life – including our own lives – depends.

- Meyer (1997) usefully defined a healthy river as "*an ecosystem that is sustainable and resilient, maintaining its ecological structure and function over time while continuing to meet societal needs and expectations.*"

- So when it comes to fresh water, what does thinking about resilience and services mean for research, information gathering and management?

- In the first place, it should help identify what knowledge we need to assess water quality and improve it, and what **knowledge gaps** may make the job harder. Having a clear understanding of what we are managing the environment for makes it easier to explicitly think about where the gaps in knowledge are, what the causes of those gaps are, and how these gaps affect our ability to manage the environment.

- We know there are lots of gaps in knowledge. Some useful data hasn't been collected at all – such as continuous dissolved oxygen concentrations in most streams and rivers. Averages or once-a-day readings are as good as useless if swings in dissolved oxygen mean that for several hours a day (say overnight when aquatic plants are not photosynthesizing) there is insufficient oxygen to support sensitive fish or invertebrate populations.

- Secondly, being clear about what we are managing for can provide **invaluable context** for deciding what 'healthy' means in the particular environmental circumstances in question. Let me illustrate with reference to the macro-invertebrate index – the MCI. It is an index that is widely used and seemingly well understood – certainly by people in this room. Put simply, a high MCI score means a stream is healthy, while a low MCI score means it is not.

- However, when we look a bit deeper, it's not quite as straightforward as that. The MCI was developed to indicate organic enrichment in one type of waterway – the ring plain streams of Mount Taranaki. It doesn't work as well in other types of waterways, and under different stressors. So a low MCI score could mean an enriched lowland Taranaki stream, but the same MCI score could indicate an unmodified coastal stream in Northland. And by the way, just before anyone here breaks out in celebration about high MCI scores, I note that there's no equivalent index that tells us about the health of estuarine and receiving coastal environments. If pollutants are all rushing down to the coast, we are just displacing the problem…

- If you step back and think about ecosystem functioning or health in a stream, then what's really important are things like the relative changes in the stream community, rather than a single number from an index. And if you ask that question, you'll start to become more interested in things like the difference between a sampled community composition and the expected community composition predicted from a model – rather than an MCI score. Of course this leads to more science questions and possibly more data gaps, but at least you would be asking the right questions.

- Used intelligently, indicators should help us keep asking good questions about what is actually happening to stream health in its fullest sense. Water is complex and views on the state of it can be poles apart – the same set of rivers and lakes may be described among the best in the world, or going to hell in a hand cart by different commentators. What can indicators tell us? There are broadly three types.

- The most useful indicators will provide direct evidence of ecosystem health and function, like the macro-invertebrate index I've mentioned.

- Proxies for health and function make the next best sort of indicator. Take dissolved oxygen again. Fish, invertebrates, bacteria and plants need dissolved oxygen. Its level will decrease when nutrient levels rise, promoting excessive plant and algae growth. Despite this being an important proxy for the health and functioning of freshwater ecosystems it is still missing from the national objectives framework, except on rivers below point sources. This means there is no obligation to measure it, or any obligation to ensure the levels are such as to ensure ecosystem health.

- Indicators of single parameters, like nitrate concentrations or clarity, tell us the least about health status in a holistic sense. But that's not an argument for ignoring them for at least three reasons. They can provide:
  - early warning that wider stream health may be at risk
  - evidence of compliance problems
  - at least partial diagnosis of the causes of poor stream health.

- I note that the judging for the most improved river award each year selects from one of four key water quality indicators – nitrogen, phosphorus, *E. coli* and MCI – and looks at trends. This year you chose phosphorus. I must say I find this a bit curious – if it's healthy rivers that can support life that we're interested in, a single indicator can't establish that. Of the four indicators, I, for my part, am most interested in what *E. coli* and MCI have to tell us.

- So if we get closer to the question Morgan asked me to address – "are we making any progress?" – there is still one more issue: the data we have, has been analysed and displayed in different ways by different organisations. All of which can leave a concerned member of the community confused about what is actually going on.

- Notwithstanding that, if we take a step back, what we see across multiple analyses are some specific patterns in changes in water quality. Some are good and some not so good. If I start with improvements, trends relating to the removal of point sources, and in some places a reduction in erosion (Horizons SLUI study) appear to be moving in the right direction. This is encouraging since it shows that we can do things when we put our minds to it.

- It is also great to see so many examples of local-scale improvements from fencing, replanting to increasing shading and habitat, and other initiatives – the very sorts of things these awards celebrate. But, and there is as always, a 'but', we are also seeing significant environmental degradation in some values.

- Intensification of rural land use has affected MCI in surface waters, and led to increases in nitrate and *E.coli* in ground water. We also know that many urban streams are in dire health, with high concentrations of metals and pathogens in particular.

- I would also like to put in a word here for the very bottom of the catchment. The place that all these contaminants end up is the estuaries and coastal habitats that many of us value, but which have been the poor cousins of catchment management. I will have some work to report on the value of estuaries and the pressures facing them next year.

- Some of these negative trends need serious intervention to reverse them, or they need an explicit conversation that transparently explains why we are not prepared to do enough to reverse the effect.

- Finally, if there is clarity about what it is we are trying to manage, we can start to **communicate the value** of research and data collection to politicians, councillors, and tax- and rate-payers. Ecosystems are complex. They make links between things that might not seem on the surface to be connected. This can be a challenge to communicate.

- I was reminded of that last week when I addressed the Grasslands Association conference and asked the roughly 300 people present how many had sighted the Land Domain report that came out in April. It was an audience of land users, scientists and many other working with sustainable land management. Just two hands went up – which is sobering. In reviewing the environmental reporting framework next year, one question I will be asking is what are we collecting all this information for if no one is reading it?

- Equally sobering was the report's long list of data gaps, which were eloquently recorded in a special table. We probably have more information about the water domain but that doesn't make it any easier to communicate. I think we have to turn the challenge into an opportunity.

- Speaking as a former politician, my experience is that people react in a rather binary like/don't like, good/bad, way to decontextualized data points – if they can be bothered to take an interest. If water quality is poor according to one measure, it will either be ammunition in the hands of one group or a bullet to be dodged on the part of another.

- But complexity makes that harder. It often involves a story about inter-relationships that don't lead to simple conclusions or solutions. In my experience, people like a puzzle if you can engage them with it. And it can create a constituency for finding out more.

- Complexity invites enquiry. Making the case for really good science is easier if it's being commissioned to answer really interesting questions. And it is really interesting questions and the challenge of answering them that inspire landowners and communities to involve themselves in what will inevitably be a long, slow road to restoring water quality.

- Awards like these are proof that there is a great will across the country to look after our waterways. I commend all of you here tonight for your efforts. I invite you to go on collecting more and better data and using it to ask the hard questions about whether we really are making progress towards healthier rivers and if not, why not.