



28 November 2024

How can ecology shape the world of policy more effectively?

Thank you for inviting me to come along to your conference.

I want to begin by saying that I am not an expert in ecology. My academic training was in literature, law and philosophy. That may sound ominously irrelevant to some of you. The world is full of PPE types who have upended all manner of institutions they know nothing about. But when I tell you that my honours thesis in law was about the treatment of geothermal waters in New Zealand and that my first political activity was trying to save the geysers here in Rotorua and stop drilling near Waimangu, you may believe me when I say that a career I would equally have relished was in earth sciences; and perhaps you might take heart when I tell you that when I was studying political philosophy at Oxford, one of my key missions was to unearth Jim Lovelock – the Gaia hypothesis man - in the remote depths of Somerset.

Almost from that day to this I have worked at the intersection of environmental science and policy. I need to understand both the biophysical dynamics of environmental issues and how these issues are managed through our environmental regulations and legislation. My current role asks me to keep under review our system of environmental management.

The theme of this conference is ‘How ecology shapes our world’. Ecologists understand better than anyone that the environment is a complex living system. You have the insights to explain what is happening and provide informed input into how we respond. I believe ecology should inform the world of environmental policy. Whether it shapes that world or not will depend on how it is communicated.

The integration of science into policy is not an easy process. The uncertainty and complexity inherent in scientific understanding, does not easily translate into rules and regulations. And I know that this can cause significant frustration amongst scientists.

It may help to think about the world of policy-making as a bit like an ecosystem. Instead of complex interactions between biota and physical earth processes, environmental policy making navigates the complex interactions between the physical world and the economic, social and cultural worlds we inhabit. It would be naïve to believe that these are any less complex.

Policy is at its heart about trade-offs and different balances between all those systems.

Science is a critical input into good policy making, but it is not some sort of trump card that can be played to win every argument. It can be intensely frustrating and perplexing when politicians make decisions that you, as scientists, don't think reflect the best science. Or worse, wilfully choose not to listen. That does happen. But in my experience politicians are usually prey to less malignant calculations: rather, they are constantly challenged to balance a range of often conflicting interests.



You may find that disheartening but I would encourage you to persist. If no-one is patiently and persistently seeking to communicate ecological science in all its complexity, policy outcomes are likely to be even worse.

Politicians often lack the capacity to communicate the complexity of what it is they're dealing with – a dilemma that is not unknown to scientists. The same goes for communicating uncertainty which, in an adversarial political world, is swiftly pounced upon as a sign of weakness. Uncertainty is often interpreted as evidence that the underlying science is poor.

It is usually fair to say that more science, more monitoring and more modelling can reduce uncertainty – I'm constantly pointing this out. But we will rarely know enough to eliminate uncertainty entirely. It can be tempting to allow uncertainty to invite such caution that an audience is reduced to a feeling of hopelessness that any conclusions can be drawn.

On the other hand, airbrushing uncertainty away for fear of undermining the case for action is equally perilous. For at least two decades now I have listened to people warn against climate doom-mongering because it is a 'turn-off'. There are good grounds for being gravely concerned - the impacts of climatic disruption are being felt and are getting worse. But it is equally true that we don't know how it will unfold, in the same way that we don't know how social and political institutions will in turn be disrupted by it.

All I can say is that none of you should be afraid to convey uncertainty. But you need to put as much thought into considering how you communicate that uncertainty so that it is not misconstrued by policy-makers.

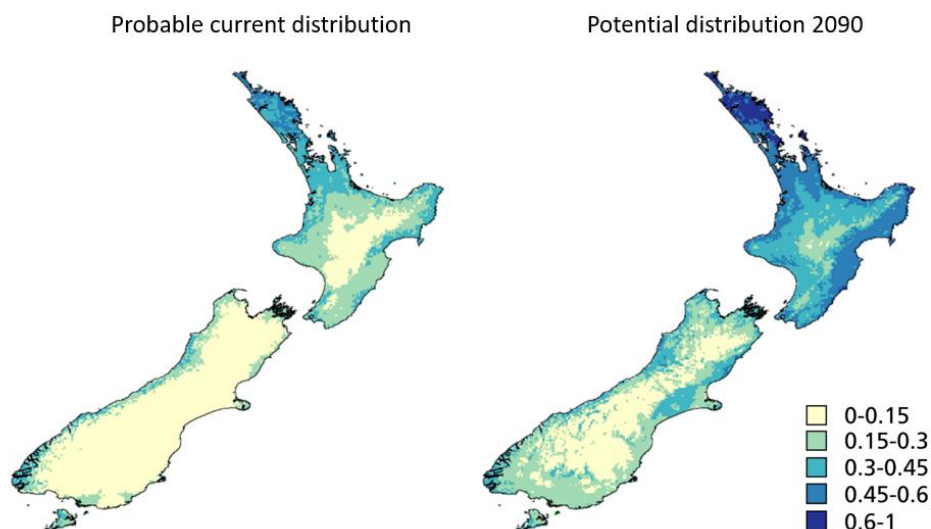
I'd like to discuss two critical roles that I see ecologists playing in informing environmental policy and provide examples of how ecology has helped to inform my work.

Understanding the dynamics of complex living processes

In the first place, ecologists play a vital role helping people to understand the processes and dynamics of the living world they are part of. A few years ago, I conducted a review of how well we are managing weeds that threaten our native ecosystems. Its short title was 'Space Invaders' - a catchy, but accurate description of how exotic plants operate in native ecosystems. Significantly, it was the ecologist in my team who thought of that title. The other best descriptor we stumbled across came from an Irish ecologist, Yvonne Buckley, who came up with the brilliant image of the 'weed-shaped hole' to illustrate the effects of so many poorly conceived weed campaigns.

While the report was a review of how these weeds are currently prioritised, managed and regulated, we prefaced it with a discussion of the dynamics of exotic plant invasion and the current state of weediness within our native ecosystems. We looked to ecology to explain how different management approaches are needed depending on where an exotic plant species falls on the invasion curve.

We also discussed how shifts in ecology – caused by climate change and land use change – could alter the risks posed by weed invasion. The north of New Zealand already harbours a large pool of exotic plants whose range will be easily extended by climate change. Some 1,800 exotic, subtropical plant species are ready to 'jump the fence'.



Adapted from Sheppard, 2013.

This figure shows the probability of common guava being able to grow around New Zealand in the current climate (left) and its potential future distribution in 2090 (right).

I won't go into the results of the enquiry – you can read it if you're interested. Some of you may already have done so. But it's a report that couldn't have been written without ecologists and neither can improvements to the system be made without them.

Some of the hardest calls involve how we prioritise scarce resources to manage some of these weeds. The reality is that we simply can't manage all the weeds that threaten our native ecosystems. Prioritisation is a fraught business – and can often lead to disagreement between experts. Disagreements are fine but they too have to be communicated clearly. Otherwise, they can be used to prevent anything from happening. Presenting complex problems without explaining trade-offs between various options or offering pragmatic suggestions is of little help to policymakers.

Big data and AI is allowing for ever greater understanding of environmental complexity. How useful insights from this information will be in influencing policy will, once again, depend on how it's communicated. If policy makers are left feeling that ecology links everything to everything else and that more research simply reveals more complexity, there is a risk they will glaze over and walk away.

Humans are a subset of the environment

The second role I see for ecologists in environmental policy is insisting **that people – our communities, economies, and culture - are a subset of the environment and not separate from it.** This perspective encourages a more integrated, holistic approach to policy.

Here I would point to my recent report on land use change, *Going with the grain*, as an example. The report argues that our current environmental policy direction has done little to improve the quality of our rural environment over recent decades. Greenhouse gas emissions have increased, water quality continues to decline and biodiversity is being lost at alarming rates.



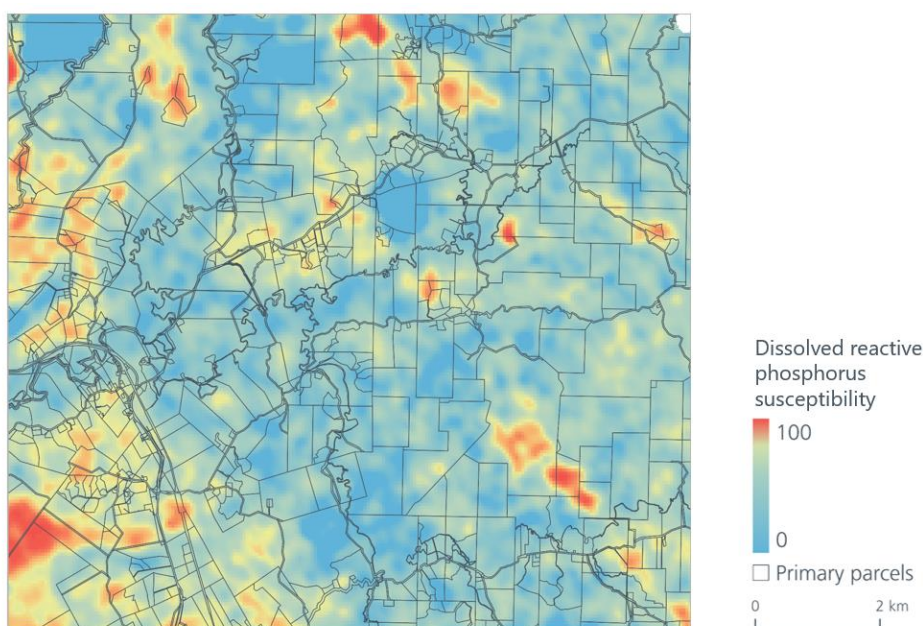
One of the reasons for these failures identified in the report is that environmental challenges like climate mitigation, climate adaptation, freshwater quality and biodiversity have been treated by policymakers as a series of technical problems with discrete solutions. This has resulted in a mass of sometimes contradictory, sometimes overlapping policies. As this patchwork of policies expands and changes, it is becoming increasingly difficult for land users and mana whenua to navigate them; and increasingly challenging for officials from different ministries to coordinate the moving parts.

This siloed approach can also cause unintended negative consequences. For example, the current strong focus on offsetting carbon emissions with fast-growing monoculture forests may improve freshwater quality in the short-term, but in the long-term it could negatively impact indigenous biodiversity and climate change adaptation, not to mention local communities and economies. It is also a very risky place to store carbon in a warming world with more intense weather events.

Another limitation of our current environmental policy approach identified in the report is that we are largely trying to manage environmental issues at the individual property-level. But environmental problems do not respect property boundaries.

Streams and sub-surface flows move across properties; birds and insects migrate across boundary lines; so do pests and weeds. Each landowner is technically responsible for the flows of contaminants lost from their land, often regardless of the fate and cumulative effects of these pollutants once they cross the property boundary or seep beneath the root zone.

Water quality is an obvious example here. When you look at the physiographic properties of the land there will often be a mismatch between where the problems are focused and property boundaries. In the absence of cooperation with neighbours and others sharing the same catchment, any individual can only have a limited impact on improving freshwater quality. Some will need to do more than others even if everyone benefits. Here is a close-up of part of the Wairoa catchment in Northland. Here we have the property boundaries and here is a map of dissolved reactive phosphorus susceptibility. As you can see, the problems don't neatly map property boundaries.





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

Our current regulatory approach is very much focused on individual properties implementing one-size fits all policies. As the slide shows, some properties are more high-risk than others. Each property owner doing the same small thing may not provide the best bang for our buck.

We might in some cases be able to achieve better outcomes by targeting just a subset of properties with tougher actions or even buying them out altogether. Doing so would require collective action and funding because everyone in the catchment benefits so everyone should be expected to contribute to the action.

I suggested that we change our view from the property-level to catchment or sub-catchment level when considering solutions. Most environmental issues that relate to how we use the land – climate adaptation, water quality and quantity, pests and weeds are best managed at this level. The exception here is methane emissions which are pretty much the same wherever they occur and lend themselves to national treatment.

The environmental issues facing catchments across New Zealand are very different – and even within catchments there are environmental hot spots where particular land uses in particular places have an outsized impact on the landscape. Solutions for each catchment cannot be one-size-fits-all dictated nationally from Wellington, but ones that are appropriate to the landscape and also ones the people living there can live with.

To ensure this happens, I suggested a different management approach – one in which humans – our communities and economies – are challenged to come up with practical measures that run with the grain of the ecosystems with which they intersect.

I recommended a rebalancing of decision-making. In brief, this means the direction of environmental policy would be set by central and regional government in consultation with local people, but the implementation of this policy would be determined by local communities and mana whenua – through catchment groups or other similar bodies.

But to be able to make land use decisions, catchment groups and all regulatory bodies need access to free, high quality environmental information. This is a point that I come back to time and again – the dearth of accessible environmental data is a major barrier to better environmental management. I argue that central government should be responsible for collecting and disseminating this information as a public good.

I can't resist noting that when it comes to our greenhouse gas emissions, our data, institutions and policies are better mainly because we've signed international agreements that bind us to report in a common format. As a result, we can quantify the lack of progress we are making – and the absurdly high level of reliance we place on planting pine trees which is no solution at all.

Finally, I think we have to be upfront about the cost of land use changes and who will pay. It will be costly, and we need to look at various financial options – land use intensity taxes or forms of biodiversity credits could play a role here.

These suggestions might be unpalatable to some of you. You may consider that the only way to produce the environmental outcomes we want is to impose them from the top down. But we have been trying to do this for decades and it isn't shifting the dial. There may be concerns about how



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

catchment groups will implement land use change in a way that protects our environment. What if a catchment community decides to give itself a leave pass and avoid the hard decisions? These are reasonable concerns and my report suggests ways to ensure regulatory backstops. Environmental outcomes can't be optional nice-to-haves.

But I maintain that those closest to the land must be incentivised to find solutions. As I noted earlier, it is clear that our current approach to environmental policy does not adequately consider the connectedness and complexity of our landscapes. Fundamentally, this disconnection stems from how humans live within nature. As a species we seem to be very good at focusing on the short term, especially when there's a crisis. Our policies often reflect this. But as I mentioned earlier, ecology can help us shift our view.

In *Going with the grain*, I advocated environmental policy that takes an integrated and adaptive approach. By integrated, I mean looking at the impacts of land uses, and changes to those land uses, all at once. By considering policies together the results of trade-offs become clearer. For instance, our modelling found that by sacrificing some of the short-term benefits of carbon sequestration, it was possible to create a more diverse landscape with reinforcing environmental benefits.

By adaptive, I mean understanding that natural environments are complex systems with all sorts of feedback loops, so any process of change should be undertaken in the full knowledge that there will be a need for constant adjustments as we learn more about the way those complex systems respond to change. Simply put, we must continually adapt our land management in ways that go with the grain of the land.

Ecologists live with the knowledge that the natural world is constantly changing and adapting and that the perturbations we have set in train mean that we in turn face adaptation on a scale and within a timeframe for which we have no culturally received experience. Reaching a consensus on how we should respond to the 'wicked' environmental problems we face is where the disconnect between science and policy is most marked. There are multiple unique solutions, each representing a different set of trade-offs and none of them perfect.

Policymakers synthesise views from a range of sources, including science but ultimately what they do has to be implementable within the social, cultural and political norms we live by. Those norms aren't immutable. But if policy makers can't explain why they need to change, they will be rejected.

So, when considering how ecology could contribute to shaping policy – my advice to you is to learn something about the dynamics and intricacies of the policy world. Consider the tools policymakers use, learn about the other sources influencing their decision-making. Present your findings in a way that clearly lays out trade-offs and consequences without compromising the science or skating over uncertainties. Conveying the likelihood and possible consequences of tipping points comes to mind here.

Almost certainly, you will find yourself having to live with compromise solutions that reflect other trade-offs decision makers make. Political choices will not always be environmentally optimal from a science perspective, but the result will be much better than if you hadn't engaged in the process at all. As my predecessor Dame Jan Wright is alleged to have said on many occasions: we mustn't let the perfect be the enemy of the good.