



# State of the Nation's Environment Address at Lincoln University

19 November 2025

## What we don't know about the state of New Zealand's environment – and does it matter?

Thank you for inviting me to speak at this event which is timed to celebrate fifty years' teaching of environmental studies at Lincoln University. I'm not going to take the risk of nominating particular trail blazers for environmental science who have issued from these precincts. But I can't resist noting two intersections between my own life and people who are or have been important to Lincoln University.

In the first place, can I acknowledge the current Vice Chancellor as a fellow Rhodes Scholar. I went to Oxford to read political philosophy. Professor Grant Edwards went to study behavioural ecology. I have no doubt which one proved to be the more useful endeavour! Secondly, can I pay tribute to my predecessor, Helen Hughes, who was the very first Parliamentary Commissioner for the Environment, appointed in 1987. Helen was one of the first two people to be awarded honorary doctorates by the newly independent Lincoln University in 1993. Helen died almost a year ago to this day. She made a profound contribution to New Zealand and Lincoln's recognition of her was richly deserved.

I have come to talk to you today about what we know and what we don't know about the state of the New Zealand environment. Back in 1997, as Minister for the Environment, I was responsible for producing New Zealand's first ever State of the Environment Report. It was a 655-page encyclopaedia stuffed with really fascinating material. Among other things, the report assembled a table summarising the state of our environmental data. Many of the identified gaps remain unfilled to this day.

Ten years later, one of my successors, Trevor Mallard, released the second *State of the Environment Report*. That report was almost as voluminous at 460 pages.

Then, Nick Smith designed and Amy Adams passed the Environmental Reporting Act 2015 with the purpose of requiring regular reports on New Zealand's environment. The Act set up a hamster wheel production line requiring domain reports every six months with a synthesis report every three years. Ten years on, in November 2025, we have completed three cycles of five domain reports and a synthesis report. We're now into the fourth cycle. It's a never-ending treadmill!

While the frequency of reporting on the state of New Zealand's environment has increased, many gaps still bedevil our understanding. That's not surprising. The Minister who passed the Act that set the hamster wheel in motion assured her cabinet colleagues that the aim of the exercise was not to devote more resource to gathering information. It was just about publishing what we already had. Almost 30 years after the first state of the environment report, our picture of the state of our environment is still riddled with gaps.

So, what do we know and what do we not know about the state of New Zealand's environment?

We know that: New Zealand's environment is diverse and complex, characterised by a varied climate, unique biodiversity, and distinct land and marine features. The climate ranges from subtropical to temperate and is influenced by mountains that create dry and wet regions, resulting in moderate temperatures and high rainfall. The country is a hotspot for endemic species on land and in the sea, though many are threatened with extinction, and there are ongoing environmental pressures, like pollution, habitat loss and climate change...

However, when you dig deeper, there are many things that we don't know. Significant data and knowledge gaps bedevil our understanding.

Take **biodiversity** for example. Our understanding of the state and trend of our native biodiversity remains patchy. Many species have not even been named. Have a look at this slide, which shows an approximation of the likely number of major groups of flora and fauna in New Zealand. As you can see, we have described around 21,600 invertebrate species, but there may be more than twice that number. For fungi, we have described 8,000 or so here, but there may be as many as 32,000 and it is hard to know which are native or not. For vertebrates and other related species, we've identified about 1,700 but there may be as many as 2,600. Maybe that's because we don't really know so much about what's out to sea. We have described 700 bacteria, but again it is hard to say which are actually native and the true number is simply unknown. Protozoa paint a similar picture – we have described about half of what there may be – 500 out of 1,100<sup>1</sup>

When it comes to plants, there may be as many as 8,600. Roughly half of these are algae and moss. For vascular plants, DOC provides a very precise total of 2,844!<sup>2</sup> But it's a number that continues to grow as new discoveries are made.

Successive attempts to gather better information on our biodiversity, especially on private land, have foundered. For example, in the early 1980s, a Protected Natural Areas Programme was established to survey all 268 ecological districts in New Zealand.

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<sup>1</sup> Gordon, DP, 2013. New Zealand's genetic diversity. In Dymond JR ed. Ecosystem services in New Zealand – conditions and trends. Manaaki Whenua Press, Lincoln, New Zealand. [https://www.landcareresearch.co.nz/assets/Publications/Ecosystem-services-in-New-Zealand/1\\_13\\_Gordon.pdf](https://www.landcareresearch.co.nz/assets/Publications/Ecosystem-services-in-New-Zealand/1_13_Gordon.pdf)

<sup>2</sup> DOC, 2020. Biodiversity in Aotearoa: an overview of state, trends and pressures. <https://www.doc.govt.nz/globalassets/documents/conservation/biodiversity/anzbs-2020-biodiversity-report.pdf#page=5.13>

The idea was to identify and protect a representative sample of all natural ecosystems. These surveys identified Recommended Areas for Protection (RAPs). After two decades, the programme was quietly shelved having got through just 95 or so of the 268 districts. A successor initiative was the identification of Significant Natural Areas by local councils under the RMA.

From the outset, it was opposed by some landowners who regarded it as an infringement of their property rights. Iwi have been similarly aggrieved seeing the initiative as one that cuts across rangatiratanga and tikanga. After a further two decades, that effort also seems to be grinding to a halt with the Government suspending any further surveys for three years.

One of my interests has been trying to understand the risks posed by weeds, particularly those that pose a risk to native ecosystems. In my 2021 report, *Space Invaders*, I described an information base that is at best patchy. It is unclear exactly how many exotic plant species there are in New Zealand. There is no up-to-date and authoritative list of plant species growing in New Zealand.

This poses a number of challenges.<sup>3</sup> If we don't know what's here, how can we say what may be new to New Zealand? We obviously need to know what's here if we're going to be able to respond appropriately to new arrivals. But sometimes we want to know what's here so that we don't end up trying to prevent the importation of plants already here.

Fundamental knowledge gaps around **soil health**, including the factors that affect soil structure and functioning under different land uses, are particularly worrisome. Soil is one of our greatest natural assets. It is also a non-renewable resource.

One important knowledge gap relates to New Zealand's soil biodiversity, which extends from basic information regarding the distribution and health of these communities through to their various functions and contributions to soil quality. Further, the impacts of primary sector land use on soil microbes and invertebrates are unclear. Other knowledge gaps relate to the extent and impact of contaminants including pesticide residues and microplastics.<sup>4</sup>

These knowledge gaps make it difficult to determine the impact of land use activities on the various dimensions of soil quality, including chemical, biological and physical properties. While these gaps pose an environmental risk, the consequences are also economic. These impacts have the potential to undermine the productive capacity of New Zealand's soil resources and the production of agricultural, horticultural and forestry products. These deficiencies in our knowledge base present a risk to New

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<sup>3</sup> PCE, 2021. *Space invaders: A review of how New Zealand manages weeds that threaten native ecosystems*. <https://pce.parliament.nz/publications/space-invaders-managing-weeds-that-threaten-native-ecosystems/>

<sup>4</sup> McCarthy et al. (2025). *Resource use and waste generation in Aotearoa New Zealand: Filling (some) gaps*. <https://pce.parliament.nz/publications/resource-use-and-waste-generation-in-aotearoa-filling-some-gaps/>

Zealand’s primary sector industries – industries that provide an important source of economic output and foreign exchange earnings.

Which leads me to ask: why is environmental information important?

Before I answer that, let me acknowledge three things up front:

- We will never have perfect information about our environment – there will always be more questions to be answered.
- Having environmental information doesn’t automatically mean it will be used. People screen out what they don’t want to hear.
- Sometimes all the information we can gather tells us little more than the extent of what we don’t know – and that can be radical. Some of the more novel and controversial fast track projects are revealing this. Proposing seabed mining in a marine environment such as the Taranaki bight runs up immediately against huge gaps in our understanding of what may be at stake. But if we don’t have a comprehensive and detailed understanding of the ecosystems out there in the Taranaki bight, how can we hope to understand the cumulative effects of mining?

So why is it worth persisting? I have reached a number of conclusions about why better environmental information is important.

**Firstly, what you don’t know can really hurt you.** The well-publicised Havelock North drinking water affair provides a tragic example of what can arise from a poor understanding of groundwater systems. The Government’s inquiry into the event found that “the Regional Council’s knowledge and awareness of aquifer and catchment contamination risks near Brookvale Road fell below required standards”. In other words, poor knowledge of the groundwater system meant that poor decisions were made resulting in illness and death.<sup>5</sup>

**Secondly, not knowing things can prove to be expensive.** Tairāwhiti contains some of the most erosion-prone land in the country. 60,000–100,000 hectares – around 10–15% of Tairāwhiti – is classed as ‘transition land’.<sup>6</sup>

After Cyclone Bola in 1988, commercial planting was proposed to quickly clothe the highly erodible soils on the East Coast. This was controversial at the time and there was considerable debate about the merit of planting a harvestable crop on such steep and erosion-prone land.

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<sup>5</sup> PCE, 2022, pp. 25-26. Environmental reporting, research and investment: Do we know if we’re making a difference?  
<https://pce.parliament.nz/publications/environmental-reporting-research-and-investment/>

<sup>6</sup> See p.315 in Gisborne District Council, 2025. 25-245 Sustainable Land Use Business Case - Council Paper in: Agenda for the Gisborne District Council meeting on Thursday 2 October 2025.  
[https://www.gdc.govt.nz/\\_data/assets/pdf\\_file/0032/93767/Agenda-Council-2-October-2025.pdf](https://www.gdc.govt.nz/_data/assets/pdf_file/0032/93767/Agenda-Council-2-October-2025.pdf)

Nevertheless, the East Coast Forestry Project was established in 1992, which offered tendered grants for planting pines – including allowing the removal of mānuka and kānuka in order to plant pines in some cases. A 1993 report entitled, *A guide to the East Coast Forestry Project*, even stated that “For both environmental, commercial and employment reasons, radiata pine is considered the first choice for planting.”<sup>7</sup>

With the benefit of hindsight, we can now say that a better understanding of erosion susceptibility and sediment delivery to waterways would have eliminated some areas from commercial planting. Post Cyclone Gabrielle, the Gisborne District Council has generated a map of the region, which identifies areas as having moderate to high susceptibility to landslides and high connectivity to waterways. But this hindsight is expensive – the Government spent \$110 million cleaning up silt and debris in Tairāwhiti after Gabrielle.<sup>8</sup> And the business case for the Sustainable Land Use Transition in Tairāwhiti indicates that the delivery phase for the first ten years will cost \$359 million.<sup>9</sup>

While this slide is not Tairāwhiti but rather Wairoa in the Hawkes Bay – it shows how granular the information on susceptibility to landslides and connectivity to waterways (the map on the right) is compared with the Erosion Susceptibility Classification (ESC) (the map on the left). The ESC is used in the NES-CF and has been derived from the NZLRI database, the mapping for which was undertaken mainly in the 1970s. While the ESC zones show uniform susceptibility of land to erosion, higher resolution and more detailed mapping reveals more heterogeneity and is better suited for informing targeted management. I’m currently finalising a publication on the LUC system, its derivative ESC, and their use in a regulatory context in New Zealand, with the aim of releasing it before Christmas.

I should note in passing that, at the other end of the spectrum, knowing the same thing n-times over without any methodological consistency is also very expensive. Let’s call it **wheel reinvention**. The problem seems endemic with data gathering, data analysis and modelling.

For example, 70+ local authorities have had to procure flood maps to provide information about flood risk, but the maps have been constructed using different models and methods. The quality of the maps varies depending on the quality of the underlying information. No current publicly-available map combines high-quality, detailed local or regional flood information with national data to build a unified and consistent view. This is why MfE is currently developing New Zealand’s first National Flood Map to provide a trusted source of flood risk information for the whole country. This map will unify the best available local,

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<sup>7</sup> Ministry of Forestry, 1993. *A guide to the East Coast Forestry Project*, p.4

<sup>8</sup> See p.358 in Gisborne District Council, 2025. 25-245 Sustainable Land Use Business Case - Council Paper in: Agenda for the Gisborne District Council meeting on Thursday 2 October 2025.  
[https://www.gdc.govt.nz/\\_data/assets/pdf\\_file/0032/93767/Agenda-Council-2-October-2025.pdf](https://www.gdc.govt.nz/_data/assets/pdf_file/0032/93767/Agenda-Council-2-October-2025.pdf)

<sup>9</sup> See p.458 in Gisborne District Council, 2025. 25-245 Sustainable Land Use Business Case - Council Paper in: Agenda for the Gisborne District Council meeting on Thursday 2 October 2025.  
[https://www.gdc.govt.nz/\\_data/assets/pdf\\_file/0032/93767/Agenda-Council-2-October-2025.pdf](https://www.gdc.govt.nz/_data/assets/pdf_file/0032/93767/Agenda-Council-2-October-2025.pdf)

regional and national-scale data, so everyone can access information to help them make informed decisions. It is expected to be publicly released in 2027.

I described a particularly bad case of wheel reinvention in my review of water modelling. There are at least 75 biophysical freshwater models in use by regional councils and unitary authorities in a regulatory context to assist with water resource management. But many of the models have overlapping functions, meaning they are used in the same environmental domain, sometimes for the same purpose.

For example, 19 river water quality models are used to estimate nutrient loads in rivers and streams; and 13 models are used to assess sediment in rivers and streams. This proliferation of overlapping models is not helpful as, rather than adding value, it confronts regulators with the quandary of having to choose the 'best' model and then defend that choice, which is not an easy task. I have called for a suite of preferred models to be chosen and a national freshwater modelling support centre to be established to coordinate technical modelling expertise.

**Thirdly, what we don't know can make a mockery of regulatory systems.** Take, for example, chemicals in the environment. We know very little about them. I examined the problem in a report entitled, *Knowing what's out there*. We identified significant gaps in the monitoring of contaminants across New Zealand.<sup>10</sup> For example, while groundwater is monitored for pesticides every four years, we lack nationwide monitoring for pesticides in other receiving environments. We also found that organic compounds, including emerging contaminants, do not receive the same level of scrutiny as heavy metals in either national or regional monitoring. In 2023, health officials in France alerted the public to the fact that a majority of drinking water samples tested by the government contained chlorothalonil. This highly toxic fungicide was banned in the EU in 2019 due to concerns over water contamination and elevated cancer risk associated with the metabolites of chlorothalonil. Chlorothalonil is approved for use by trained and certified commercial operators in New Zealand. However, no-one tracks where, or how much of it, is released into the environment. This means we can't even begin to understand whether this sort of contamination might be a problem in New Zealand, even though another jurisdiction is concerned about it to the point of forbidding its use.

The sort of regional information we need could be gleaned by using chemical sales data as a proxy for use. Such data is collected in Australia, Canada and the EU on pesticide use, but not in New Zealand. If we had such information, we could organise our environmental monitoring efforts more efficiently to match regional patterns of use.

There has been one recent positive step in the right direction. Changes to the Hazardous Substances (Importers and Manufacturers) Notice 2015 mean that, from next year, the

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<sup>10</sup> PCE, 2022. *Knowing what's out there: Regulating the environmental fate of chemicals*.  
<https://pce.parliament.nz/publications/regulating-the-environmental-fate-of-chemicals/>

EPA will be able to collect and report on the quantities of certain categories of chemicals either imported into or manufactured in New Zealand. This will give us a national level view of chemical quantities in New Zealand. But the EPA hasn't been given the power to collect regional sales data. So, we still have no idea where in the country these chemicals are used or in what quantities.

Needless to say, they are used in specific places, not sprinkled evenly across the country. One of the EPA's roles is to set Environmental Exposure Limits (EELs). They don't use them as much as they should. But when they do, they should be able to know whether those limits are being reached. What is the point of having EELs when we rarely monitor to make sure that such controls are generating the environmental loads that we consider acceptable?

**Fourth, what we don't know prevents us from understanding whether we are making a difference.** New Zealand is a biological economy, heavily reliant on primary industries and tourism for much of its export income. Yet we have a poor handle on what is actually happening on the land. You would think that a land-based economy would need comprehensive real-time information about how land is being used so that we can understand what the consequences of land use change may mean for the environment. This includes comprehensive land use data, frequent and well-distributed water monitoring and detailed assessments of soil properties.

For example, LiDAR is an invaluable remote sensing tool for creating 3D representations (called digital elevation models) of the Earth's surface and objects. It has many environmental applications, including natural hazard management. But there are notable gaps in LiDAR coverage – for example, the Manawatū-Whanganui and Otago regions.

Without consistent and robust information about the land, how we use it and what sorts of environmental impacts those uses may have, we cannot assess whether any of our environmental policies are making a difference – and whether taxpayers' money has been spent effectively.

To be able to do this, we need to combine consistent and robust environmental information with up-to-date land use information. That would allow us, for example, to identify the different types of land uses that are located in flood-prone areas and assess how they might be affected by climate change. It could help us understand the effect of spatial policies, such as farm plans, on land management and whether they are effective in improving environmental outcomes. As noted in the work of the *Our Land and Water* science challenge, our current monitoring networks are insufficiently extensive to confidently detect change.

Our knowledge about land use is even sparser: while councils have good records of consents in their regions, knowing about permitted activities presents a challenge. As a result, we do not even know how many farms are operating across New Zealand.

This lack of information poses significant challenges for (1) preparing practical and effective policies and (2) successfully implementing them.

Current attempts to change planning and environmental statutes are revealing the vulnerabilities of our rather threadbare biophysical information. The **Fast-track Approvals Act** has put the problem into sharp relief. Its requirement for one-time, or "one-shot", information provision puts both applicants and expert panels under real stress.<sup>11</sup> Unlike standard consenting processes, which allow for iterative requests, the fast-track process puts significant pressure on panels to identify and request all necessary information upfront. This means that the panels need to be exhaustive and identify every potential deficiency in the project application from the outset. Any missed information or new issue discovered later cannot be addressed through a further information request.

A recent and ill-considered amendment that has been introduced to try to make fast-track even faster risks blowing up the entire system. The Government claims that its further tweaks will save an additional six weeks in the time needed to examine applications. Six weeks – when the consents that flow from an approval may last 35 years! Faced with impossible demands for information that may or may not exist, panels have three choices available to them: (1) take a conservative stance and decline applications; (2) burden applications with onerous conditions to cover for the uncertainties; or (3) approve applications without knowing enough to impose sensible conditions and just hope that nothing goes wrong. All I can say is that I would not like to be living downstream of a tailings dam approved under a fast-track enquiry that was given neither the time nor the information to make a genuinely well-informed judgment.

Upcoming changes to the resource management system will rely heavily on information if they are to succeed. To be able to set meaningful standards and environmental limits, we need to know both what is currently happening and what might happen (using modelling and other forecasting tools). The new system that is being designed envisages reliance on the expanded use of national standards to reduce the need for resource consents. But this requires underpinning information about the current state of the environment so that appropriate performance standards can be set. The world of permitted uses and rigorous ex-post compliance and enforcement that Ministers are talking about requires high-quality monitoring information. Without it, the private sector will not be able to demonstrate compliance – unless, of course, we decide that compliance is all too hard. The use of novel tools, such as biodiversity credits and offsets, will make particular demands on high quality information. The key point is that we don't have a great history of recovery where we have crossed environmental limits (or bottom lines) in the past. We need to know where the limits or lines are before we cross them. It is generally cheaper not to screw things up in the first place.

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<sup>11</sup> See section 67 of the Fast-track Approvals Act 2025.

I have been calling for urgent attention to the state of environmental information for eight years now. It's not just about collecting more data. It's about being able to integrate it and interrogate it easily. We need to be able to quickly and easily draw together existing information from numerous disparate sources so that it can be used to support robust decision making. For example, new information from consenting and monitoring needs to be able to be incorporated (ideally in near real time) to enable adaptive management. A system that can easily pull together information in this way will also be one that can swiftly identify gaps that can be filled as budgets allow.

The Government's social investment approach is well supported through the Integrated Data Infrastructure (IDI) led by Stats NZ. The IDI is used to ensure that the development of social, health and socio-economic policy is informed by a strong evidence base. It has created the ability to generate quantitative insights on the effectiveness of policy interventions, both in terms of policy design and policy monitoring and evaluation.

A similar concept is needed for environmental information and environmental investment. I have made the case for a federated environmental data system, which – in my view – needs to be able to bring multiple data layers together at geospatial points. We need to be able to leverage technological advances (including data processing, sensor technology and artificial intelligence) to bring together existing environmental data currently held by disparate entities, and to fill the many gaps that exist.

I am also acutely aware that the risks we are running with environmental information are potentially going to be heightened by the current round of science reforms. I have made it clear to the Minister leading the reforms that I regard New Zealand's publicly-funded environmental research capability as a critical part of the system of agencies and processes on which we rely to manage our environment. The Government's reforms involve new advisory mechanisms and funding entities.

To the extent that the reforms can introduce some coherence to our national research priorities and reduce the absurd levels of contestability that have been allowed to overwhelm the system, they could yield some real improvements. But, it all depends on relative priorities and the absolute level of resources invested. I am unaware of pools of lazy money being frittered away on environment research. On the contrary, I am aware that many environmental research endeavours have been kept afloat for years without any nominal increase in resources. Yet these activities lie upstream of foundational assets, like databases and collections, and key capability, including our capacity to respond to emergencies like biosecurity breaches or natural hazard responses.

If these capabilities are placed at risk – and in some areas, they may be no more than one or two researchers deep – then this entire land-based economy will be placed at risk. I am monitoring in real time as best I can how research dollars are being moved around in the course of these reforms. They appear to be a zero-sum game. No new investments in research are being made, so any shiny new initiatives in AI or quantum this or that will need to raid resources from other fields.

If the environment loses research capability, we all need to understand what that will mean for the future state of our environment. Environmental information and the research base needed to support it should be treated as core assets. This is 'infrastructure' that enables better decisions. We need to invest in it every bit as much as we need to invest in hard infrastructure. That message hasn't yet been heard.

In conclusion, let me just say that I am well aware that resources are scarce and that from a research point of view there will never be enough money just like there will never be enough information to satisfy every doubt. Governments have to make difficult trade-offs. They also need to be able to justify them. In my view, before we embark on any grand new schemes, we need to be sure that we have the capacity to deliver them and evaluate them.

Information about the biophysical state of our environment is foundational to almost all of our economic and social aspirations. It is not a nice-to-have. Neither it is something you can rustle up in a hurry on an as-needed basis. It is defensive, it is slow and it is long. I leave it to you decide whether we have the bureaucratic and political institutions that can grapple with that.

Thanks for inviting me along.

Rt Hon Simon Upton  
**Parliamentary Commissioner for the Environment**  
**Te Kaitiaki Taiao a Te Whare Pāremata**