Environmental reporting, research and investment

Do we know if we're making a difference?

October 2022

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

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This report is a synthesis of three previous reports: *Focusing Aotearoa New Zealand's environmental reporting system, A review of the funding and prioritisation of environmental research in New Zealand* and *Wellbeing budgets and the environment A promised land?* The Commissioner would also like to acknowledge once again all those individuals and organisations who assisted him in conducting those reviews.

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Gleichenia inclusisora

Preface

Over 30 years ago, during a decade of hectic economic reform, serious concerns arose about the state of the nation's macroeconomic statistics. A review led by the Government Statistician noted that "there has been growing concern with the quality of statistics officially provided and whether they are satisfying the user needs in a rapidly changing economic and social environment".[1]

The review led to a significant investment in improving critical data on which both government and private sector advice relied. Economic reform and restructuring was the imperative of the day and it couldn't be safely delivered without better quality data.

Another generation, another set of challenges. Without question, the environmental challenges we face are today's imperative. They are already reaching far into the social and economic fabric of Aotearoa New Zealand. And, in a disquieting parallel with the past, there is a widening realisation that the quality of environmental information is not fit for purpose.

Environmental data is, of course, very different from economic data. Where macroeconomic data is often telling us about the very recent past and being used to make all manner of short-run adjustments, environmental data is usually telling us about change that manifests itself over timeframes of years to decades. But there is an increasingly urgent need to know what track we are on – and whether our actions are making a difference.

This report completes a cycle of work I have undertaken over five years. It pulls together the key elements that are needed to tell whether we are making a difference. Better quality information is at the bottom of it all. But it has to be underlined immediately that no amount of information is valuable if it isn't going to be used. So while there needs to be a big catch-up in the comprehensiveness and quality of environmental data, so too is there a need for making much better use of it.

[1] See Department of Statistics, 1991, p.17.

Decision making needs to be better informed by evidence. And those decisions – and their consequences – need to be capable of scrutiny. Only then will we know whether we *are* making a difference. Any political commitment to improve linkages between data, knowledge and investments must be undertaken in the almost certain knowledge that unexpected and inconvenient things will come to light. Targets may prove to be unreachable. Popular policies may be shown to be ineffective. New and emerging trends may strand even the most carefully considered policies.

None of this should deter any politician. If some of the ominous trends we see in terms of biodiversity, water quality, chemical pollution and greenhouse gas emissions are really going to be taken seriously and treated with the urgency they demand, everyone must be prepared to be accountable for what they are doing about them. Government policies don't always hit the mark. Neither do private undertakings. We need to know if environmental limits are being breached – or maybe, even, that they're unattainable. Accountability based on good data and mātauranga Māori has to be at the core of any democratic engagement with environmental management.

Public accountability emerges as the principal theme of this report. And for there to be accountability, there has to be **clarity and transparency** about what it is we're trying to achieve. We are beginning to realise that in respect of climate change. This report calls to extend a similar focus to the outcomes we are trying achieve in respect of the other environmental issues we face. We need:

- clarity about what environmental outcomes have been given priority by governments
- an equally clear idea of their plans or strategies to deliver those outcomes
- clarity about where and how money is being spent in pursuit of them
- information about the impact that spending is having and the progress we are making
- whole of government reporting that transparently communicates this to parliamentarians and citizens alike.

The scale and complexity of environmental challenges is not well handled by our current system of public accountability focused on individual agencies. We need to know what is happening at the level of the government as a whole, in a way that is accessible and can be easily mapped back to the environmental monitoring we are doing.

We simply do not have this at present. There is a maze of strategies, all sorts of agency-level initiatives and virtually no systematic way to evaluate whether we're making a difference. Parliamentarians and citizens are not provided with information in a form that can be easily used to hold governments to account.

I attempted, for the purposes of this report, to generate an estimate of central government's investment in the environment, broken down by the main environmental domains. It suffers from many limitations, but it is the best that I could do with publicly available information. The expertise of my office could be better spent directly advising Parliament, rather than producing annual estimates of environmental expenditure to meet the information needs of select committees. But I am prepared to do so if necessary to ensure that this doesn't slide off the radar.

People will differ over the relative seriousness of different environmental challenges. But I would be very surprised if there is any disagreement about the need to be informed about the impact and effectiveness of environmental investments. This is why accountability, the issue that lies at the heart of this report, raises its head so insistently.

In preparing it, I have been greatly assisted by the expertise of staff working for my counterpart, the Controller and Auditor-General. I discovered that many of the problems I encountered have – from a public accountability and public finance perspective – been long identified as weaknesses by his office. The commonality of our conclusions was such that I made the entire draft of this report available to the Auditor-General.

In the course of our exchanges, the Auditor-General neatly summed up the objective that lies at the heart of public accountability in these terms:

> "At any level of government, effective public accountability systems should enable the public and Parliament to understand what the Government has set out to achieve and – equally importantly – what progress is being made as a result of spending public money. Too often we simply do not get information that answers these questions. Yet these are among the questions that Parliament and the public care most about."

The recommendations in this report propose a system that will answer some of these questions – at least for the environment. Their immediate audience are the Environment Committee and Finance and Expenditure Committee. It is their responsibility to hold governments to account for what they claim they are trying to achieve and how effective those efforts are. They cannot do so with the information currently made available to them.

Providing that information will require some investment. It is tiny in the scheme of things. I acknowledge that deciding to make that investment will not win a single vote. But I for one don't want to be issuing a further report five years from now recording ongoing inaction. Rather, I hope to start issuing reports recording real progress based on real data.

Simon Upton

Parliamentary Commissioner for the Environment

Macrothelypteris torresiana

Kupu whakapuaki

Neke atu i te 30 tau i mua, i te tekau tau e hōkeka ana te whakahou ohaoha, i puta mai ētahi āwangawanga nui mō te āhua o ngā tauanga ōhanga whārahi o te motu. I kīia i roto i tētahi arotake a te Kaitatau Kāwanatanga "i te piki haere te āwangawanga mō te kounga o ngā tauanga e whakaratohia ōkawatia ana, ā, mēnā e whakaea ana ngā hiahia o ngā kaiwhakamahi i roto i te taiao e hohoro ana te panoni ā-ohaoha, ā-pāpori hoki".[1]

Nā tēnei arotake i puta mai tētahi whakangao nui ki te whakapai ake i te raraunga waiwai hei whakawhirinakitanga mā te kāwanatanga me te rāngai tūmataiti. Ko te whakahou me te hanganga anō o te ohaoha te kaupapa matua o te wā, ā, kāore e taea te whakarato haumaru ki te kore e whiwhi ai ki te raraunga kounga ake.

He whakatipuranga anō, he huinga wero anō. Kāore e kore, ko ngā wero ā-taiao kei mua i tō tātou aroaro te kaupapa nui o tēnei wā. E whātoro ana ēnei ki te hōhonutanga o te tūāpapa o te pāpori me te ohaoha o Aotearoa. Waihoki, e āhua ōrite ana ki ngā wā i mua, e piki ana te māramatanga kāore e tika ana te kounga o ngā mōhiohio taiao.

Kāore e kore, he rerekē rawa te raraunga taiao ki te raraunga ohaoha. Ahakoa ka kōrero te raraunga ōhanga whārahi mō te wāmua tata, ā, e whakahaeretia ana kia whakarite i ngā panoni wā poto, e kōrero ana te raraunga taiao mō te panonitanga e whakatinanahia ana i roto i te angawā ka inea ki ngā tau tae atu ki ngā tekau tau. Engari e piki ana te kōhukihuki o te hiahia kia mōhio ki te huarahi e takahia ana e tātou – ā, mēnā e whaihua ana ā mātou mahi.

Ko tēnei pūrongo te otinga o tētahi huringa mahi i mahia e au i roto i ngā tau e rima. Ka ruruku i ngā āhuatanga matua e hiahiatia ana kia mōhio mātou mēnā e whaihua ana ā mātou mahi. Kei tōna iho ko ngā mōhiohio kounga. Engari, me wawe te whāki kāore i te whaihua ngā mōhiohio mēnā kāore e whakamahia ai. Nā reira, me tere whakaoti te matawhānui me te kounga o ngā raraunga taiao, waihoki, e hiahiatia ana kia pai ake te whakamahinga o aua raraunga.

[1] Tirohia Department of Statistics, 1991, p.17.

Me whaimōhio te tikanga whakatau ki te taunakitanga. Waihoki, me taea te tirotiro atu ki aua whakataunga me ngā tukunga iho. I taua wā anake ka mōhio mātou, *āe*, e whaihua ana ā mātou mahi. Ko ngā herenga tōrangapū ki te whakapai ake i ngā hononga i waenganui i ngā raraunga, te mōhiotanga me ngā whakangao me mahi i runga anō i te mōhio kāore e kore ka puta mai ngā mea ohorere, whakahōhā hoki. Tērā pea kāore e taea te whakatutuki ngā whāinga. Tērā pea e kitea ai he korekiko nō ngā kaupapahere arotini. Mā ngā ia hou pea, me ērā e puta mai ana, e noho taratahi ai ngā kaupapahere kua āta whakaarohia.

Me kaua tēnei e whakataitu i tētahi kaitōrangapū. Mēnā ka āta whakaarohia, ā, ka wawe te arohia ki ētahi o ngā ia kino e kite ana mātou e pā ana ki te kanorau koiora, te kounga wai, te parakino matū me ngā putanga haurehu kati mahana, me noho haepapa te katoa ki ngā mahi e mahia ai. Kāore ngā kaupapahere kāwanatanga e heipū ai i ngā wā katoa. He pērā hoki ngā oatitanga tūmataiti. Me mōhio tātou mēnā e whatia ana ngā tepenga taiao – tērā rānei, mēnā e kore pea e taea. Me noho ki te iho o ngā whakapāpātanga manapori ki te whakahaere taiao te papanga e noho nei i runga i te raraunga pai me te mātauranga Māori.

Ka puta mai te **Papanga Tūmatanui** hei kaupapa matua o tēnei pūrongo. Waihoki, kia tū te papanga, me puta mai te **māramatanga me te pūataata** mō ngā mea e tūmanakohia ana e mātou kia whakatutukihia. Kua tīmata tō mātou mōhio ki tēnei e pā ana ki te panoni āhuarangi. Ka tono te pūrongo nei kia pērā te arotahi ki ngā putanga e whakapau kaha ana mātou ki te whakatutuki e pā ana ki ngā take taiao kei mua i te aroaro. E hiahiatia ana e mātou:

- te māramatanga e pā ana ki ngā putanga taiao kua noho hei whakaarotau mā ngā kāwanatanga
- kia pērā hoki te māramatanga o ā rātou mahere, rautaki rānei hei whakarato i aua putanga
- te māramatanga ki hea, ā, he pēhea e whakapauhia ana te moni hei whai i aua mea
- ngā mōhiohio mō te pāpātanga nā te whakapau moni, ā, te ahu whakamua e kitea ana
- te pūrongorongo puta noa te kāwanatanga e pūataata ana te whakakakau i tēnei ki ngā māngai pāremata me ngā kiriirarau anō hoki.

Kāore i te pai te whakarite i te rahi me te whīwhiwhi o ngā wero taiao e tō mātou pūnaha papanga tūmatanui onāianei e arotahi ana ki ngā tari kāwanatanga takitahi. Me mōhio mātou he aha ngā nekeneke ki te taumata kāwanatanga matawhānui, mā te ara e whakatapoko ana, ā, he ngāwari te whakamahere anō ki ngā aroturuki taiao e whakamahia ana e mātou.

Kāore e pērā ana ināianei. Kua powhiwhi ngā rautaki, me te huhua o ngā kaupapa ā-tari, ā, karekau he ara pūnahanaha hei aromātai mēnā e whaihua ana ā mātou mahi. Kāore e whakaratoa ana ki ngā māngai pāremata me ngā kiriirarau ngā mōhiohio ki te āhua e ngāwari ana te noho haepapa o ngā kāwanatanga.

I whakamātau au, hei tautoko i tēnei pūrongo, kia waihanga i te whakatau tata o te whakangao kāwanatanga matua ki te taiao, e wāwāhia ai ki ngā whaitua taiao matua. He nui ngā hē i roto, engari koinei te mea pai rawa e taea ana mā te whakamahi i ngā mōhiohio e wātea ana ki te hunga tūmatanui. He pai ake kia whakapau kaha ngā mātanga o taku tari ki te tohutohu i te Pāremata, kaua ko te whakaputa i ngā whakatau tata ā-tau o te whakapaunga moni taiao hei whakatutuki i ngā hiahia mōhiohio o ngā komiti whiriwhiri. Engari, mēnā me pērā au, ka pērā au hei whakatūturu kāore e warewaretia ai tēnei kaupapa.

He rerekē te whakaaro o tēnā, o tēnā mō te āhua o te taumahatanga o tēnā wero ā-taiao, o tēnā wero ā-taiao. Engari, ka tino ohorere au mēnā he whakahē e pā ana ki te hiahia kia whaimōhio ai ngā tāngata mō te pāpātanga me te whaihua o ngā whakangao taiao. Koinā te take ka kaha puta mai te papanga, te take e noho nei ki te iho o tēnei pūrongo.

I au e whakarite ana i tēnei, he nui rawa te āwhina o ngā mātanga e mahi ana mō taku hoa, te Tumuaki o te Mana Arotake. I kitea e au ko ngā raruraru huhua i pā mai ki a au – e pā ana ki te papanga tūmatanui me te tirohanga ahumoni tūmatanui – kua roa e mōhiotia ana e tana tari. Nā te ōritetanga o ā māua whakataunga i whakawāteahia e au te katoa o tēnei pūrongo hukihuki ki te Tumuaki o te Mana Arotake.

I roto i ā mātou whakawhitiwhitinga kōrero, i āta whakarāpopoto te Tumuaki o te Mana Arotake i te whāinga kei te iho o te papanga tūmatanui e pēnei ana:

> "Ahakoa he aha te taumata kāwanatanga, me whakamana ngā pūnaha papanga tūmatanui whaitake i te hunga tūmatanui me te Pāremata kia mārama he aha te tino whāinga a te Kāwanatanga, ā, – he ōrite te hiranga o tēnei – he aha te nui o te ahu whakamua e kitea ana nā te whakapau i te moni tūmatanui. He nui ngā wā kāore mātou e whiwhi ai ki ngā mōhiohio e whakautu ana i ēnei pātai. Heoi anō, koinei ētahi o ngā pātai e tino tūmanakohia ana e te Pāremata me te hunga tūmatanui."

E marohi ana ngā tūtohu i roto i tēnei pūrongo i tētahi pūnaha e whakautu ai i ētahi o ēnei pātai – otirā mō te taiao. Ko te hunga kaimātakitaki matua ko te Komiti Taiao me te Komiti Ahumoni me te Whakapaunga Moni. Nō aua komiti te kawenga kia whakatūturu e urupare ana ngā kāwanatanga mō ngā mea e kerēme ana rātou e whāia ana kia whakatutukihia, ā, he pēhea te whaitake o aua mahi. Kāore e taea i runga i ngā mōhiohio e whakawāteahia mai ana ki a rātouināianei.

Me whai whakangao ina hiahia ana ki te whakarato i aua mōhiohio. He iti rawa taua whakangao i roto i te whānuitanga o ngā whakangao katoa. E mōhio ana au kāore te whakataunga kia whakangao pērā e hopu ai i te pōti kotahi. Engari, kāore au i te hiahia kia tuku i tētahi atu pūrongo hei te paunga o te rima tau e whakaatu ana i te kore mahi. Engari, ko te tūmanako ka tuku au i ngā pūrongo e hopu ana i te ahu whakamua nō ngā raraunga tūturu.

Nā Simon Upton

Te Kaitiaki Taiao a Te Whare Pāremata

1

Notogrammitis heterophylla

An integrated view of environmental data, knowledge and investment

Over the last three years I have published three lengthy reports. The first, in 2019, reviewed how well New Zealand reports on the state of its environment under the Environmental Reporting Act 2015.[1] The second, in 2020, examined how public funds are invested in environmental research in New Zealand and whether that research is sufficiently focused on responding to the many environmental challenges Aotearoa faces.[2] Finally, in 2021, I published a review of how the environment found its way into the processes and calculations that underpin the annual publication of the Government's budget, styled since Budget 2019 as wellbeing budgets.[3]

The three reports were not intended as a trilogy. But as their development progressed, it became clear to me that they are – or should be – inextricably interlinked. We do not monitor the state of the environment for the sake of collecting data. Nor do we conduct much of our research solely out of curiosity (although that remains a vital element in any research system). We do both to understand what is happening in our biophysical environment because we depend on it for our livelihoods, our health and – ultimately – our survival.

Yet in common with most so-called 'developed' economies, we assume that the environment is a thing we have control of. We appropriate resources and cut across life-supporting systems on the basis that we know enough to manage the consequences. And yet time and again, when something goes wrong, we discover that it is what we did not know – or in some cases did not want to know – that has come back to bite us. A te ao Māori perspective on the environment urges a more holistic account. And in some cases, mātauranga Māori can assist. But it is not always available or acknowledged.

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1 PCE, 2019.
2 PCE, 2020.
3 PCE, 2021c.

Central government has an unavoidable regulatory responsibility for managing the way we use and transform the biophysical environment. All of us, as individuals and businesses, impose pressures on the environment that require rules and institutions to manage them. If we do not have a good up-to-date understanding of what we are doing to the environment, any management systems we design are unlikely to be very successful.

That will not stop governments intervening. They are under pressure to respond, whether the issue of the moment is very specific, for example a local groundwater chemical contamination problem, or systemic, such as the accumulation of carbon dioxide in the atmosphere or nitrogen in rivers and lakes. The quality of those interventions will be limited by the quality of the information governments can lay their hands on. But intervene they will, and in the process will potentially spend large sums of money. Ascertaining down the track whether it was worth it will depend, again, on information.

It has become clear to me that while there are links between the environmental information we collect, the research we undertake and the money we throw at environmental problems, they are often tenuous, lacking in transparency and governed by short-termism.

This brief chapter brings together the main findings from my three reports with a particular focus on the state of the linkages between data, knowledge and decisions to spend public money on environmental outcomes. It is not a summary of those reports and it does not regurgitate all their recommendations. Rather, it summarises the key findings that have led me to the view that we must improve the coherence of environmental reporting, environmental research and government decision making so that we can test whether decisions taken – or not taken – are making a difference.

What do we know about the state of our environment?

Environmental data – that is, any facts, records or measures related to the environment – are fundamental to initiate any environmental research, validate models, estimate trends and monitor environmental evolution. They are needed to support the development of policies and regulation. And they need to be gathered in a way that is consistent over time.

My review of environmental reporting in New Zealand found that the broader environmental system suffers from numerous **gaps** in data; that it is **fragmented**, relying on data acquired by different organisations for different purposes using different methodologies; and that even where data do exist, they are often **inaccessible** to decision makers. Furthermore, Aotearoa's environmental reporting is **opportunistic**. It passively harvests existing data from many organisations that happen to have collected them, as opposed to setting about systematically generating the data that are needed to address the key environmental issues of concern to New Zealanders.

An additional issue is a lack of depth in the way that mātauranga Māori is integrated into environmental reporting. There have been attempts to better represent mātauranga to address this problem but there needs to be discussion with Māori on how and when to use mātauranga, and how to incorporate locally specific mātauranga into national reporting.

I described our efforts to report on the state of New Zealand's environment as "cobbling together what we have to hand, trying to solicit the willing engagement of a wide range of stakeholders and putting the hat around to try to plug some of the many gaps".[4] For a country that is so heavily reliant on the biophysical world to make a living, it is remarkable what we do not know.

For instance, we do not have reliable estimates of the quantity of water taken from rivers, lakes and aquifers, or up-to-date, nationally consistent measures of land use. By comparison, reporting of economic data is more comprehensive. This is reflected in differences in the length and consistency of time-series datasets – for example, many economic indicators, including gross domestic product, have historical data dating back to the 1950s or earlier, whereas the coverage of many environmental indicators is limited to much more recent time frames.[5]

The problems with environmental information were known long before the appearance of my 2019 review. For some reason there has been little determination to take them in hand. To address them, I called for:

- a comprehensive, nationally coordinated environmental monitoring system, including the development of a dedicated set of core environmental indicators and the design and maintenance of the necessary monitoring networks
- a standardised and consistent approach to collecting, managing and analysing data
- a nationally mandated strategy to ensure that known environmental data gaps are progressively filled
- the development and maintenance of a fit-for-purpose national online reporting platform
- the establishment of a standing science advisory panel to provide scientific advice to ensure robust and comprehensive reporting on the state of Aotearoa's environment and identify emerging priorities for data gathering, monitoring and research.

I have also called for amending the Environmental Reporting Act 2015 to improve Aotearoa's reporting on the state of its environment to help focus our stewardship of the environment in the right places.[6]

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[4] PCE, 2019, p.3.

[5] PCE, 2019, pp.32–33.

[6] In early 2022 Ministry for the Environment (MfE) officials consulted on a discussion document, *Improving Aotearoa New Zealand's environmental reporting system*, and are currently working to amend the Environmental Reporting Act 2015, which will address many of my recommendations (MfE, pers. comm., 9 August 2022). For more detail, see Appendix 1.

How do we deepen our knowledge of our environment?

Human exposure to Aotearoa's biophysical environment is extremely recent. The first 600 years or so saw Māori painstakingly accumulate detailed, fine-grained knowledge – mātauranga Māori – about the ecosystems they encountered and considered themselves to be a part of. Despite the loss of much knowledge in the wake of colonisation, mātauranga remains a precious source of insight that can inform contemporary questions. The arrival of European settlers involved another wave of human encounter that tried to make sense of ecosystems marked by their isolation in time and space, this time applying the investigative techniques of western science.

Source: Helen Buttfield, School Journal, 1968; Archives New Zealand, Flickr

Figure 1.1: The combined knowledge of Polynesian ancestors and Māori experience over many hundreds of years living in Aotearoa is handed down through generations. To help indigenous knowledge experts memorise vast amounts of complex knowledge, whakapapa is used to better understand the connections between all living and non-living things.

In both cases, human curiosity and survival have been twin motivating spirits. They remain so today. Our reasons for trying to make sense of these islands are as much about culture and a sense of belonging as anything else. Public good research motivated purely by a desire for knowledge for knowledge's sake has always played an important role. But survival – understanding how the environment can shape our fortunes and how our actions can wreak havoc – also provides a powerful reason to find out how to interpret the environmental information we collect and fill gaps in our knowledge about biophysical processes.

My review of environmental research found that funding for it is fragmented, with no obvious line of sight between the plethora of research strategies and roadmaps that governments and research organisations have generated and the environmental research and data collection that actually take place. Nor is there any evidence that the collection of environmental data in turn feeds back into research priorities. To provide a more coherent approach to public investment in environmental research, I called for:

- a regularly updated environmental research strategy
- the ringfencing of public funds for environmental research
- the establishment of an environmental research council or similar body to give effect to the environmental research strategy.[7]

The business of collecting environmental data and conducting environmental research is obviously closely related. Data are needed as an input to validate knowledge, and knowledge is required to inform the continuing process of acquiring and interpreting data. Environmental reporting needs to inform environmental research priorities; environmental research needs to lead to improved monitoring. The combined recommendations of my first two reports were designed, in part, to strengthen those linkages.

Using environmental monitoring and research to better prioritise environmental spending

Assuming we had good environmental information, you would hope that it would guide the priorities that governments adopt to tackle environmental problems. That was the subject of my third investigation. Was the process created to generate wellbeing budgets one that took seriously the contribution the environment makes to our wellbeing? Does the concept of wellbeing narrow how environment knowledge is framed? Was the state of environmental information sufficient to make informed decisions about the allocation of public money?

I discovered that the appealing idea of trying to evaluate environmental expenditure in terms of its links with wellbeing assumes we have the information – and measures of value – needed to do so. In truth, they are often lacking. While it is not hard to make the connection between wellbeing and the immediate benefit of water that is safe for recreational purposes, or access to parks and green spaces, quantifying those sorts of contributions is challenging. Hence the case for improved environmental information on which trade-offs and policy accommodations can be made.

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[7] Two recent initiatives that touch on my recommendations without necessarily addressing them are (1) *Te Ara Paerangi – Future Pathways Green Paper* (MBIE, 2021), which is looking at the future of the New Zealand's research system and (2) the work initiated by MfE working on an Environment and Climate Research Strategy (MfE pers. comm., 26 July 2022). For more detail, see Appendix 1.

But if demonstrating the short-term benefits of environmental action is difficult, making the case for investing in environmental protection that will yield benefits over extended time frames is orders of magnitude more so. So many environmental issues involve dynamic living systems whose disruption today will impose unknown costs on younger people as well as generations to come. We do not know what future societies are going to value. What we do know is that humans can cause irreversible changes to the environment when thresholds and tipping points are passed.

Making sense of the relationship between the natural environment and wellbeing with the same granularity and certainty that we make sense of other things that matter for our wellbeing is appealing.[8] But to do it well would make extraordinary claims on information and would probably not make any meaningful difference to the way the budget process allocates investment to environmental outcomes. For here's the rub: the budget is a machine designed to focus on the short term. Ministers are supposed to make sense of a vertiginous array of competing claims – in the knowledge that their licence to do so extends only until the next election.

Rather than pursue large institutional changes to budget processes, I proposed some more pragmatic technical recommendations that could better integrate the environment into budget processes:

- improvements to the wellbeing analysis template and other tools
- updating the Living Standards Framework Dashboard and developing new tools to provide a better understanding of the environment over the long term
- modifying the social discount rate to better reflect the longer-term, intergenerational costs and benefits that pertain to the environment and consider a te ao Māori perspective in setting them
- improving the presentation and communication of critical environmental information.[9]

Beyond these somewhat technical improvements, I concluded that there was a simpler and more urgent priority in budget preparation: ensuring that the principal long-term environmental challenges we face are consistently confronted and reported on so there is clarity among decision makers and some accountability for seeing that we make progress.

These long-term challenges are there whether politicians choose to acknowledge them or not. Their magnitude is revealed by monitoring and research. Ensuring that what monitoring and research are telling us informs the budget process – and then enabling parliamentarians to debate how well environmental challenges have been responded to – would be a significant improvement on the status quo. But to do this properly, governments need to be clear about the environmental outcomes they are seeking.

This report elaborates on why much better links between environmental reporting, research, government decision making, and budgetary allocations need to be made.

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[8] The Treasury's Living Standards Framework makes use of the idea of 'natural capital' to emphasise the long-lived contribution that the environment makes, aligning its contribution with financial, physical, human and social capitals. As an accounting framework, it is an elegant way to make some very different things comparable. But while it may be conceptually tidy, the analogy is at best approximate. Some natural capital is renewable (think of fish stocks or groundwater that can be recharged). Other stocks (think mineral deposits) are not. And then there are things like the atmosphere or the oceans that are not easily described as a stock but whose state is critical to human survival.

[9] The Treasury and MfE have broadly agreed to implement each of the recommendations over time. See MfE, 2022a; The Treasury, 2022c. For more detail, see Appendix 1.

Chapter two considers what we know about the state and trajectory of the environment and illustrates why the status quo is so unsatisfactory – for the environment as well as ministers, parliamentarians and citizens. Chapter three considers what we know about the environmental outcomes that the Government is prioritising, the environmental spending it is undertaking and the effectiveness of that spending.

Chapter four proposes a series of recommendations designed to join the dots between environmental reporting, environmental research and government decision making. Like my previous recommendations, they are aimed at facilitating foundational improvements in environmental information and better-informed decision making. They are also aimed at enabling Members of Parliament and citizens to scrutinise the priorities and investment choices governments make and to hold governments to account for the consequences of decisions made and decisions postponed.

2

Nephrolepis flexuosa

The consequences of inadequate information

The picture that emerges from my three reviews is one of a poor evidence base in the form of incomplete or hard-to-access data; patchy monitoring information; holes in our understanding of natural processes; and a government policy machine that takes budget decisions that often are not well informed about the state of the environment or what the future costs of inaction may be.[1]

In the course of almost every investigation I have conducted over the last five years, I have run up against the constraints that inadequate information imposes on public and private actors who are trying to do their jobs. This chapter provides some concrete examples. Some examples have come from my previous reports, while others from conversations with people working in environmental monitoring and research. There is no shortage of examples and those I highlight are merely cases in point, not a systematic survey. Rather, the purpose of this chapter is to underline that, while there are costs to generating and using environmental information, there are consequences from not having this information to inform decisions.

The examples I have assembled are grouped into the five overarching domains under which environmental reporting should be arranged.[2]

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[1] For a list of significant data and knowledge gaps that stand in the way of good environmental management, see my 2019 review of the environmental reporting system (PCE, 2019, p.28, Table 3.1).

[2] In my 2019 review of the environmental reporting system, I proposed to call them 'overarching environmental themes'. On further reflection, I have decided to settle on 'overarching environmental domains' with additional refinements to the wording, as reflected below.

Overarching environmental domains

Land and freshwater

How we use the land

As a country reliant on primary industries and tourism for much of its export income, New Zealand needs to know what is happening on and to the land. That information is not just needed for domestic consumption. Consumers in overseas markets are constantly asking questions. Not being able to answer them or provide satisfactory answers could be increasingly costly.

We should have a good handle on how land cover (such as forest, built-up areas or open water) is evolving, how the land is being used and how that use is changing over time. Understanding land use change is critical to understanding changes in environmental pressures. Put simply, rich information about the land, including land use maps, enables us to better understand land activities and their consequences, including impacts on water quality, biodiversity and greenhouse gas emissions. Comprehensive and up-to-date information about what is happening on Aotearoa's land would seem to be indispensable to an economy like ours. But comprehensive information about how the land is used is still lacking.

For example, to categorise the country's land cover – the types of vegetation and other features that cover the land – Aotearoa has only five time points, on average five and a half years apart. National maps of land cover have been produced for 1996, 2002, 2008, 2012 and 2018.[3]

As the Land Cover Database is not considered one of the 25 Nationally Significant Collections and Databases, it does not receive any dedicated funding.[4] The funding needed to process satellite imagery for the 2018 land cover update (LCDB5) was provided by the Ministry for the Environment – Manatū Mō Te Taiao (MfE), Ministry for Primary Industries – Manatū Ahu Matua (MPI) and Department of Conservation – Te Papa Atawhai (DOC) as a three-way partnership on the basis that it was a gap that urgently needed to be filled. At the time of writing, conversations have begun about funding options for the next update (LCDB6).[5] However, there is no certainty that the next update will happen within the next two years, putting at risk the value of this time series, which becomes less useful as its frequency decreases.

Land cover gives us an idea of vegetation type. But changes to the condition of vegetation caused by pressures such as pests cannot be easily spotted from imagery. Further, land cover is not land use. We cannot see from space how the land is used, what animals are grazing where or what inputs like pesticides or fertilisers are being added.

In the past 20 years, the area of pastoral land has not changed much, yet in some places the intensity of land use has increased markedly. Data on a variety of aspects related to land, including property ownership and occupancy, management and intensity of use, and environmental pressures and any mitigations, are held in fragmented databases. As this information is often not easily retrievable, merging it to deliver a full picture of how New Zealand is changing is, while feasible, challenging and time consuming.

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[3] For more information about the New Zealand Land Cover Database, see https://lris.scinfo.org.nz/.

[4] The review of the Nationally Significant Collections and Databases was initiated in 2018, but decisions are still pending. See https://www.mbie.govt.nz/science-and-technology/science-and-innovation/funding-information-and-opportunities/investment-funds/strategic-science-investment-fund/funded-infrastructure/review-of-scientific-collections-and-databases/.

[5] MfE, pers. comm., 8 July 2022.

Source: Andrew Cooper, Wikimedia

Figure 2.1: Comprehensive and up-to-date information about the land and how it is used would enable us to better quantify and assess the pressures the environment is under, and better understand the consequences of land activities on braided rivers like the Rakaia pictured here.

Currently, we lack a robust, comprehensive and nationally representative dataset that characterises New Zealand's land use and how this is changing spatially and temporally. Current national estimates are cobbled together from data derived from a variety of sources and proxies.[6]

A nationally consistent methodology for categorising and reporting on land use as part of an authoritative land use information system would enable us to get a better handle on how we use the land across specific regions and the entire country. It would help improve our understanding of the causal relationships between land activities and their environmental impacts. It could help set water quality limits or shed light on what is happening to biodiversity or climate resilience in urban environments. Most importantly, it could deliver hard evidence about the effectiveness of policies aimed at curbing pressures that different land uses place on the environment.

A similar situation is revealed in respect of our soil. Fundamental knowledge gaps around soil health, including the factors that affect soil structure and functioning under different land uses, are particularly worrisome. While soil is one of our greatest natural assets, it is also a non-renewable resource.[7]

[6] See PCE, 2019, p.41.

[7] Soil can take thousands of years to form naturally. See https://soils.landcareresearch.co.nz/topics/understanding-soils/how-do-soils-form/.

Soil quality monitoring remains patchy and inconsistent across the country. Not all regional councils and unitary authorities collect soil quality data.[8] Further, the list of soil quality chemical analyses and approaches for classifying soils vary significantly between councils.[9] It is not possible to tell where around the country soils are in good condition and where further attention may need to be focused.

A lack of time-series data for soil erosion due to the absence of a comprehensive national monitoring programme is another example. Erosion, in particular the erosion of topsoil, can lead to reduced primary sector productivity, choking of waterways and estuaries with sediment, and damage to infrastructure. Time-series data for soil erosion could provide a better understanding of the impact of land use activities.

Without consistent and robust information about the land, it is impossible to answer policy-relevant questions such as:

- How many hill country livestock farms are in a region or a catchment?
- How much are residential areas and lifestyle blocks encroaching onto high-quality, versatile soils?
- To what extent has indigenous vegetation/habitat been lost?
- What is the area of different land uses in flood-prone zones and what is the likely impact of climate change on each of the land uses?
- How effective are specific management practices at mitigating erosion rates?
- How can we assess the effect of spatial policies like farm plans on land management?

These are the sort of practical questions decision makers at all levels are expected to be able to answer. Furthermore, they need to be able to do so swiftly. Having to commission one-off pieces of research to answer questions is costly and time consuming.

Surface water and groundwater

The quantity and quality of water is vital for our economic, social and cultural wellbeing. The shortage or absence of freshwater, or its excess in the case of floods, has blighted entire regions of the world for millennia. New Zealand's natural aquatic endowment is spectacular, but only recently have we begun to realise the extent to which we have placed it at risk.

As New Zealand tries to arrest the decline in water quality of its rivers and lakes, significant deficiencies in our **freshwater monitoring** have become apparent.[10] Freshwater monitoring records representative estimates of environmental states and trends over time by measuring key physical, chemical and biological variables across Aotearoa's rivers. However, current monitoring suffers from methodological inconsistencies, poor representativity and inadequate spatial and temporal coverage.[11]

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[8] When surveyed, Gisborne, West Coast, Otago and Nelson councils did not monitor soil quality (although Gisborne was about to start monitoring) (Cavanagh et al., 2017, p.16).

[9] Two of the councils relied solely on field-based soil profile descriptions to classify soils at soil quality sites. However, the rest of the councils used some soil chemical measurements on a one-off basis to assist in soil classification. For more details, see Table 6 in Cavanagh et al., 2017.

[10] Monitoring of the environment supports a range of activities, including: reporting on the state of the environment, policy development and implementation, monitoring the effectiveness of plans and policies, informing resource consent processes, assessing regulatory compliance and supporting operational decision making.

[11] See, for example, Larned and Unwin, 2012; Booker and Whitehead, 2018; Tadaki, 2022, pp.9–11.

While the quality of the data being collected about river water quality across the country and the consistency of monitoring have both improved over the years, significant problems remain over how useful these data are in environmental decision making. Issues include a lack of consistency stemming from the differences in what, why, when, where and how something is measured. Monitoring techniques, data analysis and accessibility also play a part.[12]

Currently, many individuals are left to work with inconsistent data, manually downloading from variable storage systems and dealing with different conventions. Without consistent standards setting out standardised and consistent approaches to collecting, managing and analysing data, any attempts to construct a national-level picture and use data for a variety of purposes will be hindered. The absence of automation can also make processing a lengthy business.

The National River Water Quality Network (NRWQN) started in 1989 with 77 sites located on 35 rivers. The network was designed with the purpose of monitoring the state and trends of river water quality, establishing baseline sites and generating long-term records on some of Aotearoa's largest rivers. The National Institute of Water and Atmospheric Research – Taihoro Nukurangi (NIWA) now operates 42 of the original 77 sites, along with its flow and rainfall monitoring sites, essentially for best practice and methodology development as well as to continue long-term recording.[13] The remainder of the original 77 sites were either handed over to regional councils following a transition period of 'paired' monitoring, or disestablished over a period of more than seven years.[14]

National water quality reporting draws from both the NRWQN and regional councils' water quality monitoring spanning around 1,500 river sites.[15] This seemingly large number does not mean that New Zealand's river monitoring network is spatially and temporally representative, nor sufficiently comprehensive in terms of the attributes monitored. At many of those 1,500 sites only a few of the attributes are measured, sometimes monthly or at ad hoc times, and in locations that reflect historical rather than current freshwater policy needs.[16]

The purpose for which a monitoring site was originally established is rarely documented. Monitoring can be undertaken for many different purposes such as compliance, safety for contact recreation, state of the environment reporting, informing resource consent processes or regional policy development. As a result, methodologies often differ depending on the purpose of the monitoring.[17] This limits the extent to which data can be used for multiple purposes and hinders attempts to construct a national-level picture.

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[12] These issues are not new – they have been well documented, including in my earlier report *Focusing Aotearoa New Zealand's environmental reporting system*. See chapter three and Appendix 1 of PCE, 2019.

[13] Two of the reasons for foregoing 35 sites are the growth in regional council monitoring networks and the generally static public funding from Ministry of Business, Innovation and Employment – Hīkina Whakatutuki since the beginning of monitoring (Jochen Schmidt, NIWA, pers. comm., May 2022).

[14] PCE, 2019, p.39; Juliet Milne, NIWA, pers. comm., May 2022. See also Davies-Colley, 2015.

[15] Larned et al., 2018. While overall, New Zealand's river monitoring network has undergone significant growth over the last 15 years, the regional picture is more nuanced. The number of sites monitored by Horizons Regional Council for water quality has increased from 60 river sites before 2007 to 142 currently. The number of Environment Canterbury's monitoring sites fluctuated between 229 in 1999 and 180 in 2020. See Gray, 2022. Also, Aquanet Consulting (pers. comm., 19 August 2022).

[16] There are 22 National Objectives Framework attributes now in regulation through the NPS-FM 2020. See Appendix 2A and 2B in New Zealand Government, 2020a.

[17] Appendix 1 in PCE, 2019, provides an illustration of this using the indicators of faecal contamination. This is a prime example of data that are collected by different providers and for different reasons, resulting in datasets that are difficult to collate or compare.

Source: Lance Andrewes, Flickr

Figure 2.2: Te Awa Kairangi/Hutt River is monitored by NIWA as part of the National River Water Quality Network. From its headwaters in Kaitoke Regional Park, the river runs through forest, rural, residential and industrial landscapes as it drains into Wellington Harbour. In lower parts of the catchment, such as in this photo near Upper Hutt, the river environment is highly modified, with toxic algae blooms in summer and poor long-term water quality.[18]

Public pressure has led to regulatory change, including regular updates to the National Policy Statement on for Freshwater Management (NPS-FM) between 2011 and 2020. As a result, our need for data and knowledge has outstripped the expansion and development of the network and the expertise needed to interpret the data.

The water quality network is primarily based on monthly discrete sampling and field measurements, which, over time, only provide an average representation of the state of water quality. Monthly sampling can lead to a slow or uncertain detection of changes, such as improvements in response to a remediation action (effectiveness monitoring) or degradation in response to a pressure (pressure–response monitoring). In addition, monthly data provide a poor understanding of temporal variability, especially if monthly sampling does not capture rainfall or flow events. In some cases, sampling is suspended during these events.[19] In short, the current approach limits our ability to make informed decisions about how to allocate water, set limits or manage contamination.[20]

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[18] See https://www.lawa.org.nz/explore-data/wellington-region/swimming/hutt-river-at-silverstream-bridge/swimsite and https://www.stuff.co.nz/environment/300283917/taniwha-in-the-valley-hutt-river-is-both-threatened-and-threatening--but-is-it-just-misunderstood.

[19] Many councils agree that sampling regimes should not be biased to exclude rainfall events, yet the Taranaki Regional Council routinely avoids monitoring sites during rainfall events (i.e. it will delay monitoring if a rainfall event happens to occur on the regular sampling day). See Appendix 1 of PCE, 2019.

[20] Aquanet Consulting, pers. comm., 27 June 2022.

National river monitoring networks need to adopt modern technologies and methodologies. Automated and remote sensors can permit the concurrent measurement of multiple variables and real-time continuous (or high-frequency) monitoring. But their adoption for policymaking is slow, in part because of the cost and in part because of a lack of national standards.[21] Developing national standards for novel technologies should be a priority. But this comes at a cost that agencies are reluctant to shoulder. The random acquisition of what should be core infrastructure makes change costly in every way and massively reduces the evidence needed to make good policy choices.

Data accessibility is another critical issue.[22] There is still no comprehensive authoritative data repository for freshwater quality including flow data in New Zealand.

In summary, the current freshwater monitoring system is fragmented and hindered by multiple inconsistencies and accessibility challenges. While freshwater monitoring is essential for judging the effectiveness of costly on-the-ground mitigation measures and policy packages, a raft of problems stand in the way of good links between data, science and policymaking.

National leadership is needed to ensure that the spatial and temporal representativeness of water quality monitoring keeps pace with our freshwater policy needs. That leadership is needed to drive innovation, ensure better methodological consistency and improve data accessibility. Finally, national leadership is needed to see that those using the network have the skills to interpret the data the network produces.[23]

Without adequate freshwater monitoring, we cannot know if:

- ecological thresholds are going to be exceeded in a certain river, stream or lake
- our rivers are being sustainably managed and water flows are high enough to sustain the lifeforms within them
- costly mitigation measures like sedimentation ponds or stand-off pads are making a difference to the quality of water in a nearby stream.

Compared with surface water, **groundwater** is even less well understood. Surface water and groundwater are strongly interconnected so that contamination in the former will almost invariably end up in the latter. Once there, water can stay in a single groundwater system for decades, which means that contamination issues can persist for centuries and have an impact well after disappearing above ground. Groundwater quality is also partly controlled by the composition of surrounding rocks. Scientists and decision makers need to understand both pressures on groundwater and surface-to-groundwater interactions if the entire freshwater resource is to be properly managed.

The August 2016 contamination of Havelock North's drinking water provides a tragic example of what can arise from a poor understanding of groundwater systems. The town's drinking water became contaminated with campylobacter and an estimated 5,500 residents fell ill, 45 people were hospitalised and four people died.[24] The outbreak was traced back to an aquifer that was thought to be confined and the "water secure from contaminants".[25]

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[21] Aquanet Consulting, pers. comm., 27 June 2022; Westerhoff et al., 2022.

[22] PCE, 2019; Aquanet Consulting, pers. comm., 27 June 2022.

[23] In my earlier review I recommended that a comprehensive environmental monitoring system should be developed. However, progress is lagging and problems remain. See PCE, 2019.

[24] Roberts et al., 2019.

[25] Government Inquiry into Havelock North Drinking Water, 2017, p.1.

Stage one of the Government's inquiry into the event commented that "the Regional Council's knowledge and awareness of aquifer and catchment contamination risks near Brookvale Road fell below required standards".[26] In other words, poor knowledge of the groundwater system meant that poor decisions were made, and people were severely affected.

While national monitoring of groundwater from boreholes and springs has existed since 1998,[27] New Zealand still lacks consistency between its national and regional monitoring programmes.[28] There is no comprehensive map of New Zealand's groundwater systems, and we lack the ability to connect information across different aquifer units. This is due partially to a lack of funding and partially to a lack of national leadership. Furthermore, groundwater monitoring programmes are still essentially considered separately from surface water in New Zealand.[29] As a result, management decisions are being made without an understanding of the size of the resource or the natural processes that control water storage, its movement and interactions.

Coastal and marine environment

New Zealand has sovereignty rights over a marine estate that is 15 times larger than the two main islands on which we live.[30] These rights include a duty to protect and preserve the marine environment.[31] However, our understanding of the ocean and the biophysical and chemical processes occurring on and below the seafloor is still extremely limited. This is largely due to the paucity of direct visual observation and biophysical samples.

Clearly, sampling every part of the seafloor is unrealistic given that much of it is remote and very deep. But knowledge about the various ecological processes happening on, or immediately below, the seafloor is required for proper conservation and management of the benthic environment.[32] The design of marine protected areas is all too often limited by a lack of knowledge about the variety of habitats that may exist. This is the case for most of New Zealand's 44 marine reserves. For instance, Kapiti Marine Reserve, created in 1992, was mapped using modern technology in 2015. This revealed some vulnerable – and unprotected – ecosystems just outside its boundary.[33]

An absence of adequate seafloor maps makes the creation and management of marine protected areas challenging. Precise seafloor information would provide environmental managers with the ability to delineate the extent of benthic habitats to guide the development of management plans.[34]

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[26] Government Inquiry into Havelock North Drinking Water, 2017, p.3.

[27] GNS Science in collaboration with regional authorities is managing this nationally significant database. See The National Groundwater Monitoring Programme, https://www.gns.cri.nz/Home/Our-Science/Environment-and-Climate/Groundwater/Research-Programmes/National-Groundwater-Monitoring-Programme-NGMP.

[28] GNS Science, pers. comm., 11 July 2022.

[29] GNS Science, pers. comm., 11 July 2022.

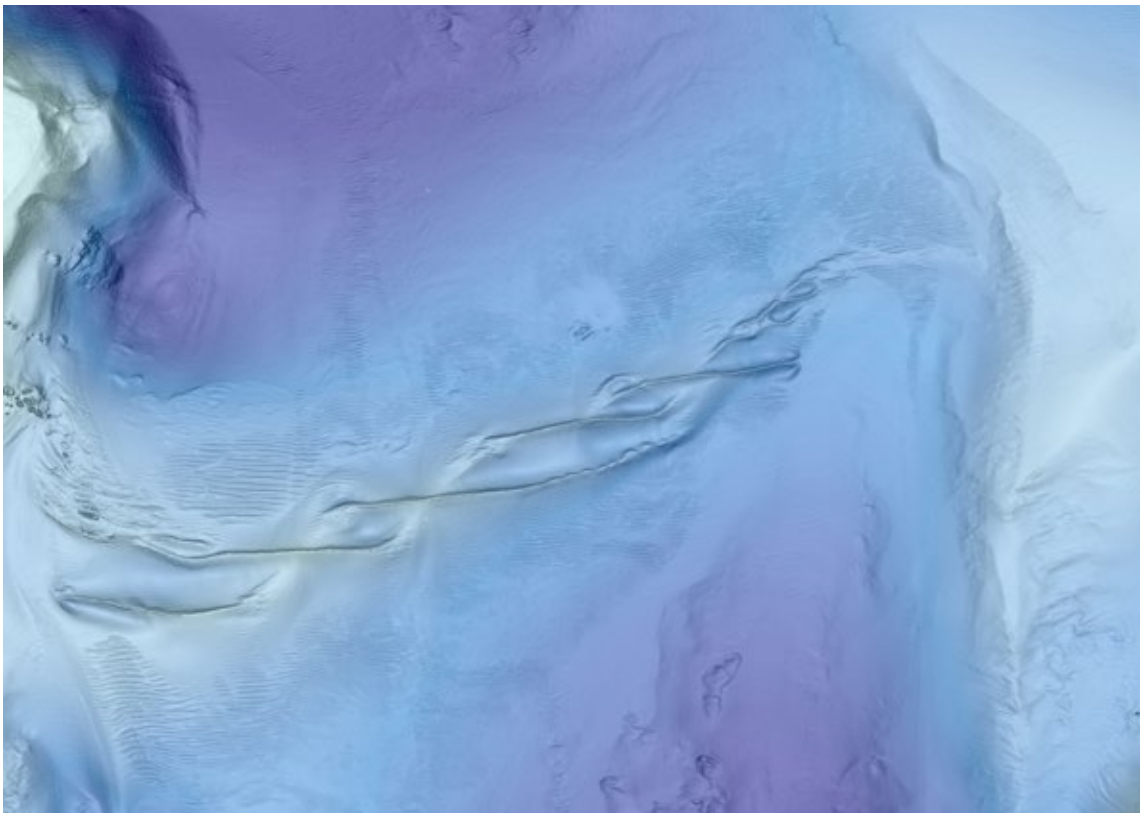
[30] New Zealand's exclusive economic zone and territorial seas total 4.1 million square kilometres.

[31] Article 56(1) of the United Nations Convention on the Law of the Sea, which came into force in 1994, states that "In the exclusive economic zone, the coastal State has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living, of the waters superjacent to the seabed and of the seabed and its subsoil".

[32] Some of the biophysical and chemical processes relevant to benthic ecological functioning include – but are not limited to – carbon and nutrient flow, decomposition, water temperature, oxygen concentration, sediment type and organic carbon concentration.

[33] Targeted visual assessments following seafloor mapping led to the discovery of large pāua reserves and extensive anemone and rhodolith beds outside the marine reserve (Lamarche et al., 2019).

[34] Wölfl et al., 2019.



Source: Marlborough District Council, image generated by NIWA

Figure 2.3: We have a good understanding of the shape of the seafloor in some localised areas, such as in Cook Strait, pictured here. Yet this is just a snapshot at one given point in time. The morphology of the seafloor evolves constantly, and sometimes changes very rapidly due to tides and currents. Our knowledge of the vast majority of the undersea world, especially in very deep and remote regions, remains very poor.

A systematic approach to mapping is needed to ensure we do not miss seafloor features that may have significant ecological value and provide the evidence required to make good management decisions.[35]

But luck has driven much of what we know. For example, the early discovery of large submarine volcanoes in the Kermadec Arc, north of New Zealand, was largely the result of serendipitous mapping.[36] Active submarine volcanoes are known to host unique lifeforms whose significance goes back to the beginnings of life on Earth. Similarly, seafloor mapping in Queen Charlotte Sound/Tōtaranui gave scientists a picture of the extent of anchor damage to the environment, a problem that had not previously been regarded as serious.[37]

[35] Australia is funding such an ambitious national marine mapping programme: https://www.ausseabed.gov.au/.

[36] Wright, 2010.

[37] Watson et al., 2022.

The protection of habitats and ocean landforms – small or large – may be critical, but before we can provide protection, we need to know where they are and what they look like. Despite the value of water depth, or bathymetric, data in New Zealand for conservation, natural hazards, fisheries and defence purposes, there is no systematic approach to mapping the seafloor. As a result, while we have a good understanding of the shape of the seafloor in very localised shallow areas such as harbour entrances or some marine reserves, our knowledge of the vast majority of the undersea world, especially very deep and remote areas, remains very poor. Areas in very shallow waters, where vessels cannot easily transit, are also paradoxically poorly mapped.[38] Yet, remote submarine environments are regularly described as pristine or unique and requiring protection.

In March 2006, the Government approved a 15-year Ocean Survey 20/20 work programme, which was estimated to cost $733 million to complete.[39] The initiative was envisaged to:

> "provide New Zealand with the knowledge of its ocean territory to: demonstrate our stewardship and exercise our sovereign rights; conserve, protect, manage and sustainably utilise our ocean resources; and facilitate safe navigation and enjoyment of the oceans around New Zealand."[40]

However, the direct appropriation for the programme was discontinued in 2017.[41]

As a result, the ongoing mapping of the New Zealand seabed has once again been left to a variety of agencies, sometimes competing, sometimes collaborating.[42] Seafloor mapping undertaken using modern technology, and at an appropriate resolution for proper environmental management, is only, at best, 32% complete.[43]

In 2017, the Government expressed support for the Nippon Foundation-GEBCO Seabed 2030 project, which aims to map the entire oceans of the planet by 2030. However, it provided no direct funding to support the project. As a result, New Zealand is failing to exercise a basic sovereign responsibility to gather and own core information about its marine estate.

Biodiversity and ecosystem functioning

Much of Aotearoa's wildlife is found nowhere else in the world. Some of the creatures and plants on these islands and in the surrounding waters are deeply endemic with lineages that date back to Gondwanaland. The unique assemblage of living things goes to the heart of national identity. In te ao Māori, people are inseparable from the lifeforms and lands of which they are a part. The land and its inhabitants are one. From a Pākehā point of view, the differentness of native ecosystems is fast becoming appreciated following more than a century of destruction. As (at least some) more recent settlers come to understand the islands they live on, they claim Aotearoa's lifeforms as a part of their identity.

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[38] The tidal zone is yet another region quite different from the offshore region that can only be surveyed by boats. Tidal areas are now mapped using remote sensing technology such as light detection and ranging (LIDAR) or satellite coverage.

[39] Tyson and Norman, 2010.

[40] Tyson and Norman, 2010, p.3.

[41] The Administering Ocean Survey 20/20 appropriation was discontinued 2014/15, but Ocean Survey 20/20 received funding from the Science and Innovation: Science Collections and Infrastructure appropriation inside Vote Business, Science and Innovation. This appropriation had funding approved until 2017/18.

[42] The New Zealand bathymetry dataset is held by NIWA, which claims it "provides the most up-to-date bathymetry of one of the largest areas of deep-water seabed under national jurisdiction". The site only offers free access to a 250-metre grid. See https://niwa.co.nz/our-science/oceans/bathymetry.

[43] Areas of seafloor mapped using multibeam echosounder technology are territorial seas 48.2%, exclusive economic zone 36.2% and extended continental shelf 22.3%. Numbers provided by NIWA (pers. comm., 19 July 2022).

But these endemic ecosystems are in trouble and the knowledge base required to protect them is thin. Colonisation has led to a loss of mātauranga Māori. And pioneering bush clearing has knocked holes in undescribed ecosystems. Many native species and ecosystems are just hanging on in the face of numerous pressures – habitat loss, mammalian predators, weed invasion, pathogens and diseases. Māori and Pākehā will need to mobilise significant monitoring and research resources to give us a chance of protecting what remains.

To date, the task of eradicating mammalian pests has mobilised a lot of political will, public support, action and funding. For some reason, the aspirational call of 'Predator-Free 2050' has no plant-based equivalent. But some exotic plant species already in the country also pose significant risks to native ecosystems, even if their impacts accrue more slowly and they lack the charisma of their four-legged, twin-eyed counterparts.

Space invaders: A review of how New Zealand manages weeds that threaten native ecosystems revealed serious deficiencies in the management of exotic plants in Aotearoa.[44] Problems include inconsistent naming conventions, patchy surveillance, limited information, fragmented leadership, haphazard actions and a lack of clarity on desired outcomes.

Several deficiencies with the current system can be illustrated by the case of alligator weed (*Alternanthera philoxeroides*). Alligator weed is one of the world's worst weeds, capable of growing both on land and in water and able to dramatically alter wetlands, small lakes, rivers, dams and drains. On land it can outcompete native ecosystems as well as pastures and crops.[45] Alligator weed is toxic to livestock and can cause blindness and other health problems.

The plant arrived in Northland over a century ago, carried from Brazil in ships' ballast, and has since slowly spread southwards. In March 2020, it was discovered by chance in an entirely new location, far from any other known population by a pest control officer from Taranaki Regional Council who happened to be walking past the Mangaone Stream in Palmerston North.

This newly discovered population is upstream of an internationally significant wetland. The population was already well established, and considerable resources are now being diverted to try to eradicate it – including the dramatic approach of digging up large parts of the streambed. Despite localised success, it is unclear how successful this will be since searches along the stream continue to find significant new infestations.[46]

A surveillance system as serendipitous as this comes at a cost. New populations of exotic plants are often only spotted and reported once they are beyond the point where eradication is feasible. Earlier detection would have provided better odds of success at a lower cost – or at least would have allowed decision makers an attempt to do so.

Wilding conifers illustrate a different gap between evidence and action. The National Wilding Conifer Control Programme, which aims to stop the spread of wilding conifers and "progressively remove them from much of the land already invaded",[47] was established in 2016. This came decades after wilding conifers were first noticed, resulting in a problem that has grown in size, cost and complexity despite earlier control efforts (Figure 2.4).

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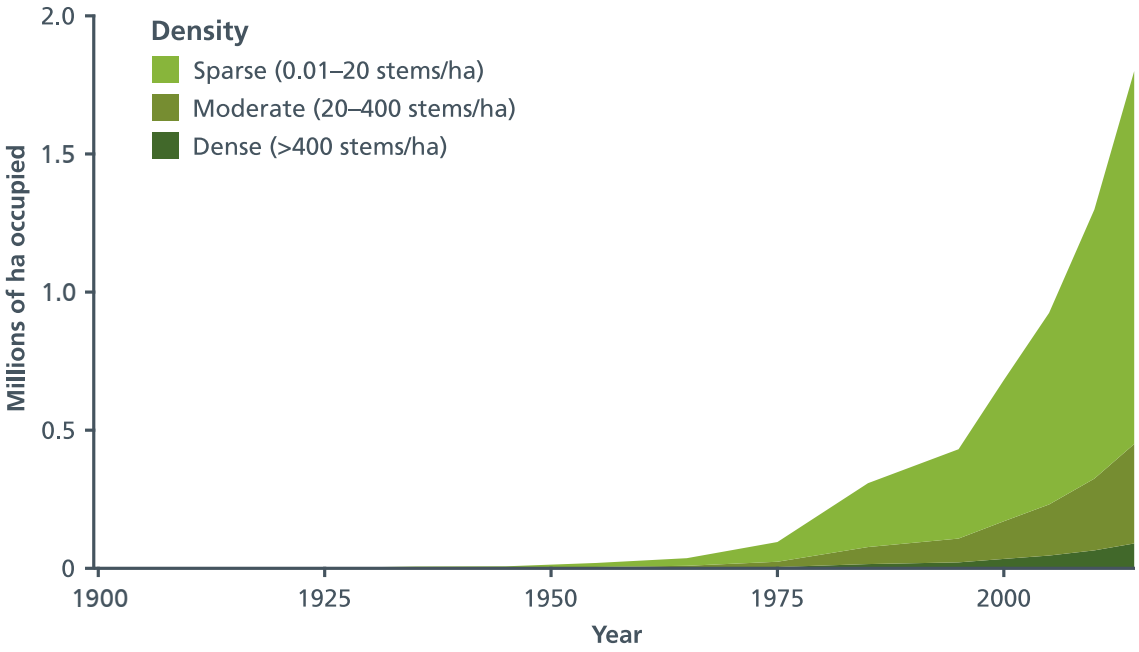
[44] PCE, 2021a.

[45] See https://www.cabi.org/isc/datasheet/4403

[46] Horizons Regional Council, pers. comm., 11 July 2022.

[47] https://www.mpi.govt.nz/biosecurity/long-term-biosecurity-management-programmes/wilding-conifers/.



Source: Howell, 2016, Figure 3

Figure 2.4: Approximate density and area occupied by wilding conifers in New Zealand.

While the increasing seriousness of the problem had been known for decades, it was only in very recent times that a collective national view of the issue quantified the costly impacts and energised significant public investment. Farmers were seeing productive land invaded, tourism operators were complaining that iconic landscapes and views were disappearing, and settlements began to be threatened by the risk of forest fires. These concerns led to the decision in 2020 to spend $100 million over four years combatting wilding conifers.

For as long as non-sterile conifer plantation forestry exists in New Zealand, there will be an ongoing battle to control wilding conifers. Given the scale of the problem, funding will need to continue into the long term if the objective of handing land back to regional councils and landowners to manage is to be safely achieved. Crown funding from Budget 2020 will drop significantly in 2024, but wilding conifers on the ground will not wait for the funding to catch up.

Without adequate ongoing spending, there is a genuine risk that the gains, and funding, will be wasted as the wildling conifers will simply reinvade. The National Wilding Conifer Control Programme has forecast that over $200 million is required out to 2031 to control 95% of known infestations.[48] Separate recent modelling has estimated that at least $400 million will be needed to remove all known wilding conifer infestations if action is taken now and costs are not deferred into the future.[49] Any delays will see costs increase.

[48] This assumes that control of 95% of known infestations begins in 2023/24 (MPI, pers. comm., 14 July 2022).

[49] See Figure 6 in Mason et al., 2021. One of several assumptions this estimate was based on was that all known infestations, including dense ones, are removed immediately.

2014

2017

Source: Sherman Smith, MPI

Figure 2.5: The experience of wilding conifers tells us what can happen if we delay action. The speed at which wilding conifers can spread and grow is seen in these photos of the Waiau Toa/upper Clarence River that were taken from the same point three years apart.

Pollution and waste

New Zealand lacks comprehensive, timely and internationally comparable data on waste generation, treatment and disposal. In the absence of information about waste generation and disposal, including volumes and composition, the scale of potential liabilities remains unknown.

One area where we lack information is related to contaminated soil. Information gaps emerge even before soil becomes part of our waste stream. For instance, there is no adequate indicator describing contaminated land, nor is there a national register of contaminated sites. Registers maintained by local government contain at least 20,000 sites but the true number is very likely to be much larger.[50]

New Zealand still has no system for tracking hazardous waste, so we cannot ascertain that wastes end up in appropriate landfills.[51] When it comes to soil, we do not know much about the level of contamination of the soil that ends up in landfills.[52] We do not even know if soils sent to landfills are posing a problem to the environment, the nature of that problem if it exists, and how it could be mitigated or remediated. This situation arises from poor definition of what constitute contaminated soils, a lack of data to enable the crafting of a better definition, and a lack of knowledge about the consequences of wasting soil and the possible alternatives such as remediation. What we do know is that vast amounts of soil are transferred to landfills at a cost approaching $500 million a year.[53]

New Zealand is the only developed country without a pollution release and transfer register – a national platform for collecting data on known discharges to the environment. My recent review of what is known about the identity and volume of chemical contaminants reaching the environment revealed many gaps.[54] While there may be strict controls on some substances, we do not track their subsequent fate in the environment. Nor do we monitor for their presence in the environment in a way that can provide information about potential risk.

The consequences – and potential costs – of not knowing what is out there were illustrated by a recent, well-publicised incident concerning firefighting foams known as PFAS (per- and polyfluoroalkyl substances). In 2018 it was discovered the foams had caused significant contamination of groundwater. The chemicals in the foam had been in widespread use since the 1950s – but this had not been monitored even though they were known to pose risks to both human health and the environment. Those risks led to the prohibition of certain PFAS compounds from use in firefighting foams in 2006. But it was not until much later that the extent of the contamination was revealed.

That led to a scramble to try to work out how much had been used and where. While it might be tempting to claim that the environmental risks posed by these foams meant they should never have been used in the first place, that reaction relies very much on the benefits of hindsight. What *was* completely foreseeable was the fact that when the inevitable consequences emerged, knowing what had been used and where would have enabled targeted monitoring and a swift response.

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[50] HAIL Environmental, pers. comm., 9 August 2022.

[51] There are five types of landfills, defined by the type of material they can accept. See https://environment.govt.nz/guides/types-of-landfills/.

[52] This is in part because cleanfill soils are loosely defined as containing contaminants within background levels, which are typically interpreted as 'natural background' levels. Because most topsoils exceed natural background, excavated soils often end up being considered contaminated.

[53] HAIL Environmental, pers. comm., 9 August 2022.

[54] PCE, 2022b.

New Zealand is running similar risks with chemicals that, unlike firefighting foam, are used over very wide areas. These so-called diffuse discharges are commonly associated with land-based industries and include pesticides and herbicides. The Institute of Environmental Science Research runs a national groundwater survey of pesticides and emerging organic contaminants in groundwater. As part of this programme, surveys have been undertaken every four years since 1990.[55] This is a unique time series that can provide some surveillance protection. For example, the 2019 survey reported detections of 227 organic contaminants in 85 out of 121 wells.

However, no similar national monitoring programmes of pesticides and emerging organic contaminants exist for other receiving environments, like rivers, lakes or the coast. All we have are one-off data points. Most importantly, we have no idea what volume of these substances is used or where they are used.

Source: Department of Conservation

Figure 2.6: Fox River landfill clean up in 2019. The vulnerability of old landfill to erosion is another area where there are large gaps in data.

[55] See Close and Humphries, 2019, p.2.

Climate change and variability

Climate presents the one bright spot in this otherwise depressing landscape. New Zealand has very good data about what is happening to our climate and the pressures we contribute to global climatic disruption through our emissions and land management practices.

This is not surprising. For nearly three decades New Zealand has been obliged to report on its emissions using a standardised reporting template. Because the sources and pathways of these emissions are largely homogeneous wherever in the world they occur and their impact is global, the reporting framework is detailed and has been able to rely on a genuinely international effort in respect of technical specifications.

New Zealand's particular interest in forest sequestration of carbon has meant that considerable research has been undertaken that has in turn fed into the development of internationally recognised approaches to accounting for forestry. This has been to New Zealand's negotiating advantage.

On the research side, New Zealand has made a major contribution to global climate-related research. First, New Zealand's isolated geographical position in the Southern Ocean has made it a natural observatory. Atmospheric carbon dioxide concentrations have been continuously measured at Baring Head since the early 1970s, providing the longest-running record of this type in the southern hemisphere.[56]

Source: Simeon W, Flickr

Figure 2.7: Atmospheric carbon dioxide concentrations have been continuously measured at Baring Head, pictured, since the early 1970s, providing the longest running record of this type in the southern hemisphere.

[56] See https://niwa.co.nz/atmosphere/our-data/trace-gas-plots/carbon-dioxide.

Second, because climatic disruption is a global rather than a place-based problem, international research collaboration is easier to justify. New Zealand has been able to contribute to major research programmes in Antarctica and the Pacific Ocean and has made significant contributions to understanding the nature of the challenge the world faces.[57]

Finally, the unusual nature of New Zealand's emission profile with its large contribution from land-based industries has provided a stronger incentive to understand these emissions than for many other countries.

New Zealand's approach to climate policy has also generated good-quality information. The New Zealand Emissions Trading Scheme, established in 2008, introduced mandatory emissions reporting obligations for selected businesses in the transport, energy, industry, agriculture and waste sectors. In addition, it gathers information on annual emissions and removals from forest land registered in the New Zealand Emissions Trading Scheme, which accounts for roughly half of the exotic forest planted since 1989.[58] By creating a market for emissions and removals, emissions trading schemes also generate information on the volumes of units traded between market participants and the prices these units are traded at. As a result, a wide range of economically *and* environmentally relevant information is constantly being generated.

Robust evidence backed by high-quality science and good monitoring information has made it possible for New Zealand to support a better-informed debate about the nature of this environmental challenge and the way to respond to it. The mandate of He Pou a Rangi – Climate Change Commission to recommend carbon budgets would have been extremely difficult to fulfil without the data and research findings that have accrued over more than three decades.

There is some irony that the environmental problem over which New Zealand has the least control is probably the one in respect of which our data and research have been most consistently supported. The need to meet international obligations and participate in negotiations has finally focused political will. Equally, it must be said that the availability of good-quality information alone was not the catalyst for action. Rising public concern, here and abroad, has provided the impetus for political action. The quality of information available means that the effectiveness of climate policies will be able to be much more rigorously scrutinised.

Numerous attempts to improve environmental information

The lack of good environmental data has been repeatedly acknowledged but the problem seems too big – or is it too boring? – to fix.

One of the first attempts to rectify the problem with environmental data was made in the late 1990s by MfE. The **environmental performance indicator programme**, which ran from 1996 until 2002, had three goals, namely to:

- systematically measure the performance of the Government's environmental policies and legislation
- better prioritise policy and improve decision making
- systematically report on the state of New Zealand's environment.

[57] For Antarctica, see https://d1e7mq055r7tid.cloudfront.net/images/Aotearoa-New-Zealand-Antarctic-Research-Directions-and-Priorities-2021-2030_Final-16-Dec-2021.pdf.

[58] MPI, 2022.

The programme made good progress towards building a strong foundation of data collection and reporting. The team had a final core set of indicators approved by the Minister for the Environment by the early 2000s. These indicators were a mix of those that were already developed and ready to implement and those that required further development. However, the programme was stopped in 2002.[59] This left the development of the core indicators unfinished, never making it to the stage of actual implementation.

This unexplained lapse of political interest has, unfortunately, been repeated since. Another attempt to improve environmental data a decade later, involving MfE, DOC and Stats NZ – Tatauranga Aotearoa, led to the publication of an **environment domain plan** in 2013.

The process for developing this domain plan had four steps:

- developing enduring questions
- compiling a stocktake of official data
- analysing the stocktake with respect to the questions
- hosting ten topic area workshops to identify and prioritise initiatives.[60]

Even though this process identified 36 "top-priority" initiatives to address information needs, acting on these initiatives remained aspirational.[61] In essence, the 2013 plan was never fully implemented, with the result that many of the problems with environmental data remain.[62]

About the same time (early 2010s) MfE initiated a National Environmental Monitoring and Reporting (NEMAR) project with the aim of more consistent regional state of the environment monitoring and reporting, to support national state of the environment reporting. MfE convened several workshops of experts to consider indicators, variables, associated protocols and network design with the focus on freshwater monitoring, and NIWA produced several reports capturing the findings.[63]

In 2014 the NEMAR project was renamed to become an Environmental Monitoring and Reporting (EMAR) initiative with the aim of providing "integrated regional and national environmental data collection networks and widely accessible reporting platforms".[64] The main focus of this initiative has been on pulling together the data collected by regional councils and unitary authorities and resulted in the development of a data visualisation website called Land, Air, Water Aotearoa. A separate regional council-led initiative called National Environmental Monitoring Standards was established in 2011 with the aim to "ensure consistency in the way environmental monitoring data is collected and handled throughout New Zealand".[65]

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[59] PCE, 2010, p.12 and Appendix 1 of that report.

[60] The ten areas were: atmosphere; climate change; coastal and marine environment; ecosystems and biodiversity; energy; freshwater; land; Māori environmental statistics; materials and waste; and mineral resources.

[61] For the list of 36 top-priority initiatives, see Statistics New Zealand, 2013, p.15, Table 2.

[62] Other initiatives included a gap analysis of the land-based environmental reporting indicators undertaken by Dymond and Ausseil in 2019, a literature review, and facilitated hui to identify indicators for reporting on the state of the environment from a te ao Māori perspective. For details, see Scheele et al., 2016; Dymond and Ausseil, 2019.

[63] See, for example, Davies-Colley et al., 2012.

[64] PCE, 2019, pp.35–36.

[65] PCE, 2019, p.34.

Although progress has been made with EMAR and National Environmental Monitoring Standards, supported by MfE, these initiatives are far from producing consistent data across the country. The initiatives appear to be held together by the dedication of a small number of committed individuals rather than by solid, strategic determination at all levels of government.

In 2015 the Environmental Reporting Act was passed, setting up a system for regularly reporting on the state of Aotearoa's environment. However, as described in my 2019 report, the Act did not result in a national environmental reporting system. Rather, it formalised a process of cobbling together what data were to hand. It was made clear at the time that there would be no requirements to produce data that did not already exist even though existing data were known to be inadequate. Unsurprisingly, almost all domain and synthesis reports produced by MfE and Stats NZ between 2019 and 2022 have documented numerous data and knowledge gaps and have called for action to improve environmental information.[66]

Many experts have also stated the need to improve environmental information. For example, in 2019, experts on a science and technical advisory group assembled by MfE called for urgent work to fill knowledge gaps that currently constrain our ability to effectively manage freshwater and the health of freshwater ecosystems.[67]

MfE officials have also repeated this call in several other publications. In May 2020 MfE officials again outlined the need to improve the evidence base – water quality and water quantity datasets in particular – so it is possible to monitor the progress and effectiveness of policies and actions to tackle freshwater issues in the context of implementation of the National Policy Statement for Freshwater Management 2020 and National Environmental Standards for Freshwater 2020.[68] A 2021 publication called for improving our understanding of the effects of water use on river flows.[69] MfE's *Statement of Intent 2020–2025* has also articulated the importance of sound information and the need for a better evidence base.[70]

[66] See MfE and Stats NZ, 2019, 2022. Other publications in New Zealand environmental series that point to the shortage of data include *Our marine environment 2019, Our freshwater 2020, Our atmosphere and climate 2020, Our land 2021 and Our air 2021*.

[67] Freshwater Science and Technical Advisory Group, 2019, pp.47–49.

[68] MfE, 2020b, p.13.

[69] MfE, 2021.

[70] MfE, 2020c, pp.13, 16, 17.

Source: Julie Vause, iNaturalist

Figure 2.8: *Amanita australis*, or Far South Amanita, grows in the soils of southern beech and mānuka forests and is found only in New Zealand. It is estimated that there are at least 13,000 indigenous fungal species, and over 70% of these are endemic. But only around 6,000 – not even half – of our native fungi have been catalogued. It is a significant task to formally describe these species and there are few mycologists trained to do it.[71]

Encouragingly, in December 2021, a Data Investment Plan – a Stats NZ-led initiative through its role as Government Chief Data Steward – was published. The plan identifies data asset investment opportunities over the next ten years for Stats NZ and other government agencies across four pillars – economy, environment, society and populations of policy interest. It profiles the top 30 investment opportunities, and lists the titles of the next 60 opportunities.[72] Seven briefly described environmental initiatives made it into the top 30 investment opportunities:

- nationally consistent measurement of land use over time at the parcel level
- enhanced and standardised climate change data
- centralised and enhanced data on the impact of natural disasters
- additional water quality data collection sites
- additional data on aquifer health and groundwater abstraction
- a new conceptual and measurement framework for ecosystem services
- data on waste that meet international standards.[73]

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[71] See https://www.inaturalist.org/posts/35101-identifying-fungi-in-new-zealand.

[72] Future iterations of this plan are envisaged to reflect priorities and broader data needs of iwi-Māori. For more details, see New Zealand Government, 2022a.

[73] It is worth noting that while there are numerous knowledge and data gaps on the vast marine environment, including poor understanding of marine biodiversity and the impact of our various activities on marine ecosystems, the Data Investment Plan has no investment opportunities to explicitly fill in these gaps. While improved data on ecosystem extent/condition, including marine, is briefly mentioned, this initiative does not make the top 30, and the need for data on marine ecosystems is mentioned together with the need for freshwater and terrestrial data.

In addition, the following four are mentioned among the next 60 opportunities:

- improved data on ecosystem extent/condition – freshwater, marine and terrestrial. Existing data are incomplete
- improved data on the conservation status of species
- more comprehensive monitoring of air quality
- enhanced biodiversity data and collections with new genomic information.

While it is a positive sign that the Data Investment Plan identifies some of the data gaps highlighted earlier in this chapter, it is remarkable that we should still only be *considering* these opportunities in 2022. In many cases, no funds have been allocated and action is yet to be taken. The Data Investment Plan is just a 'signal' for funding needs – it does not represent a commitment to new investment.

MfE and Stats NZ are decoupling existing environmental indicators currently used for the state of the environment reporting from report releases, with the intent of updating indicators more regularly. In addition, MfE has reinvigorated its efforts to establish core environmental indicators across the breadth of the environment and address other issues with environmental data. In early 2022 MfE consulted on several amendments to the Environmental Reporting Act 2015, including establishing a set of core environmental indicators and strengthening the mechanisms for collecting data.[74]

While this is encouraging, previous bursts of interest in rectifying environmental data shortcomings have come to nothing and to date there is no indication that this time will be any different. Depressingly, a prioritisation process within the Natural Resources Cluster as part of Budget 2022 failed to win approval for investment in environmental information. As the cluster funding decisions made in Budget 2022 cover three years (Budgets 2022–2024), the earliest opportunity for agencies to relodge their investment case will be Budget 2025.[75] By then, 29 years will have elapsed since the first indicator programme was launched.

The problem of budgetary priority is not confined to central government. In many ways it is even more acute at the level of regional government to which significant responsibilities have been devolved now for three decades.[76] A concerted effort to rectify existing problems and achieve a coherent system will need to engage all levels of government. It will only be achieved through strong leadership backed by technical expertise and investment.

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[74] MfE, 2022b, proposals 9 and 10.

[75] In limited circumstances, cluster agencies may be eligible for additional funding prior to Budget 2025. These circumstances include major capital expenditure and funding to deal with unexpected events (e.g. biosecurity incursions or food safety responses). See The Treasury, 2022a, Note 1.

[76] For example, the Tadaki report that described challenges faced by regional councils in respect of freshwater monitoring recommended that central government should "explore mechanisms for financing environmental monitoring that do not rely on local political budgetary processes for coherent implementation." See Tadaki, 2022, p.iii.

Inadequate information can make for costly decisions

The previous sections of this chapter provided examples of constraints that inadequate information impose on public and private actors trying to work across the breadth of the environment.

This section shines a light on what an inadequate evidence base means for one of the tools used for regulatory decision making – regulatory impact statements (RISs). My report on the integration of the environment into budget processes examined the consequences of inadequate information for the formation of budget priorities and the allocation of spending.[77]

The Government uses RISs to encourage a systematic and evidence-informed approach to decision making. These statements are required for government policy initiatives that involve a proposal to create, amend or repeal primary or secondary legislation (a 'regulatory proposal') to ensure that the agencies provide analysis and advice to ministers before they make decisions on regulatory change.[78]

An analysis of RISs produced by MfE, MPI and DOC and related to the environment was undertaken for this investigation. The analysis focused on evidence certainty and involved RISs that spanned the five overarching environmental domains mentioned earlier in the chapter.[79] Unsurprisingly, limitations in the environmental evidence base have found their way into these RISs.[80]

While all RISs discussed the evidence base that underpinned the analysis, the extent to which they articulated the level of uncertainty attached to evidence varied considerably.[81] A small proportion of RISs attempted to comprehensively describe the limitations of the data used for analysis and other constraints stemming from the evidence base. At the other end of the scale, some RISs did not provide any explicit assessment of uncertainty associated with the evidence used to support the case for intervention.

A lack of information can be costly when making policy decisions. The RISs examined could have made the implications of a poor-quality evidence base and associated uncertainties more explicit. Only two of the RISs analysed made explicit reference to the significance of limitations in the evidence base. Officials need to unpack the implications of data gaps and evidence uncertainty if those assessments are to be useful in informing decisions.

While some of the uncertainties present will never be eliminated, other uncertainties are a function of data gaps and data availability. RISs are often prepared under a very tight timeframe, yet having more time would not necessarily mean reduced uncertainties. As one RIS stated, "the limitations to the analysis reflect the limited data available, not the omission of relevant available information from the analysis."[82] The issues identified in the RIS analysis are similar to those identified in my report on the integration of environmental information into the budget process.

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[77] PCE, 2021c.

[78] The *Guide to Cabinet's impact analysis requirements* describes the requirements and provides guidance on the preparation process (The Treasury, 2020).

[79] PCE staff examined approximately a dozen standalone RISs produced by MfE, MPI and DOC between 2018 and 2022. The sample of RISs analysed spanned proposals that involved primary and secondary legislation and ranged from predominantly environmental initiatives to initiatives with environmental considerations across the five environmental themes.

[80] Similar themes are discussed in a recent publication by the Environmental Defence Society. See Koolen-Bourke and Peart, 2022.

[81] The *Guide to Cabinet's impact analysis requirements* requires that RISs include information about any key gaps, assumptions, dependencies and significant constraints, caveats or uncertainties (The Treasury, 2020, p.23).

[82] MfE, 2020a, p.3.

For example, data (un)availability and the need to rely on anecdotes rather than a solid body of evidence are issues that routinely plague RISs and the budget process.[83] While limitations in the environmental evidence base are often acknowledged, their significance and implications are often poorly communicated. This failure of communication can weigh in favour of inaction. Not only does this impair decision making, but it also means that crucial chances to address these gaps are missed.

In the meantime, the costs of addressing liabilities continue to mount.

Mounting environmental liabilities

Where resources have appeared to be 'free' and seemingly unlimited, there has been little urgency attached to measuring and managing them. It is clear, however, that the natural environment's capacity to continue to support our social and economic demands into the future is increasingly compromised. Many known aspects of the natural environment are in a state of decline with mounting liabilities starting to accrue. Further, due to many significant data and knowledge gaps standing in the way of good environmental management, some liabilities remain unknown.

Failing to respond to environmental issues is not cost-free. It simply defers costs into the future and very likely increases them. While some of these liabilities relate to environmental issues that we have only recently realised are serious, many relate to environmental issues that we have known about for a long time. It is certain that even more environmental issues will emerge down the track – especially if we know little about the state of our environment. How many more wilding conifers or PFAS scenarios are out there?[84]

All we have are fragments of information about these deferred costs. For instance, a study published in 2021 attempted to quantify the economic impact of pests. Primary sector production losses caused by pests were estimated to increase to over $4.3 billion in 2020 compared with $1.5 billion in 2009. The total economic costs of pests were estimated to be $9.2 billion in 2019/20, or 2.9% of gross domestic product.[85]

MPI estimates that wallabies spread 0.8 kilometres in the North Island and 1.9 kilometres in the South Island every year. The economic impact of wallaby spread could reach $84 million a year by 2025.[86]

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[83] For details, see chapter three of PCE, 2021c.

[84] Failing to respond may not necessarily occur because of a lack of information; it may be because the interests aligned against doing anything are huge.

[85] Nimmo-Bell & Associates, 2021.

[86] See https://www.mpi.govt.nz/biosecurity/long-term-biosecurity-management-programmes/wallabies-controlling-their-numbers/.

Source: georgemoon, iNaturalist

Figure 2.9: Wallabies damage native tussock and forest ecosystems, and increase the risk of erosion. The total economic costs of pests, including wallabies, were estimated to be $9.2 billion in 2019/20.

By contrast, we know a lot about the state of physical and financial assets. For example, the New Zealand Infrastructure Commission – Te Waihanga has recently commissioned an estimate of the quantum of the infrastructure deficit that New Zealand faces.[87] Similarly, estimated costs of upgrades to the three waters infrastructure across the country have been prepared for the Department of Internal Affairs – Te Tari Taiwhenua.[88]

[87] See Sense Partners, 2021.

[88] The GHD–Boffa Miskell report, *Three Waters Review: Cost estimates for upgrading wastewater treatment plants to meet objectives of the NPS Freshwater*, estimated that raising the standards of wastewater treatment plants that discharge into rivers and lakes across the country could cost $1.4 to $2.1 billion (Boffa Miskell and GHD, 2018). In addition, Beca estimated that the cost of infrastructure upgrades to meet drinking water standards is between $300 million and $575 million (Beca, 2018).

This stark asymmetry between what we know about different kinds of liabilities introduces a bias into our understanding of the need to make financial provision for the maintenance of the natural environment. At the same time, it makes it easier to prefer investment in physical assets. Take, for example, visitor and cultural assets (like huts) owned and managed by DOC. These assets have an original cost value of around $1.1 billion.[89,90] These same assets have an annual depreciation cost of $17 million and an accumulated depreciation of $600 million. Depreciation costs are a well-established accounting procedure allowing for annual provisions representing the replacement of the asset over its useful life. The accumulated annual provision then allows for the future replacement of the capital asset at the end of its life.

Like other forms of capital, the natural environment also accrues liabilities. In some circumstances it also depreciates but the absence of monetary values means that the case for managing and maintaining it can be more easily overlooked.

Environmental liabilities are growing, and if they continue to be ignored the costs of remedying them will eventually become unaffordable. Unless provision is made to allow for the protection, maintenance and restoration of the natural environment, we risk entering a feedback loop from which it will be difficult and costly to escape.

[89] Original cost = carrying value + accumulated depreciation.

[90] The Treasury, 2022b, p.253, Table 30.

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Lindsaea viridis

Do parliamentarians know if environmental spending makes a difference?

This chapter asks whether citizens and parliamentarians are in a position to have an informed debate about:

- environmental outcomes and priorities
- the Government's plans for achieving them
- the spending decisions that have been made
- whether any progress is being made.

While I identify a number of gaps under these headings,[1] I do not make a judgement about whether we spend too little or too much. Rather, my interest is in highlighting how inadequate environmental data and knowledge stand in the way of parliamentarians' ability to judge the effectiveness of environmental expenditure.

Of course, inadequate information is just as much of a stumbling block for ministers as it is for those who wish to judge them. While citizens and parliamentarians require transparency to hold governments to account, decision makers require clarity to make informed decisions in the first place. Where that clarity is lacking, transparency is unlikely to be forthcoming.

But before laying bare some of the shortcomings parliamentarians face, I want to draw a line under **two fallacies** that often go unchallenged. The first is a belief that **if governments knew more, they would do more**. It is tempting to believe that if only we had better information about environmental issues, the case for action would be overwhelming. Intuitively, this idea makes a kind of sense, and is often touted by scientists and policy advisors. Indeed, as Parliamentary Commissioner, I find myself constantly tempted to believe that if we just had a better understanding of problems, the resolve to deal with them would materialise.

There is something admirable about the belief that enlightenment leads to action. But the link is often tenuous and sometimes missing entirely.

[1] Many of these issues appear to extend to other areas of policy. See, for example, Controller and Auditor-General, 2021a.

Political decision making is driven by the calculation and management of interests. Those interests reflect very different economic starting positions and vest over very different time horizons. Nature itself – and future generations – have little say in how information served up to decision makers today will be weighted. Compelling information that casts a long shadow is often no match for the short-termism of three-year electoral cycles and annual budget processes.

Clarity within government and transparency to the outside will not be a panacea. But the least we can do is ensure that Parliament is presented with information in a way that enables governments to be held to account for decisions made and decisions postponed.

The second fallacy is that **spending public money on environmental issues is evidence that a problem is being addressed**. This is the standard way that budgets are communicated to the public – in all areas. As long as anyone can remember, ministers have used the appropriation of money as evidence of their concern. It may well be. But in the absence of good information, we have no way to adjudicate whether any given sum of money represents an adequate or defensible response, let alone make an assessment of how that spending is improving the state and trajectory of the environment.

Environmental expenditure is a means, not an end. What matters for a government's environmental stewardship is not how much it is spending, but how effectively any expenditure is supporting the health and resilience of the environment. This requires applying a long-term lens to decision making, planning and reporting. Its success depends in no small part on integrating environmental data and knowledge into decision-making processes. But the way that is done needs to be transparent.

What information do parliamentarians need to scrutinise environmental spending?

Members of Parliament need to know about the range of long-term environmental issues (such as climate change or biodiversity loss) that the Government could prioritise, which of those issues the Government is actually spending money on and the impacts of that spending on the environment.

They need to be able to form a view about the reasonableness of the Government's choice of environmental outcomes, whether it is spending too little, roughly the right amount or too much to achieve them, and whether whatever is being spent is being spent effectively.

In terms of the information that they need to fulfil their constitutional role, the needs of parliamentarians are not so dissimilar from those of decision makers. Nor are they so dissimilar from the needs of citizens. Whatever is fundamental to citizens should be fundamental to Members of Parliament as their representatives.

Parliamentarians need information that is accessible and relevant. Ensuring that information is relevant and accessible to citizens – who will often have less expertise and less available time – would be one way to make sure that information is relevant and accessible to parliamentarians.[2]

[2] As a commissioner whose responsibility is to Parliament, my focus is on what *parliamentarians* need to fulfil their constitutional role, and what governments need to do to facilitate that. Much of what I discuss about the needs of parliamentarians applies to citizens more broadly because it is they whom parliamentarians represent.

With the money that it spends on the environment, the Government 'buys' what are technically called 'outputs'. New Zealanders are likely to be more interested in what difference that money makes for the environment – the 'outcome'.[3] Like decision makers, parliamentarians should be interested in both of them. Understanding how well outputs are managed is an essential element of accountability for the efficient use of public finance. But understanding information about outcomes can tell us about the *effectiveness* of government spending (see Box 3.1).

Box 3.1: Outcomes and outputs

We use the term 'outcome' to denote either a (desired) state or condition of the environment or a (desired) change in it. This use reflects the repealed definition of the term in the Public Finance Act 1989. Until 2014, an outcome was defined as 'a state or condition of society, the economy, or the environment' and included 'a change in that state or condition'. Environmental outcomes might be things like improved mauri, better water quality or a halt in biodiversity decline.

We use the term 'output' to refer to the goods and services that a government 'buys' to facilitate its outcomes. Outputs could be things as different as policy advice to ministers or grants to whānau, hapū or community groups. Again, this use reflects the definition of outputs in the Public Finance Act 1989. Depending on the outcomes that it is directed to, an output may take a number of forms. For example, to maintain and restore the diversity of New Zealand's natural heritage, DOC undertakes a range of pest and weed control activities, as well as ecosystem and species management activities.

In simple terms, outcomes are the ends that government actions are orientated towards, while outputs are the means to achieving those ends.[4]

To hold a government to account, parliamentarians would benefit from at least two sets of connections between information about the environment and government spending.

At a high level, parliamentarians need to be able to see the broad relationship between environmental challenges, environmental outcomes and government spending. This would enable a coarse understanding of whether the Government is focusing its money in the right areas and whether that spending is making a positive difference to the trajectory of long-term environmental issues.

At a more granular level, parliamentarians need to be able to track more precise links between specifically desired environmental outcomes, particular environmental initiatives and the results of monitoring and evaluation. These kinds of links would facilitate a detailed tracking of the effectiveness of government spending.[5]

[3] See, for example, State Services Commission et al., 2012, p.4.

[4] See Webber, 2004, p.109.

[5] There are links between these ideas and the green budgeting literature. See, for example, Petrie, 2021.

In more systematic terms, parliamentarians need:

- a clear statement of the state and trajectory of long-term environmental issues
- a clear statement of environmental outcomes that will endure across successive parliaments
- a clear statement of the environmental outcomes the Government of the moment is specifically prioritising
- a clear statement of how the Government intends to achieve those outcomes
- a whole of government account of environmentally related spending that can be mapped to those outcomes
- a whole of government account of the key initiatives that contribute to those outcomes
- environmental monitoring that tracks progress against those outcomes via specified measures
- evaluation of the impact of those key initiatives on those outcomes
- whole of government performance reporting that links key initiatives to those outcomes
- consistency in reporting.

Setting it out like this sounds like a daunting project. But quite a lot of the raw material that is implied already exists. It is just poorly collated or labelled. And where it does not exist, there are systems that can be used to provide it. This is not about wheel reinvention. It is about reassembling a wheel that was not designed to be very useful.

This is not to deny that a reassembly along these lines would confront challenges. For example, it can be conceptually challenging to map appropriations or initiatives to a single outcome. The underlying tension – namely that the relationship between outputs and outcomes is often one-to-many rather than one-to-one – has been long noted in literature on programme budgeting.[6]

Many of these challenges relate to the state of environmental information. A clear statement of the state and trajectory of our long-term environmental issues is an important compass bearing. Chapter two (as well as many of my previous reports) has spoken to how far away we are from having that.

But the natural resources sector could do better and should do better.

Without clear outcomes and a comprehensive, high-level overview of environmental expenditure, it is not possible for Parliament to make a meaningful assessment of the extent to which the appropriations it is asked to approve actually address the key environmental issues we face.

Neither is it possible to hold governments to account for how they have prioritised their spending between existing and emerging environmental liabilities. This requires linking expenditure to outcomes at the macro level – for example, through spending reviews – and evaluating key initiatives at the micro level.

In simple terms, we need to be able to relate effort to results, and to hold governments to account for both. Table 3.1 sets out some examples of what is needed.

[6] See, for example, Ball, 2019, p.17.

What information do parliamentarians have to facilitate public accountability?

If that is what parliamentarians *need*, what information do they actually *have* about the environmental outcomes the Government is aiming for, what the Government is spending on relevant inputs and how that spending is making a difference?

Agency-level accounting

Parliamentarians are given quite a lot of information about environmentally related outputs that governments are 'buying' and the kinds of outcomes they are interested in. These can be found in a range of documents that are not necessarily well connected. Box 3.2 describes some of these documents in more detail.

If parliamentarians are interested in the intended outcomes of a particular agency, they can usually find a number of forward-looking documents of a strategic nature. These include sector-specific long-term strategies and statements of intent. In a statement of intent they may find strategic objectives, a high-level purpose, intermediate outcomes, stretch goals and priorities. However, there is no forward-looking account that clearly and comprehensively details how agencies are planning to achieve their stated outcomes, let alone the Government's stated priorities.

If they are interested in what a particular agency is spending on the environment, they can search through the appropriations that Parliament is asked to vote on. Though they are primarily fiscal, appropriations provide some acknowledgement of the kind of outcomes they are orientated towards. Criticism that New Zealand's public finance system ignores outcomes is not entirely justified.[7] Nonetheless, the structure of appropriations makes it difficult to track spending though the public finance system.

If they are interested in the impact of that spending on the environment, parliamentarians can pick up an agency's annual report. This should tell them a lot about a particular government agency. If they want detailed information about a particular initiative, they may be lucky enough to find a formal evaluation, which may include an assessment of the effectiveness of spending. This, it must be said, is more the exception than the rule (see Box 3.4 on page 73).

While reporting at the level of agencies can certainly be improved (see Box 3.2), existing documentation provides parliamentarians with a reasonable sense of some of the environmental challenges that will be prioritised, the outcomes the agency is tasked with achieving, and the amount being spent on outputs and even on specific initiatives.

[7] Indeed, the Public Finance Act 1989 requires agencies to describe what they aim to achieve (though arguably in less precise terms than it previously did). While there are no formal barriers to better specification of outcomes, there are not necessarily any strong incentives for agencies to provide this specification.

Table 3.1: Parliamentarians need to be able to see the broad relationship between environmental issues, environmental outcomes and government spending, as well as precise links between environmental outcomes, key environmental initiatives and the results of monitoring and evaluation.

What is needed	Example
A clear statement of the state and trajectory of long-term environmental issues.	Our native plants, animals and ecosystems are under threat, as demonstrated by the state of the environment reporting.
A clear statement of the environmental outcomes that will endure across successive parliaments.	Improving Aotearoa's biodiversity and ecosystem functioning and resilience.
A clear statement of the environmental outcomes the Government of the moment is specifically prioritising.	By 2030, populations of all native species threatened with extinction have stabilised or are improving.
A clear statement of how the Government intends to achieve those outcomes.	The Government presents a clear and coherent plan. This plan details what actions relevant agencies – for example, DOC, MPI, MfE, Land Information New Zealand – Toitū Te Whenua (LINZ) – will undertake, where they will actively collaborate and how they will work with local government, landowners and relevant community groups and trusts. Clear roles are assigned to achieve the outcome.
A whole of government account of environmentally related spending that can be mapped to those outcomes.	Central government agencies (e.g. DOC, MPI, MfE, LINZ) have tagged annual expenditure, supplemented by expenditure of local government.
A whole of government account of the key initiatives that contribute to those outcomes.	The Government presents a clear and coherent account of rules and initiatives. This account details key initiatives and draws on existing documents, including (but not limited to): NPS-FM and National Policy Statement for Indigenous Biodiversity (once enacted); *Te Mana o te Taiao*, internal DOC policies and plans, regional and district plans and strategies; and any other relevant initiatives that are not covered above.
Environmental monitoring that tracks progress against those outcomes via specified measures.	Ongoing regular monitoring of threatened native species in response to management actions is undertaken through time to construct time series. Data are analysed to determine whether populations of threatened species are stabilising or increasing.
Evaluation of the impact of those key initiatives on those outcomes.	Results from monitoring outcomes are analysed to determine the impact of key initiatives on preventing native species extinction and facilitating population increases. Where this is not possible, quantitative and qualitative assessments are made, drawing on any relevant monitoring.

Whole of government performance reporting that links key initiatives to those outcomes.	Monitoring, evaluation and agency-level performance reporting related to threatened species is fed into whole of government performance reporting.
Consistency in reporting.	Monitoring, data collection and reporting use shared methods and standards. This includes a harmonised set of performance metrics.

What parliamentarians are often *not* provided with is a sense of the impact that those actions are having on environmental outcomes. This is not an easy thing to do, for reasons discussed in more detail below. For example, identifying the impacts of a particular agency is complicated when the outcomes the agency is seeking to advance are subject to multiple interventions by multiple agencies as well as multiple external factors.

Even in the absence of that kind of information, parliamentarians are often not provided with a general sense of progress, relative to outcomes. In part, this is because the administrative focus of performance reporting (the outputs of agencies) is out of sync with the focus of environmental monitoring (environmental outcomes). Individual agencies may be understandably cautious about reporting overarching outcomes they have limited influence over, whatever the importance of those outcomes to parliamentarians and citizens.

Source: Anna Hooper

Figure 3.1. Takahē, pictured here, are in serious trouble (the species is classified as threatened–nationally vulnerable). Parliamentarians need to know whether ongoing efforts to increase the current population and establish self-sustaining wild populations of takahē within their former range are having an impact. Ongoing regular monitoring in response to management actions is critical for tracking progress.

In allocating spending, agencies and decision makers are required to muddle through, learn from anecdotes and limited evidence, and make investment decisions. But the consequences of limited information and feedback loops are not just a technical matter. They go to the heart of issues concerning transparency and accountability.

Box 3.2: Agency-level accounts of spending

Appropriations documents

Appropriations represent the formal statutory authority through which Parliament authorises the Government to incur expenses and capital expenditure.[8]

The Estimates of Appropriations outline planned expenses and capital expenditure to be incurred by agencies for the budget year. The intention of these documents is to ensure that parliamentarians have the necessary information to scrutinise fiscal allocation decisions and performance against each appropriation at the end of the financial year.[9] Vote documents group appropriations according to administering department and include the following information:

- the fiscal magnitude of each appropriation
- a statement outlining the scope of the appropriation and its legal boundary
- an explanation of what the appropriation intends to achieve
- assessment metrics the administering agency is required to report against.

While this presents a very general description of the content and format of an appropriation, appropriations differ in the way they are categorised and structured.[10]

Appropriations generally provide a clear and detailed account of the type of outputs that agencies are responsible for. What is often missing is a clear description of what the appropriation intends to achieve in terms of broader environmental outcomes and relevant performance metrics that assess the effectiveness of this expenditure with respect to broader environmental outcomes.

Performance criteria are often only narrowly described and typically framed in terms of the effective delivery of outputs. Performance criteria related to the efficient and effective delivery of policy, planning and regulatory outputs may be useful for monitoring organisational performance but are of limited use for monitoring the effectiveness of expenditure against desired environmental outcomes. Even when the performance assessment criteria are more closely aligned with environmental outcomes, they often provide limited insight regarding the long-term impact of programmes on environmental outcomes.

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[8] The Treasury, 2013.

[9] See https://www.treasury.govt.nz/publications/estimates-sector/introduction-environment-sector-estimates-2021-22.

[10] There are seven types of appropriations that relate to the different characteristics and purpose of appropriated expenditure. Appropriations can also vary according to the duration of their validity. Appropriations can be annual (valid for one financial year), multi-year (authority to incur expenses and expenditure for up to five financial years) or permanent. For additional information, see The Treasury, 2013.

Annual reporting by agencies

Individual agencies also deliver publicly available annual reports. There they report on what their priorities are, what actions they are undertaking to respond to those priorities and what they know about the outcomes those actions produce. While some of this would be familiar from appropriations documents, annual reports do provide more detail and nuance. Case studies are one method of adding that detail.

Agencies across the natural resources sector are reasonably effective at reporting on their performance in terms of outputs. However, they rarely provide comprehensive information about the quantum of expenditure they are allocating to specific outcomes; the impacts of particular initiatives on environmental outcomes; or even the progress (or otherwise) that is being made towards achieving outcomes. The focus on outputs means annual reports provide an incomplete sense of the effectiveness of expenditure in securing environmental outcomes.[11]

Across government, there are issues with the state of performance reporting.[12] The natural resources sector does not appear to be in the lead. A recent 'good practice' guide published by the Office of the Auditor-General – Tumuaki o te Mana Arotake, The Treasury – Te Tai Ōhanga and Audit New Zealand – Mana Arotake Aotearoa did not include any examples from DOC, MfE or MPI, but includes, among others, one example from Te Manatū Waka – Ministry of Transport and two examples from the Energy Efficiency and Conservation Authority – Te Tari Tiaki Pūngao.[13]

Within the natural resources sector, variations are apparent in the way outcomes are reported on. Compared with outputs, outcomes pose challenges. While some outcomes may be relatively easy to define, measure and report against, others may be harder to measure, lack data or have a complex relationship to outputs. As environmental change is often slow, the time horizons before an impact can be observed may be lengthy, adding further complications.

Whole of government accounting

A parliamentarian who is interested in the environmental outcomes that a government is prioritising would be spoilt for choice.

Governments appear to be rather adroit at producing lofty and often ambiguous strategic goals. Various documents – Cabinet priorities, wellbeing objectives, budget priorities, data priorities, research priorities – all provide a sense of what kinds of environmental outcomes the Government ultimately intends to facilitate. But there are so many of them, in so many different places, that the outcomes are crowded and confused.

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[11] See, for example, Controller and Auditor-General, 2021b. There is some disagreement about this, as evidenced by the recent exchange between Bertram and Warren (Bertram, 2022, p.33; Warren, 2022, p.37).

[12] Chapple links issues with annual reports to the influence of managerialism, including a focus on selling and presentation rather than policy substance. See Chapple, 2019, p.53.

[13] See Audit New Zealand et al., 2021.

Part of the explanation for this is that environmental issues cut across the activities of a wide range of agencies. There is also no common environmental outcomes framework that unites even the eight agencies that are formally identifiable as part of the wider natural resources sector.[14] There do not appear to be clearly defined expectations around the contribution that individual agencies make to environmental outcomes. Even more basically, no agency appears to be attempting to determine the kind of evidence that would facilitate whole of government accounting for environmental outcomes. This is somewhat predictable given the nature of New Zealand's public accountability system and its focus on agency-level control.

Other sectors have managed to create a much greater level of outcome coherence. For example, the transport sector has a transport-wide outcomes framework, including clearly defined outcomes and measures. According to one recent assessment, these outcomes are meaningful to both the sector and the public. Additionally, the framework enables clarity about how agencies across the sector will contribute to those outcomes.[15]

Even when environmental outcomes are explicit, an equally clear – much less comprehensive – account of how the Government intends to make progress against those outcomes is often lacking. Strategic policy and planning exercises are often weakly connected across agencies, to the budget process, the authorisation of new spending, and funding mechanisms more generally. As a result, numerous environmental strategies and plans have never made the transition from aspiration to reality.

It is easy for disconnects to emerge between long-term planning and budget processes, especially given that the latter have traditionally consisted of annual funding rounds concerned with marginal spending. These kinds of disconnects are particularly fraught in the context of environmental issues long in the making with even longer tails. Meeting the challenge represented by environmental issues will almost always require concerted effort and funding over the medium or long term.[16]

The lack of coherence around environmental outcomes poses an obvious obstacle to mapping expenditure to those outcomes. We know little about the magnitude of central government spending on the environment and how this spending is allocated across different environmental areas.

Of course, it would be simple to add the appropriations from 'environmental' Votes. Outside of that, some vague and incomplete indications can be unearthed from different documents produced by different organisations for different purposes. But existing estimates of environmental expenditure capture only a subset of spending from across the central government and fall far short of being comprehensive. They are compiled from different sources with different reporting and accounting conventions, ensuring that available figures are not directly comparable. Estimates of local government environmental expenditure are also produced. More detail is provided in Box 3.3.

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[14] The natural resources sector comprises DOC, Department of Internal Affairs, LINZ, Ministry of Business, Innovation and Employment, MfE, Ministry of Transport, MPI and Te Puni Kōkiri.

[15] See Audit New Zealand et al., 2021.

[16] As discussed below, there is ongoing experimentation with the public finance system aimed at responding to some of these concerns (including multi-year capital allowances, the multi-year Climate Emergency Response Fund, the use of spending reviews and the broader use of clusters to support medium-term planning and inter-agency collaboration on areas of related concern). See New Zealand Government, 2022c, p.11.

Box 3.3: Whole of government estimates of what we are spending on the environment

Estimates of spending based on the System of Environmental-Economic Accounting

One set of estimates of environmental expenditure can be derived from the environmental economic accounts produced by Stats NZ. These estimates use the System of Environmental-Economic Accounting (SEEA) framework.[17] The underlying accounts are intended to provide an estimate of economic activities with the primary function of reducing, mitigating and preventing pollution and other forms of environmental degradation. The accounts provide estimates of final consumption expenditure for agencies that are engaged primarily in the production of environmental quality.[18]

The most recent data suggest that central government environmental protection expenditure was $631 million for the year ending March 2020.[19] This was equivalent to 1.2% of final consumption expenditure for central government in total.

Estimates of environmental protection expenditure incurred by local government are also compiled under the SEEA. Local government expenditure on environmental protection was $1.3 billion for the year ended March 2020. This was equal to about 19% of total local government final consumption expenditure for that year.[20]

Unlike central government estimates, estimates of local government environmental spending can be disaggregated by activity. The majority of expenditure was directed towards the treatment of wastewater and the collection and disposal of solid waste/refuse, which together accounted for about 79% of local government environmental protection expenditure. Other protection activities related to air and water quality, pest management and land and soil management comprised a more negligible share of environmental expenditure.

Estimates of spending based on appropriations data

Another set of estimates of environmental expenditure can be derived from appropriations data produced by the Treasury. Appropriations are a formal mechanism that provide a Minister with Parliament's authority to spend public money. As such, appropriations data are intended to provide an accountability mechanism. They help answer the question: Did ministers spend public money in a way that is consistent with the authority they were granted by Parliament?

The Treasury tags each appropriation according to the broad function of the appropriated expenditure. Based on appropriations data and assigned function, central government environmental protection expenditure was estimated to be $1.5 billion for the year ended June 2020. This was about 1.2% of all expenditure identifiable from appropriations data for that year.

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[17] For a summary of the SEEA, see Appendix 2 of PCE, 2021c.

[18] Final consumption expenditure is defined as "the sum of intermediate consumption, compensation of employees (which includes salaries and wages, Accident Compensation Corporation (ACC) levies, employer superannuation contributions, and fringe benefits), indirect taxes, and accounting depreciation" (Stats NZ, 2020, p.30). As the production of public sector goods and services is generally not subject to a market price, consumption expenditure is valued as the sum of costs (Stats NZ, 2020).

[19] Stats NZ, 2022.

[20] Stats NZ, 2022.

This estimate of environmental protection expenditure uses a different data source and method compared with the estimate produced by Stats NZ under the SEEA framework. Accordingly, the two estimates of central government environmental protection expenditure will differ.

Estimates of spending from my 2019 review of environmental research funding[21]

In my review of environmental research, I constructed an estimate of how much the Government spends on environmentally related research initiatives. The very fact that I had to generate an estimate from scratch is evidence of the lack of connections between the environmental research system and the public finance system. Its subsequent use in the recent Natural Resources Cluster process is evidence of the usefulness of making these connections.

Depending on whether environmental research is narrowly or broadly defined, the amount of public spending in the 2019 financial year ranged between $427 million and $516 million.[22]

We know even less, at a whole of government level, about what this spending is doing for overall environmental outcomes. In part, this is a result of a lack of aggregation of agency-level reporting and in part stems from the limitations of agency-level reporting. But fundamentally, this is because there is often a lack of consistency in the environmental outcomes that agencies report against. What this means is that the effectiveness of government spending on the environment is opaque at a macro level.

If we do not have a clear sense of what impact government actions are currently having on the environment, it is impossible to know if success and failure are simply a matter of chance. It also makes it difficult to develop a shared sense of the environmental outcomes that may be achievable.

The lack of whole of government reporting that links central government spending to outcomes is something that the Auditor-General has lamented, insofar as it reduces the transparency of government spending, and the ability of Parliament and citizens to hold the Government to account.[23] It is a concern I share.

A broader point can be made: Given the existing state of our data, knowledge and spending systems, it is currently not possible to say, at a system-wide level, whether we are underinvesting or overinvesting in the environment in general. Nor can we say so in respect of any particular environmental area or issue.[24] If it is not possible for officials to reach a conclusion on this, it is unrealistic to expect parliamentarians to do so on the basis of existing reporting.

[21] See chapter two of PCE, 2020.

[22] PCE, 2020, p.36.

[23] Controller and Auditor-General, 2021b.

[24] See chapter three of PCE, 2021c.

A fresh experiment: whole of government accounting in the context of climate

Climate change may be an emerging exception.

Outcomes (emissions reductions) are clear across agencies, spending is increasingly mapped to outcomes, a single plan is formulated, and clear efforts are being made to evaluate the impacts of key initiatives on the environment. Specifically:

- the nature of the environmental challenge is clear
- emissions budgets provide clarity about the outcomes that the Government is committed to
- the Climate Emergency Response Fund will give Parliament a whole of government sense of how (new) spending aims to reduce emissions
- MfE's Climate Implications of Policy Assessment tool provides a mandatory estimate of the emissions contribution of proposals that go before Cabinet
- the emissions reduction plan provides information about the actions the Government is currently undertaking and those that it intends to undertake[25]
- the Climate Change Commission comments on its effectiveness and the Climate Change Chief Executives Board provides additional monitoring
- monitoring and reporting requirements will in time facilitate an ex-post understanding of the effectiveness of that spending.

Though gaps will remain, this system will allow parliamentarians to provide effective scrutiny. The existence of the New Zealand Emissions Trading Scheme provides a further source of detailed information and a revenue stream that can support both policy and climate action.

But climate change is only one environmental challenge among many. While it is welcome that we can finally start to take a more evidence-informed approach to climate policy, there is just as much need to do so for water, land, biodiversity and waste.

[25] MfE, 2022c.

Source: World Meteorological Organization, Flickr

Figure 3.2: The Dobson spectrophotometer at the Lauder Atmospheric Research Station in Central Otago measures ozone, which feeds into our understanding of climate change. The research station has been measuring atmospheric chemistry and radiation for 60 years and is one of five sites in the international Network for the Detection of Atmospheric Composition Change.[26,27]

A further experiment: the Natural Resources Cluster

The Natural Resources Cluster provides an interesting experiment in linking at least some significant elements of public expenditure to broad areas of environmental significance.[28] To date, the inner working of the cluster and associated spending review have largely been a matter internal to the Government.[29]

The cluster consists of three large agencies whose missions intersect with the environment: the Department of Conservation, the Ministry for the Environment and the Ministry for Primary Industries. It sits between agency-level accounting and a whole of government approach. The group was brought together in the context of Budget 2022 to increase collaboration, improve value for money and strengthen delivery against outcomes.[30] One objective of the associated spending review was to align baseline spending more closely to shared outcomes and priorities.[31]

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[26] See https://www.stuff.co.nz/science/110213327/the-ups-and-downs-of-nzs-first-ozonemeasuring-dobson-spectrophotometer.

[27] See https://niwa.co.nz/atmosphere/facilities/lauder-atmospheric-research-station.

[28] In addition to budget documents, this section draws upon discussions with officials from Natural Resources Cluster agencies (pers. comm., 24 May 2022, 17 June 2022, 19 July 2022 and 2 August 2022) and the Treasury (pers. comm., 7 April 2022, 1 July 2022 and 11 August 2022). A more detailed – but forward-looking – overview of the Natural Resources Cluster is provided in PCE, 2021c, pp.69–71, 156–157.

[29] In addition to the information made available as part of Budget 2022 (see, for example, The Treasury, 2022a), it would be expected that some documentation would be made available to Members of Parliament and citizens as part of The Treasury's proactive release of budget documents.

[30] See The Treasury, 2022a, p.2.

[31] The Treasury, 2022b, p.2.

So far, the cluster and associated spending review have:

- identified outcomes, priorities and cross-cutting areas of focus
- mapped spending to outcomes and areas of focus
- assessed the efficiency and effectiveness of baseline spending
- developed bids for new spending and constructed a Budget package.

While the spending review has concluded, the cluster is in the process of developing monitoring requirements and will be required to report against these at the agency level.

The cluster process, coupled with the spending review, varies from the standard annual budget cycle in the following ways.

- It included an expansive examination of baseline spending (as opposed to a focus on new spending).
- It included three-year funding (as opposed to annual funding rounds).
- It brought together three agencies for simultaneous consideration (as opposed to functionally treating agencies as silos).
- It facilitated the involvement of the same group of officials across the entire budget process (as opposed to largely discrete stages involving largely discrete sets of officials).
- It facilitated collaboration among three Natural Resources Cluster agencies (and the Treasury) in the development of budget packages.[32]

Though I have not examined the cluster in detail, it appears that the cluster was constrained by its limited focus, its approach to forming outcomes and priorities, the underlying lack of evaluation of initiatives, and a lack of (environmental) data and knowledge more generally.[33] Although the objectives of the cluster and associated spending review were clearly worthy of merit, it appears that, at least in its first iteration, the process was not the resounding success one might have hoped for.

Part of the explanation for these difficulties relates to the somewhat arbitrary limit to the cluster's boundaries. It embraced only three of the eight agencies from the wider natural resources sector. While this may very well be appropriate for some outcomes and some areas of focus, it is problematic for others. Though one of the areas of focus was research, science and innovation, this meant that the main funder of environmental research (Ministry of Business, Innovation and Employment – Hīkina Whakatutuki) was not involved in the cluster. More generally, cluster outcomes and priorities were not explicitly linked to outcomes and priorities generated by the environmental research system.

An additional difficulty is likely to be that the three agencies vary significantly in their core responsibilities, outcomes and priorities. The separate roles of these three agencies made 'hunting for overlaps' challenging. Coming together as a cluster does not eliminate the different responsibilities, incentives and accountabilities that confront agencies and ministers. These difficulties appear to have been exacerbated by tight timelines, as well as complications associated with the sequencing of workflow across the cluster and associated spending review.

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[32] Nonetheless, many of these features are not unique to the cluster process and have been or could be integrated into different institutional processes.

[33] Of course, the cluster and associated spending review extended beyond considerations that are directly (and indirectly) environmental. I restrict my comments to environmental considerations.

In mapping expenditure to outcomes, the cluster also faced challenges.[34] It was hampered by the limits of existing information on environmental spending. For example, the cluster noted "difficulty in obtaining agencies' climate change related expenditure (i.e. data was not available for all cluster agencies)."[35] Information limitations constrained the extent to which the Government is able to understand its fiscal commitment to environmental challenges. Previously noted conceptual difficulties with mapping an output to a single outcome also added complexity to this task.

The review of baseline spending highlighted difficulties assessing the efficiency and effectiveness of spending in the absence of sufficient environmental information.[36] While the intellectual foundations motivating the spending review appear to have been strong, similar consideration of how generic processes and methods might need modifying when applied to environmental spending appears to have been lacking. The difficulties posed by environmental outcomes and information limitations were entirely predictable.

Across its areas of focus, the spending review struggled to make evidence-informed judgements about the effectiveness of particular policies and initiatives.

There are massive limitations in what agencies know about the effectiveness of their expenditure. This is partly due to limited monitoring and evaluation. In many instances, the spending review was forced (or chose) to focus on inputs or outputs. In part, this is likely because inputs and outputs were less compromised by those information limitations.

What this means in practice is that it was challenging to provide cluster ministers with a clear sense of the impact of existing spending on environmental outcomes or where new spending might be most effectively focused.

The pressure cooker nature of the budget process provides a demanding test for whether existing information is sufficient to make informed decisions about what environmental outcomes should be prioritised, whether existing spending is sufficient to facilitate those outcomes and what new spending should be prioritised.[37] The cluster exercise provided a further affirmation that the state of our environmental information is not up to the task of providing an informed basis for decision making.

It appears that many of my comments in my earlier report on the annual budget process – including a focus on the short term and detachment from accruing environmental risks and liabilities – apply to the cluster and associated spending review. It remains to be seen how effectively the insights generated by this experiment will be used in future decision making.

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[34] From an environmental standpoint, these estimates are also limited as they only captured spending from three agencies (rather than a whole of government estimate of environmental expenditure).

[35] The Treasury, 2022b, p.76.

[36] This finding mirrors a long history of critical assessments of New Zealand's public finance system. For example, Petrie and Webber noted in 2001 that there was a "broad consensus" that there is a "lack of information on the effectiveness of the public sector." See Petrie and Webber, 2001, p.28.

[37] For a detailed account of this pressure cooker process, see chapter three of PCE, 2021c.

What else do we need to do to enable public accountability?

The gaps between what parliamentarians and citizens need to know to scrutinise environmental spending and what they actually know are rather wide. Chapter two has provided a sense of what we need to know about the state and trajectory of environmental issues, including environmental liabilities. In the remainder of this chapter, I focus on what we need to know about:

- environmental outcomes
- planned initiatives and actions
- total environmental spending
- the breakdown of environmental spending by outcome
- the impact of that spending on environmental outcomes.

Being clear about the environmental outcomes the Government is aiming for

As outlined earlier, the Government's stated environmental outcomes are simultaneously everywhere and nowhere. They proliferate, exist at multiple scales and are orientated to different purposes. As a collective, they provide little coherence and their sheer number obscures public accountability.

What is needed is clarity – at a whole of government level – about the environmental outcomes that governments want to achieve and the time horizon over which they want to achieve them.

One way to produce clarity is to spell out – and distinguish between - the enduring and overarching environmental outcomes that New Zealanders value over the long term, and the specific outcomes that the Government of the day will prioritise and focus on in the medium term.

Governments will inevitably disagree with one another about the worth of some outcomes or at least how they should be prioritised relative to other outcomes. When they do, governments should refresh their specific, priority outcomes, their time horizons or their ambition. Targets or limits may be effective in communicating some of this information.

Environmental reporting provides a pre-existing framework for such an exercise. Drawing on the amended domains I have proposed for environmental reporting, six enduring environmental outcomes could be:

- improving Aotearoa's land and freshwater, including sustainable management of resources
- improving Aotearoa's biodiversity and ecosystem functioning and resilience
- improving Aotearoa's coastal and marine environment, including sustainable management of resources
- reducing greenhouse gas emissions
- reducing pollution and waste
- improving the efficiency and effectiveness of institutions designed to manage human interventions in the environment.

These headings represent enduring, general and uncontroversial environmental outcomes. These kinds of enduring outcomes should place sufficient emphasis on the long term, including future generations.[38] They should be shaped with te ao Māori perspectives in mind. Underneath these, the Government should then clarify those specific outcomes it wishes to prioritise over the medium term. Such an approach would provide coherence within different environmental domains and between environmental reporting, strategic policy and planning, investment decisions, performance reporting and accountability processes.

Source: Dave Young, Flickr

Figure 3.3 Dairy farm, Taranaki. Exploring on-farm mitigations, changes in management practices and land uses could contribute to several enduring environmental outcomes related to improving Aotearoa's land and freshwater, biodiversity and ecosystem functioning and reducing greenhouse gas emissions.

There are many benefits to linking the Government's environmental outcomes to environmental reporting. In terms of environmental information, environmental reporting already provides the beginnings of a set of indicators that could help the Government track its progress. More importantly, the results of environmental reporting can point to those environmental issues that might be specific, priority outcomes.

Indeed, one of the functions of state of the environment reporting is to report on priority environmental issues. Though these issues are not formulated as outcomes, construing them as outcomes appears straightforward. For example, an issue identified in *Environment Aotearoa 2019* was "The way we fish is affecting the health of our ocean environment".[39] This could be effortlessly reconstructed as an outcome in the following way: "fish stocks are managed sustainability to protect the health of our oceans". But it would be for a government to spell out the specific, priority outcomes it wants to pursue consistent with enduring and overarching outcomes.

[38] These outcomes could be formulated in language that refers to concepts of sustainability, resilience and risk as well as concepts found in te ao Māori (such as mauri). Whatever forms these outcomes take, they should not reduce the value of the environment to its immediate impact on current wellbeing.

[39] MfE and Stats NZ, 2019, p.83.

There are international examples that we can draw on. For example, Sweden's environmental objectives system contains a single generational goal, 16 environmental quality objectives and a similar number of milestone targets.[40]

Whatever outcomes the Government chooses, it needs to be clear about what it wants to achieve, the time horizon over which it wants to achieve it, what it expects each government agency to contribute and which agency is responsible for achieving each outcome.

Spelling out how the Government is planning to make progress

The Government should be clear about how it plans to respond to environmental issues identified in state of the environment reporting. A first step is to identify its specific, desired outcomes. A second step is to identify *how* it is going to achieve those outcomes.

When done well, a clear statement of what a government intends to do can provide both a powerful coordinating force for long-term decision making and a strong foundation for public accountability. Better planning would allow agencies to communicate more clearly about how they intend to use the money that Parliament approves to work towards the delivery of specific, priority outcomes.

Meaningful accountability is, in part, about being able to judge whether a government has actually done what it has publicly committed to do.

This would require the Government to state clearly both its general approach to meeting its outcomes (its strategy) and the particular actions it intends to undertake to achieve its outcomes (its plan). Strategic planning is ultimately about the allocation of resources – becoming something of an oxymoron if it is disconnected from investment.

A clear strategy should provide overall direction for spending. I have previously recommended that the Government should produce an environmental research strategy to provide structure for the funding of environmental research. Such a strategy could benefit from clearly specifying how the environment research that it seeks to prioritise will facilitate environmental outcomes.

A clear action plan that is orientated to the long term and signals well-phased and coordinated fiscal commitments could play an important role in reducing the fragmented short-termism of the budget process. A whole of government plan for achieving environmental outcomes should be integrated into the budget process, including priority setting and actual investment decisions. There appears to be some progress in this direction with the use of three-year funding cycles in the context of the Natural Resources Cluster. While the first iteration of the cluster was by no means a resounding success, future iterations may well enable agencies to plan together better.

Alternative models exist in other jurisdictions. For example, the Dutch Parliament approves a five-year plan for the environment. The Department for Environment, Food & Rural Affairs in the United Kingdom releases an 'Outcome Delivery Plan' that sets out how it will achieve its priority outcomes.

Whatever form it takes, a clear plan can be an important way of linking environmental outcomes, long-term planning and investment decisions (including budget process). Most importantly, it needs to show how the Government plans to translate talk into action.

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[40] Milestone targets are divided into areas such as reduced climate impact, air pollution, biodiversity, dangerous substances, sustainable urban development and waste. These areas are similar to my proposal for the environmental domains that should structure state of the environment reporting.

Accounting for the totality of the Government's expenditure on environmental protection and resource management

As outlined earlier, existing reporting requirements are incapable of producing a meaningful sense of what we are spending on protecting and restoring the environment.

I have attempted to fill this gap by producing a new estimate of environmental expenditure. Compared with existing estimates, this new estimate is both comprehensive and systematic. The estimate pulls together central government expenditure from publicly available appropriation data.

Both the method I have used to compile my estimate and the underlying data I have used have distinct limitations. This estimate should not be regarded as definitive and should be treated with a degree of caution. Details on how this estimate has been derived, the different ways of categorising spending and the limitations that attach to it and their consequences are set out in my accompanying *Estimate of environmental expenditure 2019/20: Method and results*.[41]

From the standpoint of the capacity of existing systems to enable public accountability, these limitations represent an important finding. If it is difficult to map many appropriations to even a broad environmental area, it will be extremely difficult for parliamentarians and citizens to scrutinise public expenditure or hold governments to account for the effectiveness of their spending.

This suggests that appropriations – as they are currently structured – do not enable Parliament or the public to understand what agencies are planning to do to contribute to government priorities and environmental outcomes more generally. While appropriations may work well in terms of authorising and controlling expenditure, they fall short as a means of facilitating effective public accountability.

I estimate that central government expenditure on the environment was $2.6 billion for the year ending 30 June 2020.[42] This equates to 2.0% of central government spending authorised through appropriations for that year.

In my 2021 review of the budget process, I suggested that existing estimates are likely to underestimate central government spending related to the environment.[43] My own estimate appears to confirm this.

It is instructive to broadly contrast this figure with environmental taxes. According to estimates prepared by Stats NZ using the SEEA, revenue from environmental taxes was $5.8 billion for the year ended March 2020.[44] That estimate includes revenue generated from energy, transport, pollution and resource taxes based on whether the tax base has a proven and specific negative impact on the environment.[45]

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[41] See PCE, 2022a.

[42] This estimate includes about $357 million of expenditure that appeared to be only marginally related to the environment. It also includes an appropriation of about $650 million related to the allocation of New Zealand Units to eligible sectors of the economy that are subject to the emissions trading scheme. Note that this estimate is not directly comparable with other estimates of environmental spending presented in Box 3.3. For additional information on differences in data sources, method and coverage of these estimates, see PCE, 2022a.

[43] PCE, 2021c, p.71.

[44] See https://www.stats.govt.nz/information-releases/environmental-economic-accounts-data-to-2020.

[45] The technical definition of an environmental tax under the SEEA framework is "a tax whose tax base is a physical unit (or a proxy of it) of something that has a proven, specific, negative impact on the environment". See United Nations et al., 2014, p.121.

It is also instructive to broadly contrast this figure with local government spending on environmental protection. Estimates prepared by Stats NZ using the SEEA showed that local authorities spent $1.3 billion on environmental protection for the year ended March 2020.[46] See Box 3.3 above.

The most important caveat to note in interpreting my estimate of central government environmental spending is that it provides an estimate of direct environmental protection and resource management expenditure. It does not aim to provide a broader estimate of environmentally related spending (i.e. spending with more indirect environmental implications, either positive or negative). Almost all government expenditure and transfers will have environmental impacts through their influence on consumption patterns. These impacts are likely to dwarf the environmental impact of spending that can be specifically defined as 'environmental'.[47]

Nonetheless, this is my best estimate of how much is at stake, in terms of the fiscal footprint of environmental spending. How this estimate compares with other functional areas of government expenditure is indicated in Figure 3.4.

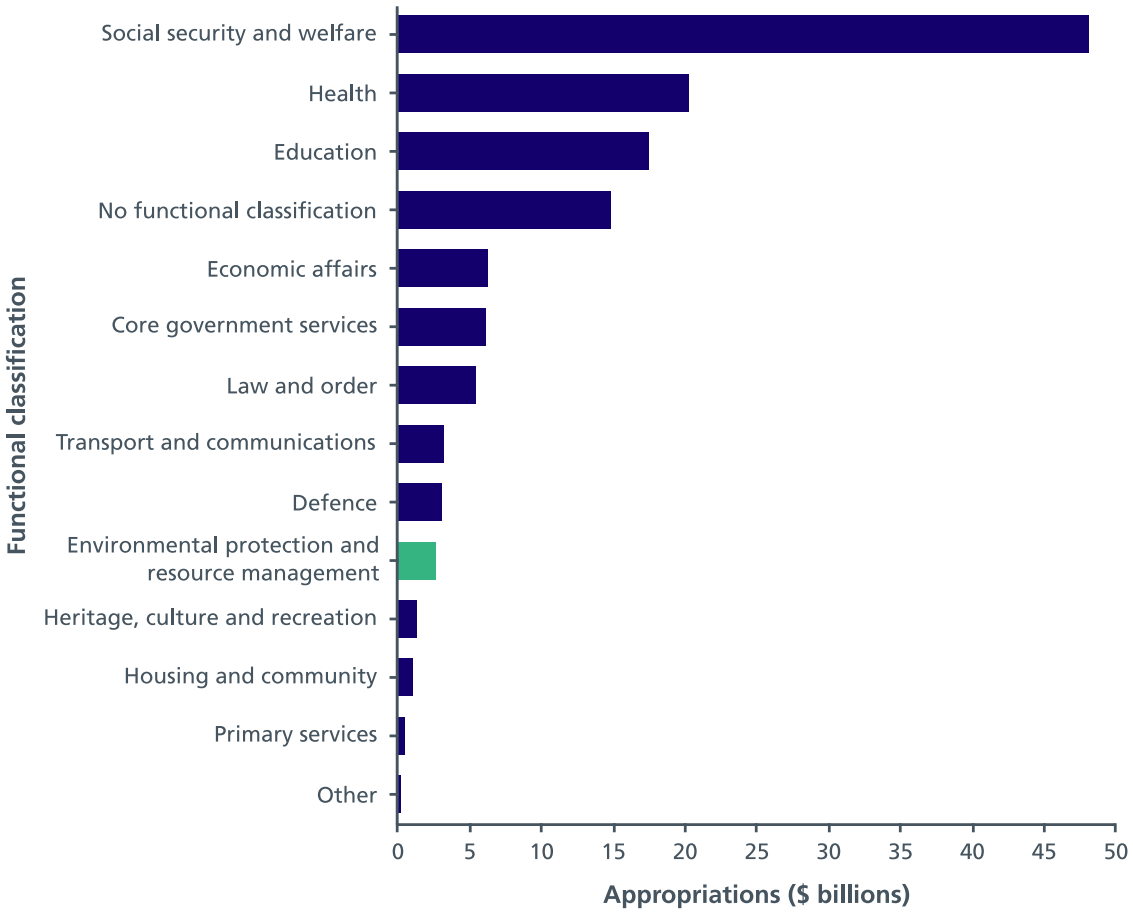


Figure 3.4: Total central government expenditure, disaggregated by function for the year ended June 2020. Relative to other functions, government spending on the environment represents a tiny fraction of total expenditure.

[46] Stats NZ, 2022. Note that this estimate of local government environmental expenditure is not directly comparable with my estimate of central government spending due to differences in data sources and methodological compilation.

[47] This highlights the importance of integrated environmental policy and, more generally, the need for environmental policy to align with other areas of policy.

The footprint represented by environmental expenditure may pale in comparison with that of spending in other sectors. But it still represents a serious claim on government finances, albeit one that is likely to be dwarfed by the fiscal liabilities we are accruing through the erosion of natural capital.

Breaking down expenditure by environmental outcome

More interesting than the total spend is what the Government is spending on particular areas of the environment and what outcomes it is attempting to advance through this expenditure.

Knowing this would help decision makers, Members of Parliament and the wider public to scrutinise whether the amount the Government is spending on a particular area is sufficient to match the severity and urgency of challenges there. In areas where there is more information, it will be useful to compare that spending to what we know about the environmental liabilities that have been accrued or are accruing. This will provide a sense of what the current Government is billing to future governments representing future generations.

While environmental expenditure can be categorised in a number of different ways, there are benefits to categorising spending in a way that creates a line of sight between what environmental reporting is telling us about environmental issues, the environmental outcomes that the Government aims to secure, and the spending decisions that are made. Even if this is not done, categorising environmental spending by broad environmental area will provide a coarse sense of the Government's fiscal contribution to existing and emerging environmental liabilities.

Table 3.2 provides linkages by breaking the total environmental expenditure into headings that can easily map onto the environmental domains that I have proposed as the framework for environmental reporting. These headings indicate the ease with which environmental domains could be translated into enduring environmental outcomes. It is further broken down into the priority environmental issues identified by MfE and Stats NZ as part of their independent reporting on the state of the environment.[48] Each of these issues is, effectively, a specific environmental outcome.

[48] See MfE and Stats NZ, 2019. Priority environmental issues are less explicit in the latest state of the environment report; see MfE and Stats NZ, 2022.

Table 3.2: Disaggregation of environmental expenditure by enduring and specific outcomes.

Environmental expenditure 2020	Sum of amount $ (000)
Disaggregated by enduring and specific outcomes	
Reducing greenhouse gas emissions[i]	**$815,411**
New Zealand's per person emissions are declining	$813,326
Indeterminate	$2,085
Improving Aotearoa's biodiversity and ecosystem functioning and resilience	**$613,337**
Our native plants, animals and ecosystems are thriving	$613,337
Improving the efficiency and effectiveness of institutions designed to manage human interventions in the environment	**$491,722**
–	$491,722
Improving Aotearoa's land and freshwater, including sustainable management of resources[ii]	**$287,021**
Land management is improved to enhance soil and water quality	$168,904
Mineral and energy resources are managed sustainably	$102,908
Management of water takes is improved to ensure sustainability of our freshwater ecosystems	$15,209
Reducing pollution and waste	**$247,885**
Indeterminate	$152,428
Pollution in farming areas is reduced and waterways in farming areas are cleaned up	$52,484
Waste and pollution in urban areas are reduced	$42,973
Improving Aotearoa's coastal and marine environment, including sustainable management of resources	**$108,897**
Fish stocks are managed sustainably to improve the health of our oceans	$107,291
Indeterminate	$1,606
Total	**$2,564,273**

Notes:

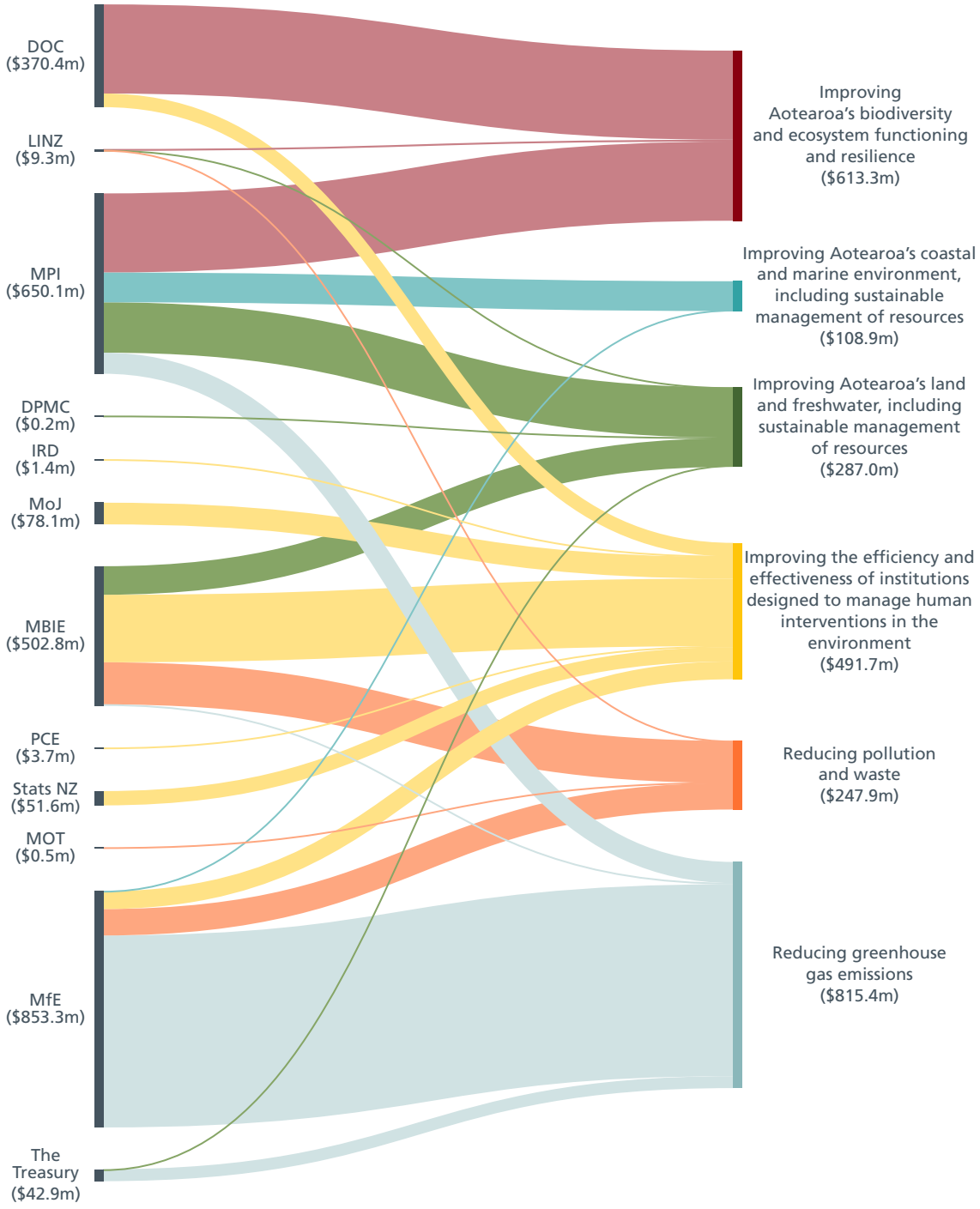
[i] The analysis of appropriations did not identify any expenditure related to the specific outcome 'New Zealand is effectively adapting to the impacts of climate change'.

[ii] The analysis of appropriations did not identify any expenditure related to the specific outcome 'urban growth is managed without affecting versatile land and native biodiversity'.

An important benefit of disaggregating expenditure by 'domain' is that it provides a direct and explicit link between what we know about the state of the environment (via state of the environment reporting) and a government's revealed expenditure priorities as they emerge from the budget process.

Figure 3.5 links environmental expenditure to the agencies that administer it, again using the enduring environmental outcomes. This provides a sense of who spends what, and where they spend it.

In the same way that we need time-series data about the state of the environment, we need time-series data about the amount and distribution of environmental expenditure. At the least, it should sketch the beginnings of a picture of how government ambition towards different issues is changing through time. Being able to examine the level of investment over time for a given area is critical because an environmental problem deferred today can be both an environmental liability and a fiscal risk that will have to be faced in the future.



Note: DOC = Department of Conservation; DPMC = Department of the Prime Minister and Cabinet; IRD = Inland Revenue; LINZ = Land Information New Zealand; MBIE = Ministry of Business, Innovation and Employment; MfE = Ministry for the Environment; MoJ = Ministry of Justice; MOT = Ministry of Transport; MPI = Ministry for Primary Industries; PCE = Parliamentary Commissioner for the Environment.

Figure 3.5: Environmental expenditure by government agencies attributed to enduring environmental outcomes. The left side of the figure provides a sense of total environmental spending; the right side provides a sense of where that spending is focused. Flows capture the contributions of individual agencies.

The Government can and of course does respond to environmental challenges through non-fiscal actions such as regulation. And of course local government, private firms and civil society groups are also important responders to environmental challenges. Before the Government decides how much money it should spend on a given environmental issue, it should consider what kind of non-fiscal actions it might take or, indeed, whether it is the right agent to undertake action. This is a further reason to resist attempting to assess the Government's response to environmental issues solely on the basis of its expenditure.

Accounting for the impact of that spending on the environment and whether progress is being made towards those outcomes

Members of Parliament need a clearer sense of the impacts of government spending on the environment. Evaluation – and monitoring more generally – provides clarity and enables accountability. Other processes, like spending reviews, also provide insights.

While I have been able to provide a sense of what the Government spends on the environment, it is well-nigh impossible to provide any meaningful sense of the actual outcomes we are securing for all that spending.

This is in part due to inadequate environmental monitoring at national and regional levels, the state of performance reporting within agencies and a lack of coherence in the way agencies report their performance. But it is also due to patchy connections and misaligned incentives.

At a general level, progress can be tracked via monitoring. Environmental monitoring provides a sense of the state of the environment as well as trends in environmental quality. When changes in the environment are tracked against desired outcomes, actions and spending, this can be enough to provide a very coarse sense of how ambition is tracking against desired environmental outcomes.

Source: Chris B, Flickr

Figure 3.6: Wetlands like the one at Matarangi Beach, Whangapoua Harbour are under threat from multiple pressures. Ongoing regular monitoring is needed to determine the health of these ecosystems, guide management initiatives to halt wetland degradation and track progress against desired outcomes.

However, that is not enough to provide a granular, evidence-informed basis for understanding the impact of key government actions on environmental outcomes. An assessment of the effectiveness of government actions on outcomes is one facet of what is typically included under the term 'ex-post evaluation'.[49] For more on the state of evaluation of environmental initiatives, see Box 3.4.

The formal evaluation of environmental initiatives requires linking inputs to outputs, outputs to impacts, and impacts to outcomes. Not only does the absence of evaluation limit what is known about baseline spending, it also casts a shadow on assessments of the effectiveness of future spending. In the decision-making context, this limits the extent to which decisions about either existing or new spending can truly be said to be informed by evidence.

[49] For example, the Social Policy Evaluation and Research Unit distinguishes between process evaluation, outcomes evaluation, economic evaluation, impact evaluation, developmental evaluation, realist evaluation and utilisation-focused evaluation. See Superu, 2017, p.5.

Evaluation is easier to demand than it is to undertake. Undertaking it takes time, money and resources. Even when such money and resources have, in an original policy funding decision, been tagged for evaluation, there is no certainty that an evaluation will take place. The money may simply be reprioritised (whether to some other policy or to shore up the implementation of the policy to which it was originally attached). Initiatives – environmental otherwise – vary in the ease with which they can be evaluated.[50] For many environmental initiatives, formal ex-post evaluation would be a tall order.[51]

Rather than involving tidy interventions in well-understood problems, environmental spending is often having to tackle problems plagued by uncertainty. Other environmental initiatives are system setting or are simply aimed at facilitating better environmental stewardship. Environmental reporting is a case in point.[52]

The biophysical characteristics of the environment often make it difficult to evaluate environmental initiatives.[53] One of the key difficulties is that environmental problems often lack a simple link between cause and effect. Another problem is the potential for serious lags between policy interventions and changes in the state of the environment. For example, if all sediment, *E.coli* and nutrients reaching a lake were stopped today, the lake would not suddenly cease to be polluted or reverse its decline. There would still be historical levels of pollution in the lake with more still to work its way downstream into the lake. Finally, in complex policy areas, it is also difficult to attribute the efforts of a particular government agency (or even the efforts of the government as a whole) to a particular outcome.[54]

These are not reasons to avoid evaluation but underscore the importance of developing ways to measure policy effectiveness at the time those initiatives are being designed. Even where evaluations of initiatives are not able to resolve uncertainties with any finality, they can be extremely valuable. For example, they can be useful inputs into a broader process of policy learning.[55]

Nor are these difficulties reasons to avoid the need for clarity and transparency. Governments are authorised to spend money for the purpose of achieving certain outcomes. While it may be unreasonable to expect every variable and every causal relationship to be accounted for, it is not too much to expect citizens and parliamentarians to be presented with a meaningful and understandable account of the progress that governments are making.

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[50] See, for example, Ogilvie et al., 2011.

[51] Indeed, establishing the existence of causal links between environmental initiatives and environmental outcomes (let alone the strength of those links) is difficult. See, for example, Jordan and Lenschow, 2010, p.154.

[52] For a discussion of the difficulties of evaluating investments in science more generally, see MBIE, 2017.

[53] Many of the characteristics of the environment that I identified as challenges for the budget process are also challenges for environment evaluation. See chapter four of PCE, 2021c.

[54] See, for example, Warren, 2021, p.23.

[55] Mickwitz, 2003, p.433.

Box 3.4: The state of environmental evaluation

While there has been variation through time in the priority given to evaluation and in the capacity of agencies to undertake evaluation, it appears that the general state of environmental evaluation could be strengthened.[56]

That we know remarkably little about the impacts of government spending on the environment is not an accident. Historically, governments have demonstrated an ongoing reluctance to prioritise the evaluation of policy, including environmental policy.[57]

At the very least, governments have demonstrated a reluctance to make public the results of evaluations.[58] There have been calls for the Public Service Commission's guidance around proactive release to explicitly include reference to ex-post evaluations.[59] However, guidance is one thing; following that guidance is another.

It is nonetheless difficult to develop a broad and deep view of the state of environmental evaluation. It appears that evaluation is sporadic, often focused on process rather than outcomes and often contingent on political demands.[60] The industry of ex-ante evaluation built around section 32 of the Resource Management Act 1991 dwarfs the ex-post evaluation undertaken or commissioned by MfE.[61]

There are, of course, notable examples of ex-post evaluation in the natural resources sector. For example, Motu has undertaken two large-scale research projects evaluating the impact of fisheries management. The first, in partnership with Resources for the Future (Washington, DC), examined the role and effectiveness of market-based instruments as fisheries management tools. The second, in partnership with Te Pūnaha Matatini, looked at the impact of fishing quotas.[62]

With some exceptions, there appears to be a culture of review that responds to political cycles and sensitivities. For political priorities, this is exemplified by major independent reviews of policy systems – such as the Randerson report – that precipitate a process of law reform.[63] For policy areas that are lower priority or less contentious, internal review appears to be more common. Independent and internal reviews alike would, at the least, benefit from a culture of evaluation.

Of course, the desirability of evaluation extends beyond the environment. Some government sectors appear to have stronger cultures and practices of evaluation.

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[56] See, for example, OECD, 2017, p.27.

[57] For example, independent oversight and evaluation was "watered down" by Cabinet in the context of the New Zealand Biodiversity Strategy (launched in March 2000). See Logan, 2013, p.128.

[58] See, for example, Chapple et al., 2018, pp.14, 16; Cook, 2021, p.10.

[59] See Markland, 2020, p.4.

[60] While process evaluation can provide information about whether an intervention is doing the right thing in the right way, a focus on implementation risks underemphasising environmental outcomes. At the same time, a myopic focus on outcomes – to the exclusion of other values and understandings of policy success – can also be criticised. See, for example, Dryzek, 2002, p.143.

[61] See MfE, 2017. This focus on ex-ante as opposed to ex-post evaluation does not appear to be a recent trend. A 1992 "evaluation framework" published by DOC devotes one page to ex-post evaluation, notes that the framework is "not so much concerned with ex-post evaluation" and directs the reader to American texts (Meister and Rosier, 1992, p.17).

[62] See https://www.motu.nz/our-research/environment-and-resources/fisheries-management/.

[63] See Resource Management Review Panel, 2020.


Hypolepis lactea

4 Recommendations

A nationally critical investment

If I was asked to sum up the problems exposed by the three reports that preceded this one in a single sentence each, I would level the following charges:

- We have an opportunistic environmental reporting system that relies on fragmented and patchy environmental monitoring and, as a result, is unable to provide a reliable picture of the state of our environment.
- The funding of environmental research is largely detached from the endless strategies and roadmaps we invent and from the output of environmental monitoring and reporting systems.
- We have a budget process that lacks the capability to consistently raise and address the long-term environmental challenges that we face.

This final report draws on the learnings of my prior reports and calls for:

- foundational investments in environmental information
- clarity about why we are prioritising certain environmental issues (and not others)
- transparency about what environmental outcomes the Government is aiming for, what the Government plans to do to achieve them and how much it spends as part of that response
- accountability for the results of that spending.

Chapter two laid out the deficiencies that plague our investment in environmental data and knowledge. It highlighted examples of the way a lack of data or knowledge is impeding effective environmental management. The general story is often the same: data collection is stop–start; research funding is haphazard; fiscal liabilities accumulate.[1] This status quo is unsatisfactory for the environment as well as for ministers, parliamentarians and the public.

[1] My three previous reports provide a more complete evidence base, and an explanation for why we find ourselves in this position. For more detail, see PCE, 2019, 2020, 2021c.

Chapter three identified significant gaps that impede public accountability. As part of my report, I tried to map the Government's environmental spending. Even with the dedicated resources at my disposal, I found the task difficult and frustratingly imprecise. If it was hard for me, it will be even harder for parliamentarians and the public they represent to get a clear picture.

As I have remarked, the one partial exception appears to be climate change, where we have good information as a result of meeting international reporting requirements. We also have policy instruments, such as the emissions trading scheme, that generate both information and revenue.

The questions I keep asking myself are: Why do we need an international agreement to provide the incentive to generate good information and report properly about what we are doing? Why is it that we cannot summon the same determination to take all environmental monitoring seriously and then use that to determine our research priorities and the way we invest in trying to protect our land, water and biodiversity?

There is no shortage of alarming signs of environmental deterioration and there will always be hard choices to make. There will also be uncertainty attached to those choices. There should not, however, have to be poorly informed choices. But there will be if some foundational investments in environmental information continue to be avoided.

The public finance system needs to resource environmental reporting and environmental research sufficiently to match the scale of the environmental challenges we face. This is the number one priority that must be addressed if we are to have a hope of outflanking some of these challenges.

It is unfortunate that investments in information are probably the easiest expenditure to continue to defer. There are certainly no votes at risk and the topic will not inspire protests. But before the Government embarks on any major new environmental spending, it should sort out environmental reporting and research and the links between them. This represents a nationally critical investment. If it is made, the Government will then be in a better position to sort out its priorities and reflect them in its expenditure decisions.

That investment needs to incorporate Māori expectations. During the time that I have been preparing these reports, there has been extensive ongoing policy work on the way in which te ao Māori is reflected into the management of water and reform of the wider resource management system envisaged by the proposed Natural and Built Environments Act.

I do not want to pre-empt where those considerations will end up but I am clear in my own mind that we cannot collect information on the state of the environment in Aotearoa or seek to understand the environmental challenges we face without engaging seriously with Māori. As Māori have the longest association with these lands and are custodians of deeply embedded knowledge about them, environmental reporting and research must be able to speak to them. That will not happen if the sort of national-level leadership I am advocating fails to acknowledge the tino rangatiratanga of local hapū and the mātauranga they guard.

What this report recommends

In previous reports and submissions, I have made a series of recommendations aimed at improving the quality of environmental reporting, the way environmental research is funded and integration of the environment into the budget process.[2] Many of those recommendations include an emphasis on better linking environmental reporting, environmental research and government decision making to create a more cohesive alliance. These recommendations are set out in the appendix along with an indication of the extent to which the Government has taken steps to implement them.

To my earlier recommendations I have one addition that relates to the need for national leadership in gathering environmental information and three that relate to the need for clarity within government and transparency to the outside.

Providing national leadership in gathering environmental information

Recommendation 1: The Government should give the Environmental Protection Authority a specific mandate to provide oversight and leadership of environmental monitoring.

My examination of the environmental monitoring system in 2019 and chapter two of this report reveal the need for:

- a more strategic approach to the design of environmental monitoring networks to enhance national consistency in the collection and reporting of environmental data, so information gathered is fit for purpose and representative
- mechanisms to collect new environmental information and drive innovation in the collection and analysis of environmental data
- more predictable, stable and consistent funding for environmental monitoring, especially given the technical expertise required
- better integration of high-quality science and reporting into the decision-making process about the nature of the environmental challenge we face and the way to respond to it.[3]

To do this properly requires a national approach and funding. Despite my earlier recommendations calling for a comprehensive environmental monitoring system and a nationally mandated strategy to progressively fill in known data gaps, national leadership has to date been largely missing.[4]

We have a national environmental body with technical expertise, the Environmental Protection Authority – Te Mana Rauhī Taiao (EPA), but its current mandate is an eclectic mix of functions that do not extend to environmental monitoring.

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[2] See PCE reports (PCE, 2019, 2020, 2021c) and PCE submissions (PCE, 2021b, 2022c, 2022d).

[3] See chapter two of this report and PCE, 2019, pp.21–44, 60–61.

[4] See PCE, 2019, pp.86–87.

With an expanded mandate, the EPA could take a national leadership role that could span some or all of the following responsibilities:

- providing national operational direction on standards and methodologies for environmental data collection
- advising on an appropriate national network of monitoring sites for all environmental domains. This network would be a collation of regional council sites, existing research sites and new sites to be set up either nationally or regionally
- collecting new environmental information to complement information collected by regional councils and other organisations such as Crown Research Institutes
- working with regional councils and the research community to drive innovation in the collection and analysis of environmental data
- providing funding to regional councils and other organisations to achieve the above.

Regional ratepayers are currently reluctant to shoulder significant, centrally imposed environmental monitoring costs. Collecting new environmental information and driving innovation in the collection and analysis of environmental data are beyond the resources of many regional councils. Giving some of these functions to the EPA and funding it centrally would resolve a funding stand-off that has held back environmental monitoring for three decades.

I am well aware that environmental pressures happen in local places. A national approach still requires local knowledge and presence. I am not proposing that the EPA should attempt to monitor the environment from Wellington. But it could provide a coordinating and resourcing role for local on-the-ground monitoring if it had a regional presence. That could easily be provided with little to no new bureaucracy.

At one extreme, regional council staff currently assigned to this function could simply be transferred to the EPA, creating a regional office. A less disruptive option would be for a few EPA staff to be co-located in each regional council. They would provide a liaison to feed the local situation and experiences, including mātauranga Māori, back to Wellington and form the nodes of a network of technical expertise across regional councils and with the EPA national office.

Such a change would simultaneously strengthen the environmental monitoring and reporting system and the resource management system. A regional presence for the EPA would be one way to ensure that local perspectives, including those of hapū, are not forgotten in the development and implementation of national environmental policy.

Whatever solution is adopted, it must be able to link national direction with local implementation. Under the proposed Natural and Built Environments Act, environmental limits will become a primary tool for the protection of the environment. It is critical that environmental limits are monitored and enforced so that they are not breached. This requires technical expertise, consistent resourcing and, critically, independence – all things that are sparse in the current system.

Recommendations focused on clarity within government and transparency to the outside

The balance of the recommendations in this report are designed to ensure that the actions of the Government are focused on the most important environmental outcomes, that the effectiveness of those actions can be assessed, and that Members of Parliament and citizens can hold governments to account for decisions made and decisions postponed.

In my review of budget process, I foreshadowed the focus of this report in these terms:

> "The basis on which long-run environmental issues are handled in the budget priority setting process needs to be examined. The Minister of Finance should receive reporting on how well existing policies and initiatives are addressing the environmental issues that are being identified by state of the environment reporting. This briefing should include how much expenditure is allocated to each of the environmental issues and what is known about the effectiveness of that expenditure. The Minister of Finance should then, each year at the time of the presentation of the budget, publish a report that outlines how new fiscal initiatives as well as any changes to baseline expenditure respond to the environmental issues identified. Such a process should be provided for in statute and be linked to reporting under the Environmental Reporting Act 2015."[5]

I am now in a position to propose a way to achieve this.

I am making three recommendations aimed at improving the clarity of decision making and the accountability of the Government for decisions made and decisions postponed.[6] They are:

- Recommendation 2: The Government should clearly state its environmental outcomes and how it will achieve them.
- Recommendation 3: Agencies should tag expenditure that relates to the Government's environmental outcomes and report on the contribution they have made to those outcomes.
- Recommendation 4: The Government should provide a whole of government report to the House on the expenditure it allocates to its environmental outcomes and the progress that is being made towards those outcomes for Parliament to examine.

These three recommendations – elaborated below – aim to provide clarity and transparency about how central government is responding to the environmental issues that state of the environment reporting identifies. Local government will need to be part of this journey but additional work is required to consider how it could be integrated into my proposals.

These recommendations are not about wheel reinvention or perfect standardisation. Significant advances can be made by better collating and leveraging existing material, knowledge and systems. I also recognise that different environmental issues will need to be tackled differently, will require different kinds of coordination within and beyond government, and will demand different kinds of reporting.

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[5] PCE, 2021c, p.125.

[6] There is crossover between these recommendations and the themes of the green budgeting literature. See, for example, Petrie, 2021.

Recommendation 2: The Government should clearly state its environmental outcomes and how it will achieve them.

The Government needs to be clear about the outcomes it is prioritising, its level of ambition and the role individual agencies are playing in contributing to those outcomes.

There need to be two sorts of environmental outcomes expressed over two different time horizons. And they serve different purposes.

- Enduring, overarching outcomes run across successive governments and multiple generations (say 10–50 years). These are not the stuff of party politics.
- Specific, priority outcomes that, for the time being, are identified by the Government of the day. These have a shorter time horizon (say 3–10 years).

Recommendation 2.1: Enduring environmental outcomes should be set in legislation.

There should be one enduring outcome for each environmental domain listed in the Environmental Reporting Act 2015. In chapter three, I interpreted these domains as enduring, long-term outcomes. For example, one enduring outcome could be 'Improving Aotearoa's biodiversity and ecosystem functioning and resilience' (see page 61). There should also be at least one other enduring outcome capable of capturing the role of institutions in securing general resource management and environmental protection outcomes.

Enduring outcomes should be uncontentious. If there are New Zealanders out there who believe that collapsing biodiversity, declining water quality or increasing pollution do not matter, they must be a very small band. It is not hard to spell out high-level outcomes that we can safely assume will outlive any particular Government. The function of these enduring outcomes would be twofold: firstly, to set the general direction of travel for the sort of environment we want to live in; and, secondly, to provide a stable framework for reporting and public accountability.

In light of their function, enduring outcomes should be embedded in primary legislation. Two statutes could provide a home. Since I am recommending that they are related to environmental reporting domains, a pragmatic location might be the Environmental Reporting Act 2015. Alternatively, a home could be found for them in the Environment Act 1986. The latter option would clearly communicate their wide-ranging role and provide explicit direction to the two institutions that that Act establishes: the Ministry for the Environment and the Parliamentary Commissioner for the Environment.

Stating such enduring outcomes would not lock individual governments into any particular courses of action. Individual governments would still have to choose, as they do now, which areas to prioritise, the level of ambition they have for their priorities, and the specific actions that they may take to meet those outcomes.

But those choices should be able to be mapped back to the enduring outcomes that underpin the reporting framework.

Recommendation 2.2: The Government should be required to outline specific outcomes.

Governments should be required to outline at least one specific outcome that will contribute to each enduring outcome. This would provide some clarity about what the Government intends to prioritise over the medium term. It would be specifying what it wants to achieve in the face of the many environmental challenges it faces. This, in turn, would provide a structure for linking together strategic planning, the formation of investment priorities, and spending decisions.

Each government-specified outcome should clearly communicate how it relates to an enduring outcome, the level of ambition it represents and the time horizon over which it is intended to be realised. This level of ambition could be communicated by limits or targets and will clarify what outcomes the Government considers to be achievable.

The soon to be introduced amendments to the Environmental Reporting Act 2015 propose to require the Government to respond, every six years, to state of the environment reports. That response would be a good place for the Government to outline the specific outcomes it intends to achieve. For example, it might respond to an issue identified in *Environment Aotearoa 2019*, such as "Our native plants, animals and ecosystems are under threat",[7] by specifying the following specific outcome: "By 2030, populations of all native species threatened with extinction have stabilised or are improving").[8] Provided that these government-specified outcomes are integrated into budget processes, this will help to link together environmental reporting and spending decisions.

However, these specific outcomes should be capable of review at any time. Obviously, a change of government would likely mean a change of priorities. But changing environmental conditions will mean that even within the lifespan of a particular Government, there will be changes in priorities.

This statement of outcomes should be the primary location where the Government's environment-focused strategic planning is collated and made available to the public. The Government should state its specific outcomes and what it intends to do to achieve them in a way that:

- signals the extent of any fiscal commitments
- facilitates budgetary trade-offs
- enables coordination and collaboration between agencies
- enables ministers, parliamentarians and members of the public to compare what the Government has said it would do with what it actually does.

At the time that it publicly outlines or updates its specific outcomes, the Government should also state:

- the agency that is responsible for each outcome
- the agencies that will contribute to each outcome
- its general approach to meeting these outcomes (its strategy)
- why this general approach is preferable to alternatives
- the particular actions it intends to undertake to achieve each outcome and the timeline over which they should be implemented (its plan)
- what the likely impact of those actions will be on each outcome
- how progress against each outcome will be measured.

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[7] MfE and Stats NZ, 2019, p.14.

[8] See Table 3.1 (p. 49).

Taking whole of government environmental outcomes seriously will require coordination and collaboration across and beyond the wider natural resources sector.[9] Some outcomes may naturally suit the grouping of agencies currently organised by the Natural Resources Cluster, some outcomes may suit different groupings (including the wider natural resources sector) and some may suit a whole of government approach.

Relevant ministers will need to ensure that the work programmes of agencies are singly and jointly aligned with environmental outcomes. In practice, this means that ministers would need to provide clear direction to agencies about their roles and expectations with regard to achieving each environmental outcome, through existing planning mechanisms such as statements of intent. Using both whole of government and agency-level accounts would allow agencies to clarify how they intend to contribute to the Government's plan and work with other agencies.

Recommendation 3: Agencies should tag expenditure that relates to the Government's environmental outcomes and report on the contribution they have made to those outcomes.

Once whole of government environmental outcomes are in place, agencies should tag expenditure and actions related to these outcomes.

As appropriations are authorised by Parliament, it is constitutionally important that information about the expenditure administered through appropriations is transparent.

My estimate of environmental expenditure points to the difficulties of using appropriation data to paint a coherent picture of environmental expenditure.[10] In compiling an estimate of natural hazard expenditure, the Office of the Auditor-General faced similar difficulties and came to a similar conclusion.[11]

Given the current structure of appropriations, tagging expenditure in a way that is transparent may require agencies to identify a suitable financial unit at a more granular level than appropriations.[12] When expenditure contributes to multiple environmental outcomes, that expenditure should be tagged in a consistent way that captures its contribution to those outcomes. Tagging research spending to environmental outcomes will be a particularly important challenge and needs to be carefully considered in the context of any changes to the way research is funded.

Annually tagging expenditure by environmental outcome should significantly improve accountability to Parliament for money that is appropriated in the name of environmental protection and management.

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[9] Of course, they will also require the involvement of organisations outside of central government, including local government, iwi and other civil society organisations.

[10] See chapter three and PCE, 2022a.

[11] See Controller and Auditor-General, 2020.

[12] As noted in chapter three, there may be limits to how well the current system and structure of appropriations can be aligned with accountability mechanisms, including performance reporting. Tagging of expenditure may be required at the level of key initiatives or another financial unit.

Evaluation of the effectiveness of key initiatives and actions is an important – and largely missing – element of performance reporting. In order to understand the impact that key initiatives and actions are having on particular environmental outcomes, formal ex-post evaluation is necessary and needs to be publicly available.[13] Other processes – such as environmental monitoring and spending reviews – may also produce valuable insights.

In its annual report, each agency should specifically detail:

- all the environmental outcomes that the agency is responsible for or contributing to
- the key initiatives and actions that it is undertaking (or working on with other agencies) to contribute to those outcomes
- the expenditure it has allocated to those key initiatives and actions
- how those key initiatives and actions are contributing or are expected to contribute to those outcomes. This should include any formal evaluations of their effectiveness
- the expenditure it has allocated to those outcomes.[14]

In the course of reporting on their performance, agencies will identify limitations in environmental information and knowledge gaps. Agencies need to be charged with explicitly identifying, collating and communicating these deficiencies to the environmental monitoring and reporting system.

Select committees and the Office of the Auditor-General would then be able to scrutinise agency performance in terms of their contribution to achieving environmental outcomes as part of their regular examination of estimates and annual reviews.

Recommendation 4: The Government should provide a whole of government report to the House on the expenditure it allocates to its environmental outcomes and the progress that is being made towards those outcomes for Parliament to examine.

Achieving the Government's environmental outcomes will often require cross-agency action and collaboration. While annual reports might be a good way for Parliament to assess an agency's contribution to an outcome, they are not a good way to assess progress towards an environmental outcome to which multiple agencies contribute. Doing that requires information aggregated by outcome rather than by appropriation or agency.

Currently there is no authoritative place to easily see what the Government is doing to achieve its environmental outcomes, what it is spending on the environment and the impact of that spending on the environment. Though reporting requirements associated with the Natural Resources Cluster may provide new opportunities, existing mechanisms do not sufficiently support performance reporting above the agency level. The information that is available is buried in different reports and documents.

I have spent the best part of two years trying to make sense of this information with the assistance of a small but increasingly well-informed team. If we have struggled, how can we expect parliamentarians, select committees or members of the public to do this?

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[13] As noted in chapter three, an increased understanding of the effectiveness of government actions is one facet of what is typically included under the term (ex-post) evaluation. See, for example, Superu, 2017, p.5.

[14] If the Government does not clearly state its outcomes, expenditure could simply be tagged against the environmental domains listed in the Environmental Reporting Act 2015. Agencies would still be able to report on their total environmental expenditure and disaggregate it by the domains that are used to structure state of the environment reporting.

If agencies were required to tag expenditure to outcomes in a consistent way, the Treasury would easily be able to generate an annual budgetary annex aggregating expenditure against outcomes at a whole of government level. Even in the absence of consistent information standards across agencies, it would still be possible to generate such an annex. However, it would have similar limitations to my attempt in chapter three to generate an estimate of environmental expenditure.

Expenditure is a means, not an end. Therefore, any information about tagged expenditure needs to be presented alongside analysis of progress towards outcomes. Indicators of progress mapped to outcomes would be a valuable input into debates about the adequacy of the Government's response. It would help answer questions like: "Is it doing enough?" and "Is money being spent for no real value added?" Where there are no quantitative indicators, a qualitative assessment should be provided.

Annual reports already require assessments of effectiveness and performance measures that make sense for agencies. But we need to be able to measure and assess progress towards environmental outcomes at the whole of government level.

There can be a tension between what agencies want to provide to meet their reporting obligations, and what Members of Parliament and citizens want to know. Provided that it is focused on the kinds of things that are meaningful to parliamentarians and citizens, whole of government reporting would fill this gap.

We already report progress against a whole of government outcome for one environmental outcome – climate action – through the accountability process set up for the emissions reduction plan. That is a complex, detailed and prescriptive requirement.

I am proposing something much simpler for other environmental outcomes, akin to the annual requirement to report progress in alleviating child poverty. It would be a simple statement of progress towards each outcome, to be scrutinised in tandem with information about the expenditure allocated to those outcomes. Depending on the outcome in question, there should be variation in what would be involved in producing this statement, which agencies should be involved and which ministers should be accountable.[15] While it could take place annually, it should happen at a minimum every three years.

A requirement for whole of government reporting on environmental outcomes would be best achieved by amending the Public Finance Act 1989. Tagging expenditure should take place in the context of budget processes. A progress report of the type that I am proposing is essentially performance reporting at the whole of government level.

An obvious parallel – reporting against child poverty – is already found in the Public Finance Act 1989, where a progress report is explicitly linked to provisions in the Child Poverty Reduction Act 2018. Having a reporting requirement in the Public Finance Act 1989 explicitly linked to the Environmental Reporting Act 2015 (and its proposed amendments) would strengthen links between environmental reporting, strategic planning, and investment.[16]

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[15] Key factors to consider could be the complexity of the outcome in question, how many agencies contribute to that outcome and which agency is responsible for that outcome.

[16] A less desirable alternative would be for these reporting requirements to be centralised in the Environmental Reporting Act 2015, as part of the process by which the Government responds to state of the environment reporting. If this was done, the Government should be required to clearly separate any statement of what it plans to do to respond environmental issues from its statement of what progress that makes over time. Without this separation, public accountability would be compromised.

Select committees already play a role in scrutinising environmental outcomes and the effectiveness of environmental spending at an agency level. They do so without an adequate information base and without a whole of government lens. My recommendations would provide both of those. They would also make it easy for relevant select committees to:

- examine the reasonableness of the Government's specific environmental outcomes
- assess the effectiveness of expenditure in making progress against those outcomes
- compare the Government's stated plan to achieve those outcomes with what it has actually implemented
- make an assessment of whether the initiatives and actions the Government is undertaking are sufficient to meet those outcomes
- assess the effectiveness of the cooperation between agencies that have lead responsibility for an outcome and the agencies with which they have to interact to deliver those outcomes.

The combined effect of these recommendations would be to encourage governments to be clear and transparent about what they are trying to achieve and the progress that they are making. Provided that this information is provided in a way that is accessible, this will allow parliamentarians and the public alike to have an informed debate about whether the resources being directed to the environment are well prioritised, well spent and making a difference.

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Hymenophyllum flexuosum

Appendix

Summary of recommendations from my previous reports and submissions

In three previous reports and three submissions, I have made a series of recommendations aimed at improving:

- the quality of environmental monitoring and reporting systems
- the way environmental research is funded
- the integration of the environment into the budget process.

These recommendations are reiterated below, along with an indication of the extent to which the Government has taken steps to implement them.

Focusing Aotearoa New Zealand's environmental reporting system (2019)

Recommendations

In 2019, I made seven recommendations aimed at improving Aotearoa's environmental reporting system and the broader environmental monitoring system. Specifically I recommended that the Government should take the following actions.

Recommendation 1: Prepare a Bill to amend the Environmental Reporting Act 2015 to:

- amend the purpose clause
- change the frequency of state of the environment reports
- include drivers and outlooks
- require five overarching themes to be stated in the Act to form the basis of the environmental reporting system
- replace domain reports with theme-based commentaries
- adjust the responsibilities of the Secretary for the Environment and the Government Statistician
- establish a standing science advisory panel to provide independent expert advice
- define a set of core environmental indicators in regulations
- require the Government to provide a formal response to the state of the environment reports.

Recommendations 2 and 3: Adjust the roles of the Government Statistician and the Secretary for the Environment to reduce overlaps and play to the strengths of their organisations, with:

- the Government Statistician acting as the leader of the official statistics system
- the Secretary for the Environment acting as the steward for New Zealand's environment.

Recommendation 4: Develop a comprehensive environmental monitoring system.

Recommendation 5: Develop a nationally mandated strategy to progressively fill known data gaps.

Recommendation 6: Link New Zealand's environmental reporting system with the science system to ensure that key knowledge gaps are incrementally closed.

Recommendation 7: Develop a multi-year investment case to deliver the recommended improvements to New Zealand's environmental reporting system, taking into account a fair distribution of costs between central and local government.

Government response

Since the release of my 2019 review, the Government has taken significant steps to implement a number of my recommendations.

Significant progress has been made to amend the Environmental Reporting Act 2015 (recommendation 1). In early 2022, MfE publicly consulted on ten proposed amendments to the Act that generally reflected recommendations from my review.[1] I recommended further refinements to some of the proposals by way of submission (see below).

In addition, progress has been made on adjusting the roles of the Government Statistician and the Secretary for the Environment within the constraints of the current Act (recommendations 2 and 3).

Progress on recommendation 5 is less straightforward to assess. This recommendation called for a nationally mandated strategy to progressively fill in known data gaps. Such a strategy has not been developed but the Data Investment Plan published in December 2021, led by Stats NZ, could be used to respond to this recommendation.

The Data Investment Plan contains data asset investment opportunities over the next ten years for Stats NZ and other government agencies across four pillars – economy, environment, society and populations of policy interest.[2] The Plan is much broader than the environment. The 30 highest-priority data investment opportunities are profiled in the plan, with the titles of the next 60 opportunities also listed. Seven environmental initiatives were included in the top 30 investment opportunities. While this is a promising initiative, the Data Investment Plan is just a 'signal' for funding needs – it does not represent a commitment to new investment.

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[1] MfE, 2022b.

[2] New Zealand Government, 2022a.

Progress on recommendations 4, 6 and 7 has been lagging. There has not been significant movement towards developing a comprehensive environmental monitoring system or bridging any knowledge gaps. In Budget 2021, the Government committed $25 million over three years to establish an "enduring environmental monitoring and reporting system", in a direct response to recommendations from my 2019 report.[3] However, this initiative is narrowly focused on targets and limits as part of the resource management reform. Thus, the $25 million cannot be accurately claimed as an investment in an effective monitoring system for the environment. That system needs to deliver a broad suite of environmental information on which any policy initiatives, including limits and targets for the resource management reform, can be reliably based.

Disappointingly, a prioritisation process within the Natural Resources Cluster as part of Budget 2022 failed to win approval for investment in environmental information. Rather than seeing environmental monitoring and reporting as a foundational investment in its own right, New Zealand continues to make ad hoc investments to meet the policy and legislative priorities of the moment.

Submission on Improving Aotearoa New Zealand's environmental reporting system (2022)

Recommendations

Earlier this year I was pleased to see public consultation on proposed amendments to the Environmental Reporting Act 2015. The consultation document contained ten proposals, which generally reflected my recommendations from the 2019 review.

Four of the ten proposals were almost exactly the same as those recommended in my 2019 review. I have suggested further refinements to the other six proposals covering the Government's response to state of the environment reports, the standing advisory panel, cross-domain themes, commentaries, core environmental indicators and mechanisms for data collection.

Government response

Since public consultation, officials have been working to further progress the amendments. The amendment Bill – set to be introduced into the House in late 2022 – will reveal the final shape of the amendments. At the time of writing, I am cautiously optimistic.

[3] New Zealand Government, 2021, p.77.

A review of the funding and prioritisation of environmental research in New Zealand (2020)

Recommendations

In my 2020 report, I recommended:

- developing a clear and unambiguous national-level **environmental research strategy** under the leadership of MfE, along with key stakeholders
- ringfencing **public resources for environmental research** and explicitly linking them to the environmental research strategy
- establishing an **independent environmental research council** to allocate research funding. The council should be at arm's length from officials and be held accountable for investing resources in a way that will deliver the environmental research strategy. It should be run by people who understand what environmental research entails and the characteristics of New Zealand's highly dynamic environment.

Government response

The Government is currently progressing the following two initiatives that are relevant to my 2020 recommendations but do not amount to an implementation of what I recommended.

- **Environment and Climate Research Strategy.** Work on this strategy has been initiated by MfE officials in response to the recommendation for a clear, unambiguous national-level environmental research strategy. While it is envisaged that this strategy will direct mission-driven research and guide investigator-led research, the strategy has not been drafted yet and its relationship with funding mechanisms – the crucial issue – is unknown.

- **Te Ara Paerangi – Future Pathways Green Paper**.[4] This initiative is looking at the future of New Zealand's entire research system and as such is much broader than just environmental research. In March 2022 I made a submission on this paper with a focus on environmental research (see below).

Submission on Te Ara Paerangi Future Pathways Green Paper (2022)

Recommendations

In my submission earlier this year, I further elaborated on my recommendations from the 2020 review, including the recommendations to:

- develop the national environmental research strategy, including providing a role for the standing science advisory panel (recommended in my 2019 report in the context of the Environmental Reporting Act) in developing the strategy
- establish an environmental research council tasked to perform a range of roles, including delivering on the environmental research strategy.

In addition, I cautioned against large-scale institutional reform of Crown Research Institutes, which include in their number the only publicly owned entities whose mission is to address key environmental research domains. Most of the problems that can be identified in environmental research can be traced to a fragmented and strategically opaque funding system. Clearer national priorities and dedicated funding, including more non-contestable funding, would go a long way to improving the system without the upheaval and lost productivity that inevitably follow in the wake of institutional reorganisation.

Government response

It is too early to provide any detailed assessment. Any changes that might be considered in the light of consultations on *Te Ara Paerangi Future Pathways Green Paper* appear to be on the back burner. As a result, it is likely to be many years before hopes for much better linkages between environmental monitoring, policy and research are realised.

[4] MBIE, 2021.

Wellbeing budgets and the environment: A promised land? (2021)

Recommendations

In this report I made nine recommendations aimed at improving the integration of the environment into the budget process. These recommendations were grouped in four clusters, as follows.

Recommendations 1, 2 and 3: Ensure that investment decisions accurately reflect the value derived from the environment by:

- updating the wellbeing analysis template
- updating budget guidance to include information on cost-effectiveness
- adding new environmental values to CBAx.

Recommendations 4, 5 and 6: Mitigate future risks, uncertainty and tipping points by:

- updating the Living Standards Framework Dashboard
- developing baseline forecasts or outlooks
- developing new exploratory scenarios.

Recommendation 7: Ensure the long-term nature of environmental impacts is not ignored by modifying the social discount rate.

Recommendations 8 and 9: Improve decision making and communication in the face of environmental complexity by:

- improving the presentation and communication of environmental information
- developing a new, structured, multicriteria analysis tool.

Government response

The Treasury and MfE have broadly agreed to implement each of the recommendations over time.[5] The pace and significance of changes will depend on the determination of ministers to give them priority and, where necessary, the resources to develop some of the tools I have recommended.

Submission on the Living Standards Dashboard (2021)

Recommendations

In my December 2021 submission, I further elaborated on my recommendations from the 2021 review by making three recommendations.

Recommendation 1: The Livings Standards Framework should be amended to improve its description of the natural environment.

Recommendation 2: The Livings Standards Framework should be amended to provide a more detailed definition of what is constituted by natural capital.

Recommendation 3: The Treasury should, in conjunction with Stats NZ, identify and develop a set of natural capital accounts.

Government response

The Livings Standards Dashboard was refreshed in April 2022 but did not incorporate suggested changes from recommendation 1. It is too early to provide a more detailed assessment of progress on the other two recommendations. However, the Treasury has broadly committed to a general programme of work to improve the measurement of natural capital over time.[6]

[5] See MfE, 2022a; The Treasury, 2022c.

[6] The Treasury, 2022c.

Sticherus flabellatus var. *flabellatus*

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This report has been produced pursuant to subsections 16(1)(a) to (c) of the Environment Act 1986. The Parliamentary Commissioner for the Environment is an independent Officer of Parliament, with functions and powers set out in the Environment Act 1986. His role allows an opportunity to provide Members of Parliament with independent advice in their consideration of matters that may have impacts on the environment.

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