Address to the 2025 SETAC AU/ACTRA Conference

26 August 2025

The lasting legacy of chemicals in the environment

Ngā mihi nui kia koutou kātoa,

I am not an ecotoxicologist – but in a variety of roles I've been forced to think about how we balance environmental health with the use of the battery of chemicals that our modern economy has developed. During my time as Environment Director at the OECD, I was responsible for the chemicals programme, which forced me to make myself familiar with a galaxy of acronyms that I still have trouble remembering: IATAs, IUCLID, QSARs and OHTs. Not having a chemicals background, I found that the only way I could really understand what was going on was to make **myself** give the presentations we made to committees of officials. The high point (the audience might have thought otherwise!) was a presentation I gave on adverse outcome pathways. It only took me about three months to get the PowerPoint into a form that was both intelligible to me and still made sense to my vastly expert team of chemicals experts.

Returning to New Zealand in this role, I decided to take a look at how chemicals are managed in Aotearoa New Zealand. The specific focus is captured in the title of that report, *Knowing what's out there: Regulating the environmental fate of chemicals*. It appeared in March 2022 and included eight recommendations aimed at improving the current chemical management system. Some of you may be aware of this report, hopefully a few will have read it.

Today, I would like to discuss where we are three years later and what more needs to be done.

Let me start with a quick comment about the theme of this conference: *Building a lasting legacy: our choice, their future*. While I understand the importance of taking the long-term, intergenerational view of chemical management, I think it is worth asking: **do we even understand the legacy that we are living with today?** We are only just becoming aware of the full extent of the risks posed by plastics and how they degrade; of the risks posed by pharmaceuticals and chemicals, such as those contained within the huge family of per- and polyfluoroalkyl substances. I'm not sure we understand the legacy we have already created, let alone have the skills – or the judgment – to build a legacy for the future.

This concern was essentially the jumping off point for my chemicals report. I wanted to ascertain what was known and, more importantly, **not** known about chemical management in New Zealand. I wanted to answer two key questions:

- Do regulators possess adequate information about the likely fate of the chemicals they regulate?
- Are the right questions about environmental impact being consistently asked so that regulators can impose conditions on use?

My conclusion was that we cannot confidently answer either question in the affirmative. The report describes a complex and disjointed system that fails to deliver key information on the volumes of chemicals used throughout the country, their subsequent release into the environment and their effects on the environment. I would encourage you to read the full report if you are interested in the thorough analysis my team carried out.

Issues were identified at all stages of the chemical management process from assessment to monitoring of impacts.

Assessment

New Zealand's process for approving and managing chemicals spans multiple agencies. There are roughly 150,000 substances approved for use in New Zealand that encompass an estimated 30,000 chemicals. This is similar to the around 40,000 chemicals approved in Australia.

The vast majority of these have been the subject of some scrutiny by regulators in other large economies, so we do not start with a blank sheet. But the particular features of the New Zealand environment and the particular use we make of certain substances means that we cannot simply adopt the judgements of other countries without further assessment in the same way that overseas regulators impose their own cultural risk filters. As such, it may not always be appropriate to generalise from one national context to another. It was impressed on me at the OECD that it is for this very reason that countries have never allowed assessments of risk to be contained in international guidelines. Countries can agree on harmonising processes and methodologies but judgments about risk are for national jurisdictions to pronounce on.

Despite the complex system we have created for the regulation of chemicals in New Zealand, as of 2022, only about 3,500 substances have ever been the subject of individual approvals and only a few hundred have been fully reassessed. This is the legacy of a mass transfer of chemicals to the system created by the Hazardous Substances and New Organisms Act that took place in 2005. It has left some enduring consequences.

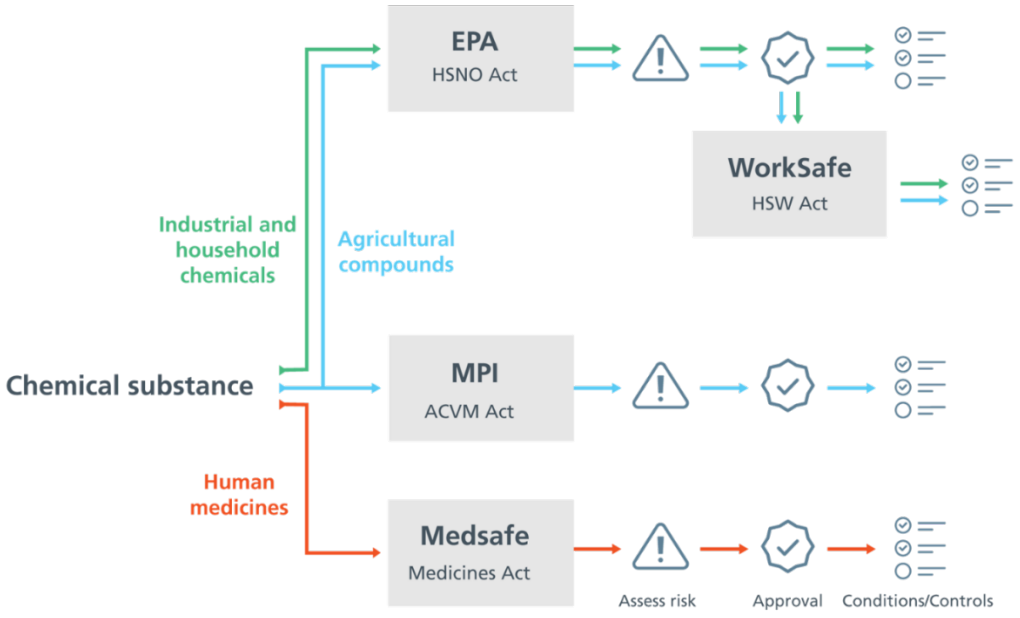

Figure 1. An overview of which national level regulator assesses risk, authorises, and imposes controls on the use of different groups of chemicals in Aotearoa New Zealand.

Firstly, the bulk of substances present in New Zealand are managed under group standards. These are a very 'hands-off' form of regulation because they delegate responsibility to assign approval status to an importer or manufacturer. While records of this assignment must be kept, the Environmental Protection Authority as the national regulator typically only receives this information if a compliance issue arises, so it provides little oversight.

Secondly, at the time of transfer there was no formal risk assessment weighing up the risks, costs and benefits, and effectiveness of individual substances. This was due to the sheer size of the task. While group standards and transfer notices provided new controls, individual substances were not evaluated and won't be unless the chemicals are formally reassessed. The EPA has been undertaking a programme of reassessments to address this situation. However, it is a costly business, and the EPA has never had anywhere near the resources needed to conduct more than a handful of reassessments per year. This means that many chemicals that have been in use for decades in New Zealand have not been subject to close scrutiny. This under resourcing of the EPA has also led to slow processing times in the applications for chemical approvals, which can be frustrating for those who wish to use these chemicals.

Monitoring is not happening at the scale or with the consistency needed either. As you all will be aware, without sufficient monitoring and data there is no way of knowing if management controls are adequate. My report found that fewer than 200 chemicals were regularly monitored by regional councils for their presence in receiving environments.

Realistically, we will never be able to assess or monitor every substance in use in New Zealand. That means we need to prioritise those chemicals we need to target, but there is currently no framework to undertake such a task.

The principal recommendation from my report was that the Ministry for the Environment should create a common framework to prioritise the management and monitoring of chemicals – something that could be used by regional councils and government agencies alike. The design of any such framework would need to consider how Māori are engaged in the process.

Any such framework needs to be based on three factors. This Venn diagram illustrates how information about each of these factors can help regulators ask the right questions about the most important risks. It is based on the excellent work of Dr Nick Kim of Massey University.

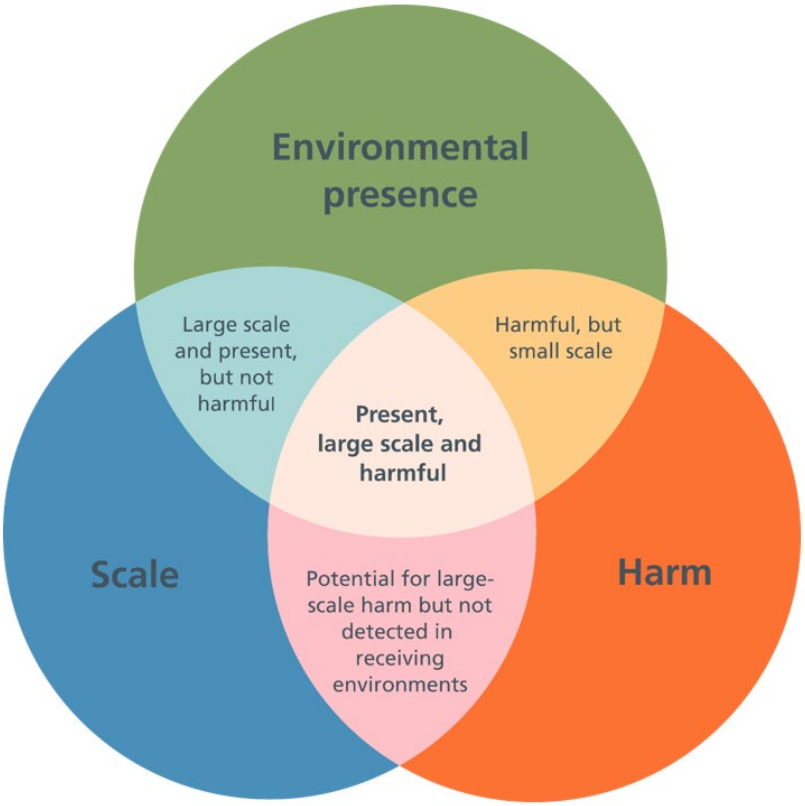

Figure 2. How information about presence, scale and harm can help regulators ask the right questions about the most important environmental contamination risks.

As you can see, the factors are the **scale** at which a chemical is being used, the potential **harm** that it could cause and the **extent** to which its presence is detected in the environment. It would clearly make sense to focus our regulatory efforts on those chemicals that fall in the centre of the figure: chemicals used on a large scale, known to cause harm and whose presence is detected in the environment. But beyond that, the existence of two of the three factors could indicate a need for greater attention.

Initial progress on developing this framework was made by the Ministry for the Environment and the EPA, who developed a draft framework for consultation in 2023. Since then, progress has stalled. I understand that the focus is now fully on responding to the Ministry for Regulation's findings and recommendations following their agricultural and horticultural products regulatory review, undertaken as a result of heavy lobbying by the ag chemicals sector. It is unfortunate that the focus on improving the speed of Ag-Hort product approvals appears to be coming at the expense of progress on some of the broader improvements to the chemicals management system I have suggested.

In terms of my other recommendations, some limited progress has been made. I'll now talk you through what advances have been made in improving our understanding of scale, harm, and presence and what remains to be done.

Scale

New Zealand has the unfortunate distinction of being the only OECD member country without a pollution release and transfer register – a PRTR. This is national platform for collecting data on known discharges to the environment. It enables countries to join the dots between permitted discharges of potentially harmful substances to the environment and

environmental monitoring that picks up traces of contaminants. Clearly, this type of platform does not need to track every substance. In New Zealand, it could focus on the things that are most widely used in our economy and those that are potentially a concern due to their scale of use or possible harm.

I recommended that the EPA be required and resourced to collate, collect and report on importing, manufacturing and sales data – and to develop a data platform to make that data accessible. That would enable greater visibility of chemicals from importation through to their environmental fate.

There has been one positive step in the right direction. Changes to the Hazardous Substances (Importers and Manufacturers) Notice 2015 mean that the EPA will be able to collect and report on the quantities of certain categories of chemicals either imported into or manufactured in New Zealand. This will allow a national level view of chemical quantities in New Zealand. Reporting requirements on this will come into effect at the beginning of next year. But without complementary data at the regional or sub-regional level, they won't know **where** in the country these chemicals are used or **in what quantity**. There are very real risks if we do not collect this data.

In 2023, health officials in France alerted the public to the fact that a majority of drinking water samples tested by the government contained chlorothalonil. This highly toxic fungicide was banned in the EU in 2019 due to concerns over water contamination and elevated cancer risk associated with the metabolites of chlorothalonil. Chlorothalonil is approved for use by trained and certified commercial operators in New Zealand. However, no one tracks where or how much of it is released into the environment. This means we can't even begin to understand whether this sort of contamination might be a problem in New Zealand, even though another jurisdiction is concerned about it to the point of forbidding its use.

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

Harm

Scientists and authorities need both guideline values and monitoring to identify when contamination is reaching potentially problematic levels. And this information should be fed back to regulators to aid environmental protection efforts.

New Zealand does have a range of guideline values for environmental protection, such as for zinc and copper in freshwater as set by the Australian and New Zealand Guidelines for Fresh and Marine Water Quality. But challenges remain, particularly in relation to environmental exposure limits (EELs).

EELs, as their name indicates, are limits on the concentration of a substance with ecotoxic properties that should be tolerated in an environmental medium like soil or water. They should be used in conjunction with maximum application rates to measure the actual concentrations of certain substances in the environment and assess if application rates being used are appropriate.

However, although the EPA can set EELs at the national level, this rarely happens for the following reasons.

To begin with, there is no detailed methodology to guide their formulation and taking any enforcement action on exceedances is hampered by challenges in proving the source of contamination.

Secondly, EELs can currently only be set on a substance-by-substance basis, however many substances contain the same active ingredients. This means that an EEL placed on a certain substance will not automatically apply to all approvals containing the same active ingredients.

The EELs set for neonicotinoid-containing substances illustrate how this substance-by-substance approach is problematic. The EPA has set EELs for four imidacloprid containing products: two flea treatments for pets, a bed bug powder and a wood preservative product. However, no agricultural insecticide formulations containing imidacloprid have EELs set for them despite having use patterns that make environmental exposure far more likely to occur.

A more sensible approach would be to set the EEL for an active ingredient when first approved, which could then be applied to all subsequent approvals containing the same active ingredient.

The absence of EELs makes it very difficult to establish a link between the adequacy of national controls and what is occurring on the ground.

My recommendations addressed the need for the EPA to give higher priority to the development and use of EELs, particularly for chemicals of national concern.

We also identified several limitations with the current modelling used in risk assessments by the EPA and recommended upgrades to align with international best practice while still taking New Zealand-specific scenarios into account.

Following a similar recommendation from the Ministry for Regulation as part of their review of the approvals process for agricultural and horticultural products, the Government recently allocated $10 million to the EPA to undertake this task over the next two years. This is a positive step forward, but I have concerns about the short timeframe that has been imposed. I worry that such a compressed timeframe will impact on the quality and comprehensiveness of these updates.

Progress has also been made on regulating imported treated seed. I highlighted the example of treated seeds in my report as an alternative pathway for chemical contaminants to reach the environment that was overlooked by the current system. Seeds treated with hazardous substances have been considered a ‘manufactured article’ by the EPA and therefore outside its jurisdiction. This has resulted in pesticides being introduced into the environment in quantities that – in terms of individual seeds – may be tiny but, in aggregate, add up to very significant quantities that fall outside the scrutiny of the regulatory system. I am pleased that the EPA proposes to close this gap. Interestingly, 25% of submissions on this consultation are still opposed to simply categorising treated seeds as hazardous substances and want the EPA to continue considering them as manufactured articles. Why, I wonder, do the companies selling these seeds not want us to be able to estimate the environmental load of substances that they know their seeds will introduce into the environment? I will be following this work closely moving forward.

Presence

Finally, *Knowing what's out there* identified significant gaps in monitoring contaminants across New Zealand. For example, while groundwater is monitored for pesticides every four years, we lack nationwide monitoring for pesticides in other receiving environments. We also found that organic compounds, including emerging contaminants, do not receive the same level of scrutiny as heavy metals in either national monitoring (through State of the Environment reporting) or regionally (through discharge consents). This is a significant oversight and indicative of the broader issue of environmental data collection and management in New Zealand – a topic I have raised many times with the Government. To date, no progress has eventuated either specifically in relation to chemical monitoring information or broader environmental information.

Overall, the progress made since 2022 is underwhelming. It is hard to figure out whether complacency or fiscal constraints are getting in the way. I suspect it is a bit of both. But decision makers need to be aware that the days of, "what you don't know can't hurt you", are well and truly past. A legacy of unknown dimensions will almost certainly be more costly than one that is consciously defined.

So, what can we do?

My challenge for you as experts in this field is to persist with communicating the urgency of these issues to our decision makers, which is no easy task.

I will repeat to you what I once told an audience of ecologists.

As ecotoxicologists, you understand better than anyone the complexity of chemicals and interactions with the environment. You have a role in helping policy makers understand these complexities and navigating the fraught but necessary issue of prioritisation.

Prioritisation can often lead to disagreement between experts. Disagreements are fine but they also need to be communicated clearly, otherwise they will become a barrier to action. Complex problems must be presented with explanations of trade-offs between various options or pragmatic suggestions, otherwise they are of little use to policy-makers.

Almost certainly, you will find yourself having to live with compromise solutions that result from the trade-offs necessary in political decision making. From a scientific perspective, these choices will not always be environmentally optimal and might be uncomfortable. But the result will be much better than if you haven't engaged in the process at all.