

## **Comments to Science New Zealand Conference, 9 November 2017**

E nga iwi o te motu, e nga hau e wha; he mihi nui, tenei ki a koutou.

I would like to start by congratulating the Minister on her extreme good fortune in landing this portfolio. Without a shadow of a doubt it is the best portfolio of them all.

I can say this on the basis of some experience having held it for the best part of a decade. In no other job will you wake up every day with an agenda filled with fascinating meetings with very bright people engaged in work that really matters.

True, there are purgatorial moments to be endured in cabinet expenditure committees. But they're all swept away by the truly absorbing substance of what our public science investment represents. My advice to her is to enjoy every day of it!

However, I'm not here to reminisce. I'm here as a major consumer of the output of environmentally related research. To alert Parliament to environmental issues of concern, I need to be able to draw on a very wide range of research investments that we have made over decades and continue to make. And let me start with one positive fact I bring back from the OECD: according to the OECD's statistics, New Zealand spends as far higher percentage of its public good science envelope on environmentally related research than any other country. Of course the absolute sums are much smaller than those expended by far larger economies, but what that weighting says about our priorities is important.

I suppose it is not surprising that a biological economy needs to know more about the physical world, but our investments in understanding this country, its surrounding oceans and Antarctica are not just about the economy; they are about understanding

our place in this part of the world and I think we should be very proud of what has been achieved with so little.

So that's the good news story. We take environmental science seriously in this country. However, as a significant user of research outputs, I'd like to signal three things to keep in mind as we move forward. The first concerns the timeframes within which research is undertaken and new knowledge painfully acquired. When it comes to environmental science we are playing a long game. The rate of environmental change and the loss of ecosystem resilience is accelerating in the face of inexorably rising human demand for water, food and mineral resources. We will be living with the consequences of those demands and our ensuing waste streams for a very long time to come. And that means we need research programmes that match the enduring nature of the problems we are making for ourselves. We need long-term goals and steady, sustained investment in working towards them. I'm not sure we're there yet.

I ushered in the era of CRIs and lost a key battle right at the outset. While I had – and still have – no problem with funding being contestable, I always envisaged that the new institutes would attract a significant measure of straight institutional funding – core funding if you like. My reasoning was simply this: if contestability was a good way of encouraging different approaches to tackling research challenges and providing a way for different groups of scientists and stakeholders to coalesce, we couldn't put too much faith in the all-seeing wisdom of an arm's length 'science purchaser'. I reasoned that CRIs should be able to bat against the current of bureaucratically determined priorities; that putting too many eggs in the purchaser's

basket ran the risk of cutting ourselves off from the deep embedded knowledge of providers. So I argued for 40% core funding at the outset. I got 10%. In one surreal exchange, a Treasury official helpfully suggested that perhaps having a single purchaser was a risk and that we should have competing purchasers as well. In the flood tide of theory that engulfed public sector reform in the late 80s and early 90s, no idea was too outlandish. Fortunately this one didn't have a life belt and sank without trace.

So we entered a world of contestability that progressively wore everyone out. Unsurprisingly, there were calls for change and in 2010 Neville Jordan's review again made the case for institutional funding stability. He argued for – and got in 2011 – a far higher share of core funding than I had dared to ask for: an average of 67% across CRIs ranging from 58% to 97% in individual institutes. Battle won. Well, not quite.

Because I see there has been a hive of further review activity since then. It spans the years I have been away. And in the four weeks I've been in my new role, I must confess I've had difficulty coming to grips with it all. It is like an exotic botanical garden in which previously unidentified acronyms and funding vehicles have germinated and completely engulfed the landscape. We have statements, challenges, platforms, programmes, road maps and infrastructures. It's all very busy. Please don't think I'm making fun of it – much of it is very impressive. We have smart officials in New Zealand and some of these documents are very well written. From an environmental research point of view it's all there. When I read the conservation and environmental science roadmap I was really impressed by the

breadth and ambition of (to quote the document) “what we will want to know over the next 20 years”. At last, I thought, someone has finally lifted their eyes to the furthest horizon. But then as I read on I discovered that there would be a four yearly review to update and refresh it. And then that there would be an annual review of progress. That raised my eyebrows. Any review takes time. Annual ones could be very distracting. That led me to dive off the path into the undergrowth of this luxuriant new policy hothouse. I read the National Statement of Science Investment (NSSI) and learnt about its ‘three investment horizons’. One of these – the ‘generating new ideas’ horizon seemed the most plausible one for the environment even if seems a slightly strange way to characterise a lot of research which is about understanding long-term biophysical processes. But I was pleased to note that the statement had a 10 year label on the cover.

I then read the Strategic Science Investment Plan for 2017-2024 which opened a door into the world of research platforms, programmes and infrastructural investments. Here I encountered a 7 year horizon. I note that the SIFF is described as non-contestable. But it is also described as providing the government with (and I quote) “the flexibility to adapt the portfolio as priorities change and opportunities emerge. Individual investments may be grown, shrunk or halted altogether.” So it sounds as though a contest could reignite at any time.

What really floored me though was SIFF’s requirement that research providers (ie the platforms) should take into *account all relevant government priorities and strategies*. They are voluminous:

## RELEVANT GOVERNMENT PRIORITIES AND STRATEGIES

**The National Statement of Science Investment:** The NSSI sets out the Government's strategy for the public science and innovation system over the period 2015-2025.

**Business Growth Agenda:** The Business Growth Agenda applies across research funds with an economic development focus or a focus on resource development and management. Goals of particular relevance to the SSIF include growing exports, improving the quality of our natural resource base, harnessing Māori resources, encouraging more business expenditure on research and development, and building international linkages.

**He kai kei aku ringa:** The Crown-Māori economic growth partnership aims to grow the Māori economic sector and deliver prosperity to Māori and resilience and growth to the national economy.

**Vision Mātauranga:** The Vision Mātauranga policy aims to unlock the science and innovation potential of Māori knowledge, resources, and people for the benefit of New Zealand. The policy applies across, and is integrated within, all MBIE science investment mechanisms.

**Research, Science and Innovation Domain Plan:** The domain plan sets out the enduring questions for the science system, the current status of data holdings, and a strategic five year plan for improving the quality of data on the science system. Over time, research organisations will need to meet minimum standards.

**New Zealand Antarctic and Southern Ocean Science Directions and Priorities 2010-2020:** This strategy sets the framework for New Zealand's Antarctic science during this decade and identifies three high-level research outcomes encompassing climate, ice and atmosphere; inland and coastal ecosystems; and the broader marine environment.

**The New Zealand Biodiversity Strategy:** The strategy provides a framework for action to conserve, sustainably use, and manage New Zealand's biodiversity in response to New Zealand's obligations as a signatory to the United Nations Convention on Biological Diversity.

**Biosecurity 2025:** This strategy outlines how New Zealand will strengthen its biosecurity system to continue to protect against pests and diseases.

**Environment Domain Plan 2013:** This Plan is an initiative to address our environmental information needs.

**The Conservation and Environment Science Roadmap:** This roadmap identifies critical goals for environmental research and conservation.

**Primary Sector Science Roadmap Te Ao Tūroa:** This roadmap identifies future science needs and opportunities of most importance to protect, grow and enhance New Zealand's primary sector, strengthen New Zealand's bioeconomy and support the wellbeing of New Zealanders.

**Predator Free New Zealand 2050:** The Government's initiative to achieve a predator-free New Zealand by 2050. This is an ambitious target and will require novel approaches to pest eradication.

By my count there are, for the moment, twelve – and all of them are relevant to environmental research. Some of them are very detailed and (as I've said with respect to the conservation and environment roadmap) very good. But they've got different shelf lives. And all of them have to be kept track of!

I then turned to the National Science Challenges. These really look exciting and just about every one of them is relevant to the environment – a fascinating comment on the community's priorities given that they grew out of a major public consultation.

I've already been briefed on one – the Deep South challenge – and have asked to be

briefed on every single one of them. The time horizon here is 10 years – with reviews already coming over the horizon at the 3-4 year mark. From what I have heard, the Challenges have generated some really useful stakeholder engagement and buy-in on topics that have been hard to socialise previously. So well done to whoever pioneered these. But I note in passing that I learnt last night that some Challenges have developed internal bidding mechanisms of their own: so you compete to get your NSS funded and then start bidding for some of the proceeds.

Now if I've properly understood the combined effect of all these new initiatives we appear to have moved to a world in which a variety of vehicles will yield public funding over a variety of horizons ranging from three to ten years with more or less frequent reviews and many signposts of a strategic signalling nature. It is hard to disagree with almost anything that has been written. But it is equally hard to square all the moving parts with the SIFF's declaration (on its frequently asked questions page) that it is after a system that is "as simple as possible" and one that is "stable ... by sending long-term investment signals".

It's a complex system for a small country. I cannot judge if this is better or more stable set of arrangements than what preceded it. But as a Commissioner with a brief to investigate a very wide range of issues pertaining to the environment, I will certainly monitor the situation – if only because, as I say, I am a major consumer of the environmental science output. The health of the CRIs is crucial to New Zealand's long run environmental interests.

That brings me to my second point concerns – the research workforce. At the end of the day, research is conducted by researchers. If we don't have really good people with really good research skills we don't have anything other than maybe some remote data collection (without anyone to interpret it). If we are going to make sense of our environmental challenges, researchers are absolutely in the front line. That's because we don't fully understand either the indigenous or the exotic ecologies with which we are trying to coexist in this country; and we don't understand how changes both domestically and globally are overturning our working assumptions about the dynamics of those ecologies. This is a fascinating but distant corner of the planet and we're the only people who have an unconditional interest in coming to grips with it. So I need to know that really good research teams are secure.

I scoured the documents I've just referred to for references to this 'human capital' factor. They weren't easy to find. In the SIFF's documentation I found a summary of investment signals for infrastructure platforms one of which was entitled "support for talent attraction, retention and development'. So that was good. Except that the platforms a funder-side vehicle and people actually work for institutions. So I turned to some of the CRI statements of Core Purpose. These are quite crisp statements about what a CRI exists for, why the people of NZ own it and how stakeholders understand its mission.

Again, there were fairly lean pickings. NIWA and GNS had apparently worked from the same template and nominated as an operating principle (among many others) establishing "policies, practices and culture that optimise talent recruitment and retention". Landcare by contrast didn't seem to make any references to human

capital. Maybe it was located somewhere else in the document. All three were strikingly outward looking and stakeholder focused. I think this is commendable and something we have long needed – particularly when it comes to the environment. But maybe there's a case for some more attention on the part of boards to how they attract, develop and retain their single most important capital asset.

My team and I are acutely aware of the skill sets that we all need access to. And when I say 'all' I mean the entire population. Our environmental scientists, broadly defined, are part of a standing army that can find itself being called (at short notice) onto the biodiversity, biosecurity or public health battlefields to name just three. Interestingly, under section 43 of the Crown Research Institutes Act, the Prime Minister may give directions to CRIs to react in the case of emergencies under the Civil Defence Emergency Management Act and a range of Acts dealing with biological emergencies. It would be a pity if our investment strategies had been so ingenious or so regularly updated that they had eliminated key skills needed to understand the crisis. I'm thinking of expertise in fields like taxonomy and biosystematics, population ecology and genetics, environmental toxicology. In a small country there will quite often be just one or two people with the specialised expertise needed to solve a particular problem.

Some time ago the Royal Society of New Zealand reviewed the country's national taxonomic collections. In summarising the state of the field, the lead author of the report, Dr Wendy Nelson, noted the severe constraints taxonomists face.

She noted that the NIWA Invertebrate Collection had been closed in successive years for one month each year to conserve and manage funds. Retiring taxonomists

had not been replaced as the proportion of individual scientists' time funded from taxonomic programmes was insufficient to make a case for staff recruitment."<sup>1</sup>

All in all, the Royal Society found that the majority of the country's remaining taxonomists spent less than a quarter of their time on taxonomic research – that is, expanding basic knowledge about our unique biodiversity and what threatens it.

Looking to other fields, I understand that scientists with the skills to research and develop new genetic tools to manage pests, or to model the impacts of climate change on the New Zealand environment, can probably be counted on one hand each. We don't want to be in a position where a single car accident can eliminate our science response capability.

I'm fully aware that science is the ultimate globalised activity and that these days we have astonishing access to offshore expertise. But much that happens is context specific and we are a rather special context. We need local interpretative skills. We must ensure – whether from the investment side or the institutional side – that we can keep an eye on the skill sets we need for environmental management.

My third and final point concerns keeping public science at arm's length from political and commercial interference. At the time I created CRIs, this was very much in the front of my mind. It was probably a reaction to my own experience in the early 1980s during the last days of 'Think Big'. I entered Parliament as a 23 year old in 1981

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<sup>1</sup> <https://sciblogs.co.nz/infrequently-asked-questions/2015/12/16/whats-in-a-name-funding-new-zealand-taxonomy/>

amidst long forgotten crises like the Clyde Dam Empowering Bill and the Motonui Synfuels plant. It was a world in which Ministers were pulling all sorts of levers without parliamentary oversight and commanding vast resources – including research resources – to support their designs. The Resource Management Act was Sir Geoffrey Palmer's response to this over-reach in the planning and resource management area. In some respects the CRIs was my response. I felt that politicians should spell out their priorities transparently and leave researchers to do their jobs; and that some of those resources should be completely unprioritised. That became the Marsden Fund. And since the results were funded by taxpayers, they should be fully accessible to all those who had paid for them.

On this score we are living in troubled times. Science is becoming re-politicised in some countries as research on climate and other environmental issues fall out of favour with policy makers who seem to have parted company with evidence as the basis for good public policy. These are countries we once looked to as the leaders and guardians of science. Of course it is not just politicians who can wreak mayhem. Research funded by commercial interests is no stranger to distortion or influence. What we have learned about the ethics of some car companies or pharmaceutical companies has left us aware that a single-minded focus on profit is not necessarily a friend to the public health or the environment.

It is for this reason that those who manage and govern science institutions need to be scrupulously aware of the pressures that may be brought to bear on scientists. CRIs invite both. They are Crown owned and boards are appointed by Ministers. They also do commercially sensitive work on contract for private interests. I have no

problem with the requirement that government scientists should steer clear of policy advocacy roles; neither do I with the principle that undertakings of commercial secrecy should be observed. But **all** research, as section 5 of the CRI Act puts it, “should be undertaken for the benefit of New Zealand”. It should never be regarded as being to the benefit of New Zealand that publicly funded research results are withheld or avoided because they call into question the pronouncements of politicians or because they may make it difficult to win privately funded work. If companies choose CRIs to do research, they must know they are doing it in publicly owned institutions with a particular ownership rationale. And if governments maintain environmental research institutions, they can’t pick and choose the results of the research that they commission from them.

Environmental research often impinges on resources in the public domain such as air, water and biodiversity whose protection can sometimes run counter to the interests of private resource owners. Boards – and the shareholding Minister – need to defend the integrity and independence of that research even if its implications are uncomfortable. We will not move forward as a society if we seek to purchase ‘safe’ or ‘sound’ science to name a couple of normative weasel adjectives that rear their heads from time to time.

A society’s investment in and respect for science is one marker of its ambitions, health and resilience. New Zealand is one of a small number of developed economies that have the technical, intellectual and human capital to deal with the environmental challenges we have brought on ourselves. This should be a source of huge optimism – and opportunity. Over the last two decades the Rosetta and

Cassini space ventures – led by the EU and the USA respectively – and the multi-national CERN particle physics project, have delivered mind-bending insights into the physical nature of our existence with knock-on insights for how we understand our place in the universe. Earth-based observations have dramatically improved our understanding of global bio-geochemical processes and the very nature of life itself.

New Zealand has contributed in all sorts of ways. But we are small and we need that sort of sustained global research endeavour to continue if we are to head off the many environmental challenges we face. Yet those endeavours are at risk. The necessary investments will not be made if the tribal politics and calculated misinformation we see emerging in many western democracies take hold.

Only societies that have confidence in themselves can calmly face the evidence that much environmental research is revealing to us. Contrary to what I was irresponsibly told as a child, what you don't know *can* hurt you. CRIs – and our universities – have to be the guardians of a process of enquiry that keeps us all honest even if we don't want to know what might hurt us. As the Kaitiaki Taiao, I will be a vigilant advocate for the vital part science and research plays in helping us care for our environment here in Aotearoa New Zealand.

I wish you well in all the research that you undertake. Kia ora, koutou katoa.