

Submission to Te Ara Paerangi - Future Pathways

Thanks for the opportunity to contribute to the Te Ara Paerangi - Future Pathways Green Paper. Much of the current research carried out in New Zealand is of very high quality due to the current workforce, international collaborations and scientist-end user relationships. However, I wish to share some experiences and have some suggestions for improvement.

Priorities:

My experience was a lack of stable and consistent priority setting leading to the wasted effort of putting in a funding bid that was doomed to failure. Even if you could get a sensible answer to what were the priorities were at the start of the bidding process, the funders often funded a completely different set of priorities by the end.

- I support national policy to guide science/research priority setting but this must be outside the political cycle to be consistent and sustainable.
- Priorities should not change mid cycle during the funding round. A contingency of say 10% of the funding could be held for unforeseen or emerging issues with this being redistributed at the end of the funding round if it was not required.
- There should be improved openness in science and research, with improved transfer of knowledge from science to the Public, and improved information and data sharing from institutes (current issue with public funded information being captured/appropriated and commercialized and not easily available to others)
- Support mission led research, but “Mission” needs better definition and development with good public engagement.
 - Missions need to be longer-term, e.g. 10-yearly, and not influenced by the political cycle.
 - Multi-disciplinary
- Need a stable system that can adapt in a changing world. Current system is too complex and inconsistent.
 - Principles for setting priorities should be set using an open and inclusive process. Priorities derived should be reviewed and updated.
 - This process also needs to be open and clear to observers.

Te Tiriti, mātauranga Māori, and supporting Māori aspirations:

- Increased engagement of and outcomes for Māori.
 - Iwi want to be partners, i.e. be part of and co-owners of the research.
 - Need to recognise the journey is as important as the destination and research timelines are intergenerational.
 - Recognise that the whole environment, peoples and places are connected
- Better resourcing for setting up relationships and continuing relations.
- Enhance the capacity for iwi to partner with researchers, including enhancing researchers capacity to work with iwi. I have found long-term commitment (multi-generational) from the researcher and iwi is important. Although challenging, involving school children in the research helps with the intergenerational connection.
- Recognise different ways of assessing scientific excellence, e.g. how are rangatahi are being trained. What will they do differently now they have been armed with new knowledge? How does this integrate with traditional knowledge?
- Māori can co-lead research, even without traditional qualifications.

Infrastructure

Buying a specialised piece of machinery does not mean it will produce useful research. My experience was the need for specialist operators and operating costs beyond the immediate project were overlooked. So, a machine worth hundreds of thousands of dollars or more would be little more than junk metal once the operator's funding ceased and they left. Another example is when I left an institute, the machine I was a specialist operator for was eventually taken to the rubbish dump as the institute could not find another specialist for the \$ they expected me to work for.

- Infrastructure needs to be sustainable, i.e. long-term ongoing work and adequately funded for specialist staffing and maintenance. Includes maintaining machinery, databases, collections and repositories of national importance. Not just CAPEX.
 - Clarity funding for ongoing maintenance, operation and staffing.
- Better support for SoE reporting – we can only monitor if we have methodology to do so.
- Models to support SoE reporting need to be easily available to test for repeatable and reproducible results and for helping project possible results of different management scenarios.
 - Several publicly funded models are now commercialised e.g. OVERSEER – how is OVERSEER and other publicly funded models to be made available? (model developed with public funding but is now commercialised and not publicly available).
 - Some databases contain publicly funded data that has become commercialised and not available, even though needed by SoE reporting
- Need research stations where the research is to be applied. Much of my research is related to the rural sector, taking place on farms or in forests and could not be done in a city. Would Alexander von Humbolt become anything more than a mining inspector if he had stayed home?

Partners and Stakeholders

When the government arbitrarily stopped funding research in my area of soil survey, I was forced to compete and take money from a competing CRI. My project was to identify and quantify the best devices to treat road runoff and stormwater. The idea was right and leading at the time. However, I made many elementary mistakes due to inexperience in the water domain. What would have been better for New Zealand Inc. is the funder putting my work alongside the skillset of the more experienced (in water) NIWA team (who's proposed project was a bit of a dinosaur).

- Funding should relate to the problem addressed.
 - End users of the research should be involved early in the process for applied research
 - May require funding itself
 - Opportunity for researchers secondments to user organisations
 - My experience is that many environmental problems are decadal and are inadequately addressed by short-term funding.
 - Consistent, robust, long-term funding is required.
 - Funding criteria need to recognise the incremental work of science.
 - Both fundamental and applied science is needed to address environmental problems.
 - Need to fund both innovation and to maintain what we have.
 - Suggest a mix of base operating and blue-skies grants
- There is a lot of wasted effort if a funding bid is unsuccessful. Instead, bring competing bids together as a collaboration rather than picking winners and losers.
 - Make funding more flexible
 - Encourage cooperation so that there is collective learning.
- Finding the right scientist partner can be a problem for us (need to improve capacity within the research community in NZ).
- Scientists need to consider how will a research project impact or be important to users.
- I have relationships with other parties in the science sector not covered by this review (and not just in NZ). This is likely true of institutes and other research bodies.

- How to include relationships with international and other parties outside the science sector?

Institutions

- Some excellent research under the current system but more emphasis on applied environmental science is urgently needed.
- Wicked problems require wide collaborations
 - Need collaboration rather than unhelpful competition or institutions protecting their patch
 - Do we need to define more clearly what each CRIs “patch” or rohe is?
- Institutions need the capability and flexibility to timely respond to emerging issues, e.g. climate change impact to the environment; pathogen invasion of indigenous vegetation.
- NZ went to a multitude of competing entities in the 1990’s. Could there be less “protecting the patch” and more transfer of researchers across institutes? Even at a project scale, a soils specialist like myself could be in projects run at different institutes. In my current role at regional council, I provide specialist input to multiple research projects and programmes across several CRIs and universities.

Workforce

My experience was that a range of skills are needed for a successful programme. “Unqualified” (scientifically) field workers who operate heavy machinery, field staff, technicians, research scientists, science managers, librarians, specialists like statisticians, administration staff ...

- Science utilizes a range of scientist roles and skills.
 - Skills can be learnt in different ways. The university path is one but it is not the only one, particularly in applied science. I was told on joining DSIR as a school-leaver-technical trainee that it takes 10 years to train a school leaver until they become useful, and it take 5 years to retrain a fresh PhD until they become useful. After 10 years I was successful with my first FOST-funded project.
 - Since then, my experience is it takes 10+ years for a scientist to gain enough world experience to really become useful in a regional council setting or as a principle scientist with central government (e.g. MfE).
- Long-term security is needed. Short-term funding means job insecurity.
- Career structure needs addressing.
 - Do we want our best scientists doing management or science?
 - Pathways for those who can’t afford the university route to develop a scientific career.
- A multitude of skills are needed in research. Technicians, academic field, desktop and laboratory scientists and office staff are all required and need meaningful career structure.
 - All science roles should have ways to improve and advance over a career.
 - Merit-based ways to transfer from one career path to another should be available, e.g. technician to scientist.

Finally, I think it pays to look at the system set up by Sir Ernest Marsden as Secretary of the DSIR. Sir Ernest brought together what we would call end users of the science, especially in the agricultural area, which was NZ’s economic powerhouse at the time. I suggest it still is and plays an essential role in NZ Inc. Nevertheless, collaboration and co-operation were engendered by Sir Ernest. As today, most issues of the time required multifaceted responses; approaches from various scientific disciplines.

Matthew Taylor
Soil Scientist.