

Ben Jeffares, Jonathan Boston, Juliet Gerrard,  
Shaun Hendy and Wendy Larner

# Science Advice in New Zealand opportunities for development

---

## Abstract

What is the state of play for science advice to the government and Parliament? After almost ten years with a prime minister's chief science advisor, are there lessons to be learnt? How can we continue to ensure that science advice is effective, balanced, transparent and rigorous, while at the same time balancing the need for discretion and confidentiality? In this article, we suggest that the hallmarks of good science – transparency and peer review – can be balanced against the need to provide confidential advice in an Aotearoa New Zealand context. To complement the advice to the prime minister, an expanded role for the Royal Society Te Apārangi would support public and parliamentary understanding of science and science issues relevant to policy.

**Keywords** science advice, independence, Royal Society Te Apārangi, prime minister's chief science advisor

---

Ben Jeffares is director of the Office of the Prime Minister's Chief Science Advisor. Jonathan Boston is Professor of Public Policy in the School of Government at Victoria University of Wellington. Juliet Gerrard FRSNZ is a Professor at the University of Auckland and the Prime Minister's Chief Science Advisor. Shaun Hendy FRSNZ is Professor of Physics at the University of Auckland, and is Director of Te Pūnaha Matatini, a Centre of Research Excellence. Wendy Larner FAcSS, FRSNZ, FNZGS, PFHEA is Provost at Victoria University of Wellington and President of Royal Society Te Apārangi.

Over the last decade Sir Peter Gluckman built the role of the prime minister's chief science advisor (PMCSA) from a part-time individual position to an office with a semi-formal network of chief science advisors within ministries, and a legacy of reports and activities. The result has been some notable inputs into the Aotearoa New Zealand political discourse, most publicly with the 'meth report' of 2018 (Gluckman, Bardsley and Low, 2018). But perhaps the most important contribution the PMCSA has made over the last decade has been an increased awareness of the potential of science advice for evidence-informed policy, and the opening of connections between researchers and policymakers at the highest levels (Gluckman, 2011, 2013). The increased awareness of the role of science advice within a policy setting has been cause for reflection by local observers (Boston, 2017; Hendy, 2016a). Is it time to more strongly embed the institution of the PMCSA, and the cohort of chief scientists? How should the chief scientists connect to other institutions, such as the

Royal Society Te Apārangī? Would we be better served if the role had the status of a commissioner for science? How might the provision of science advice be extended beyond the prime minister and cabinet and make a contribution to wider democratic processes? Are there areas of need for science advice and how might these be addressed?

In an earlier article (Hendy, 2016a), one of us identified a new challenge for science and science advice within policymaking: the emergence of the tools of large data. In the Aotearoa New Zealand context, Hendy argued that the application of statistical methods to large administrative data sets, held in the Integrated Data Infrastructure (IDI) or otherwise, introduces the possibility of data-driven policy: decisions being made on the basis of an analysis of data held by the government. This data analysis requires a high level of expertise, some of which may be opaque to non-specialists. Hendy's concern was that this kind of work also needs scrutiny by people with sufficient expertise to ensure the quality of the analyses involved. Hendy argued that the existing science advice ecosystem was poorly adapted to provide this scrutiny and suggested the need for new institutions in this environment.

Jonathan Boston agreed with the broad thrust of Hendy's argument, but came to a slightly different conclusion. In a paper presented in 2017 (Boston, 2017), Boston agreed that there was a need for science to be clearly heard within policymaking, and that there was also a general need for the better use of evidence in policymaking. He also argued that the inputs into advice need to be open and transparent, and allow for points of difference and disagreement. Advice givers whose recommendations differ from, or are a point of challenge to, prevailing views or policy agendas must be able to offer challenge without fear or favour. For scientists within government-funded institutions, they need to feel in a position to speak out without concern for their livelihoods or careers. In contrast to Hendy, he suggested that strengthening existing mechanisms and institutions might be sufficient to provide some of these safeguards.

To frame the questions and the issues at stake, we acknowledge the tension

between the need for science advice within the free, frank and fair exchange of views of the policy environment, and the need for transparency that is a hallmark of robust science. We examine ways that the transparency and independence of science advice can be maintained and enhanced in the Aotearoa New Zealand context, by examining the roles of the PMCSA, chief science advisors, the Royal Society Te Apārangī, and other parts of the science advice ecosystem. In doing so we identify opportunities to develop the science advice system and make the broader ecosystem healthier, more robust and responsive to the needs of the policy process. We also

in active research. The chief science advisors are complemented by scientists who are senior public servants within ministries who are often, but not always, named chief scientists.<sup>1</sup> The logic is that chief science advisors can contribute up-to-date research knowledge, link to an active community of research practice and expertise, and provide important points of challenge on the robustness of evidence, scientific method and objectivity of science advice. They can act as in-house peer reviewers, mentors and conduits to the science community.

The PMCSA advises the prime minister and, as required, the broader cabinet and

... chief science advisors can contribute up-to-date research knowledge, link to an active community of research practice and expertise, and provide important points of challenge on the robustness of evidence, scientific method and objectivity of science advice.

---

note the need to strengthen the evidence base by incorporating wisdom from te ao Māori, and stress that science advice is better able to be responsive to the diversity of New Zealand by ensuring that the advice providers are representative of that very diversity.

#### The state of play

Ministries and departments contain many specialists, scientists and advisors with science training. So the first source of science advice will often be those professionals within the policy environment. In response to concerns raised by Sir Peter Gluckman and others about the use of evidence in policy development (Gluckman, 2011, 2013), those advice systems have been supplemented in recent years by the appointment of chief science advisors: appointees from outside the policy environment who are engaged

executive, endeavouring to ensure that the government's policy agenda is informed by the best science advice. Like the chief science advisors, the PMCSA can act as a point of challenge, in-house peer reviewer, and link to the broader science community to help ensure evidence-informed policy. They also advise at times of urgent need, when formal advice-commissioning processes might be too slow.

Both the PMCSA and the chief science advisors are to some extent covered by our conventions of free, frank and fair advice (Armstrong, 2018; Kibblewhite and Boshier, 2018) and should be regarded as working within that sphere. As we shall demonstrate, that raises some tensions around the notion of independence and the robustness of advice: science is supposed to be open to scrutiny and review, while advice provision does demand a certain amount of discretion in order to maintain the

confidence and working relationship with politicians and senior officials.

The chief science advisors come together under the chair of the PMCSA in the Chief Science Advisor Forum. This has recently been given some structure by the PMCSA (Office of the Prime Minister's Chief Science Advisor, 2018b). The purpose is to ensure a community of practice for independent science advisors across government, and to promote a 'whole-of-government approach' to science advice. The forum also allows for peer review from within the free, frank and fair framework that allows for the robust exchange of ideas.

## We live in an extraordinarily diverse society, and we need to be more than just mindful of diversity; we need to incorporate it.

---

The Parliamentary Library has an important role in providing evidence and research services to parliamentarians and their staff. While they are not specifically 'science' advisors, much of the research work the library staff do, and the information they provide, will necessarily be of a technical nature.

The Royal Society Te Apārangi is legislated to provide science advice (Royal Society of New Zealand Act, 1997). However, it sits outside the advice provision framework. This independence is useful, and a potentially powerful position to be in, as it isn't bound by the conventions around discretion of advice provision. It can potentially be openly critical of government policy and government-produced science. We will argue that it is necessary for the Royal Society to be suitably independent, but we also identify a need for an institution to be responsive to policy agendas, both from within government and particularly from Parliament, and this is a role that the Royal Society could usefully fill.

Other statutory organisations also provide independent advice and criticism of policy. A clear example is the parliamentary commissioner for the

environment. Such institutions are important actors with a clear constitutional role, positioned to advise the whole of Parliament and not tied to the government's agenda, but often within a narrow mandate of subject area.

### Science and the need for transparency

How do we ensure good science advice, and that different actors within the science advice ecosystem provide it? A necessary (but not sufficient) condition for robust science is transparency, which enables the detection of errors: methodological errors, unwarranted assumptions, bias

and straightforward mistakes (Giere, 2006; Lennon and Whitford, 2002; Wylie, 2002). Science might not be free of bias, but the culture of practice within science, at its best, is one of verification and robust critique of the claims of others. The need for scrutiny by others motivates the practice of peer review, but the need for scrutiny does not end with a scientist's peers; it requires diverse views to be brought to bear from different standpoints and positions (Lennon and Whitford, 2002).<sup>2</sup> Viewing a problem through different lenses sheds light on new solutions. Thus, initiatives to increase the demographic diversity of research practitioners increase the range of questions on the table to be examined, but are also crucial to ensuring balanced views about the impacts of research. Diversity of thought and communication across disciplines ensures that conclusions on a given issue are robust.

Therefore, in the policy context, in order to ensure that science advice is based on robust science there is a need to ensure scrutiny of this science, via peer review and more, from diverse perspectives. Ideally, in the long run, the scientific process itself should provide this scrutiny, but a science advisor will only very rarely face a situation

where the science is settled. Instead, their job is often to navigate science that may as yet be ambiguous, underpowered and contested. In this environment, science advice must subject itself to the same checks and balances as the broader science ecosystem, welcoming peer review and an openness to revisions and criticism. Peers and critics need access to the data, starting assumptions, modelling methods etc., so that expertise can be brought to bear on the science that is then fed into the decision-making process. One of us has made the argument that to ensure this, we might want to explore the idea of a commissioner for science: a resourced, independent agency that can ensure scrutiny of the government's use of science (Hendy, 2016a).

It is worth noting that this need for open practices, scrutiny, a variety of advice sources and a diversity of views is also key for the success of the advice ecosystem as a whole. To legitimise the policy process, we expect to be able to understand the reasons decisions have been made, and to know who informed the decision-making process. Assuming that there really are 'wicked problems' (Rittel and Webber, 1973) which don't admit of straightforward policy solutions, with solutions that satisfy no one, then the dissatisfied have a right to know why the decision went against them. The call for open government, transparency around advice provision and a diversity of advice provides a solution to this legitimacy. So a recognition that we need openness and transparency for science advice to be 'proper science' aligns with a need for a general openness and transparency around advice, influence and the mechanisms around decision making, regardless of what 'flavour' that advice may take.

Science is one actor among many in the political system and takes part in setting the political agenda, be it as an interested party, or be it because other actors, such as the media, are interested in the pronouncements of science. (Weingart, 1999, p.155)

In Aotearoa New Zealand, that ecosystem includes Te Tiriti o Waitangi partners, professional policy advisors, political advisors (Eichbaum and Shaw, 2007, 2008), peak industry bodies, public

consultation and a host of other inputs. Incorporating te ao Māori views is crucial. The role of these inputs into the advisory system potentially all need to be open to scrutiny, but this process of open and competitive advice tendering is an important part of keeping public administration open and accountable. We live in an extraordinarily diverse society, and we need to be more than just mindful of diversity; we need to incorporate it.

#### **Free, frank and fair science advice**

Ideally we seek science input early in the policy process, and to be responsive to issues as they arise. This is the role of the PMCSA and chief science advisors, although at different locations in the policy process. The PMCSA works with the prime minister and executive, and the chief science advisors typically report to chief executives of ministries. By ensuring the active use of evidence, adherence to good practices and availability, chief science advisors should be in a position to both encourage and scrutinise research use within government and be responsive to immediate needs, but also be aware of the political nuancing that occurs within the policy process.

It's worth stressing that an important part of this advice provision is informal. As Allen notes, 'although [chief science advisors] have multiple formalised roles to undertake with, and on behalf, of the executive, it is often their informal actions that can be the most valuable and influential to decision makers' (Allen, 2014, p.6). This informality and intimacy with administrations is important, but it raises a crucial tension mentioned earlier: the need for transparency and peer review within science seems at odds with the desire to have confidential advice within the policy environment.

However, similar tensions exists elsewhere in the policy process. The former chief executive of the Department of the Prime Minister and Cabinet, Andrew Kibblewhite, and the chief ombudsman, Judge Peter Boshier, jointly authored an article on free and frank advice in relation to the Official Information Act (Kibblewhite and Boshier, 2018) which dealt with this tension. Their article acknowledges a need for confidentiality in the early stages of the

advising process. Advice providers need to be able to provide advice that is free and frank, and, where this is in disagreement with the stated aims of the government, that advice should be allowed to be provided in ways that support an ongoing and productive relationship between the government and advice providers. There needs to be an open and honest exchange of ideas. Informal advice allows for controversial and potentially difficult issues to be dealt with early. It creates a climate in which advice can be asked for, knowing that it is not going to be on the front page tomorrow. However, informal advice is not just about sensitivity. For

an important ballast to their position: as an 'outsider' inside the system, with an academic position and academic freedoms, a chief science advisor can act as a key point of challenge early in the advice process while questions are still being formed. Both PMCSAs have been seconded from universities, and a number of the current chief science advisors have as well. Provided the term of appointment is finite, seconded advisors who retain academic or research appointments need to maintain a future outside the policy system by retaining academic credibility. A seconded chief science advisor has a strong incentive to ensure they retain the respect

... robust science advice requires a diversity of viewpoints, and evidence suggests that this correlates with a diversity of gender and ethnicity around the table ...

---

example, politicians and senior officials are the target of lobbying about plausible-sounding technological solutions<sup>3</sup> to problems. Informal advice early can be an efficient way of bringing to bear expertise before significant investment is made in investigating dead ends.

This free and frank, but nevertheless informal and discreet, locus of advice provision is an important point in the policy process to 'get the science in'. The ability of the PMCSA or a chief science advisor to 'pop their head around the door' at multiple points in the policy process has a utility that should not be underestimated. By being well connected to the science community, and accessible to senior policymakers, a chief science advisor can act as an important conduit between the science community, the current state of play within the sciences, and the executive and policymakers.

#### **Maintaining independence and integrity**

A chief science advisor who has been seconded from an academic role brings

of their academic peers, even as they retain the confidence of the prime minister and other ministers, the executive, and senior members of the policy profession. This is also why it is important that the PMCSA and seconded chief science advisors remain at arm's length from science funding allocation, as at least some of their interests remain within the research community.

Chief scientists and chief science advisors who are full-time public servants have a slightly different set of pressures to be independent. To maintain their credibility and mana within the system they need to be active and constructive voices within the policy process. But they also need to demonstrate clear expertise. However, as public servants they are firmly embedded in the advice process, while as scientists they are less open to peer review. For chief scientists, the Chief Science Advisor Forum can play a crucial role in providing peer review.

Thus, chief science advisors have some capability to act as a point of challenge



within the policy-making process. They may collaborate with the Royal Society or other bodies to deliver some science advice and analysis. But that intimacy with the policy process is crucial. A chief science advisor can identify gaps in science advice, can encourage the use of evidence and, through informal networking and formal contributions, will provide a key point of challenge around the use and abuse of science advice within the executive and senior ranks of the policy environment.

### ... the PMCSA and the chief science advisors work within the policy-setting environment, and need to be in a position to provide discreet and confidential advice.

---

#### **The Chief Science Advisor Forum, and peer review within the free and frank environment**

The chief science advisors were first brought together informally under Sir Peter Gluckman's tenure, and, as noted, this group has been given a more formal structure by the current PMCSA in late 2018 as the Chief Science Advisor Forum. The recent terms of reference enabled a more transparent and structured interaction on cross-sector issues for the forum (Office of the Prime Minister's Chief Science Advisor, 2018b).

As we noted earlier, robust science advice requires a diversity of viewpoints, and evidence suggests that this correlates with a diversity of gender and ethnicity around the table (Gaston, 2015). Thus, it is important that the cadre of chief science advisors who make up the forum are diverse in gender and ethnicity. These concerns about a lack of diversity apply to the science community as a whole (ibid.). The terms of reference allowed the forum to co-opt members to address skills gaps and improve diversity around the table.

All chief science advisors sit within the policy environment, and all provide both formal and informal advice. Who they report to, and who they talk to, is mixed.

Most report directly to the chief executive, or deputy chief executive, of their ministry, and are advisors to the policymakers of the ministry. Some have a level of contact with ministers, but most are advisors to government officials rather than politicians. The result is a variety of relationships between chief science advisors, their ministries and their ministers.

A genuinely diverse forum, both demographically and technically, allows for some measure of peer review within and

between the chief science advisors, chief scientists and the PMCSA, in line with our criteria for a robust science. As long as exchange within the forum is with free, frank and fair, and, where necessary, kept within these bounds, the Chief Science Advisor Forum can act as a well-informed, scientifically literate source of robust advice.

It also extends the pool of capability of the PMCSA and the chief science advisors beyond their own specialities. The recent 'information sheet' on antimicrobial resistance (Office of the Prime Minister's Chief Science Advisor, 2018a) was authored collaboratively by the chief science advisors and national experts. This puts the Chief Science Advisor Forum in a position to advise beyond the remit of individual ministries and across advice silos. The potential to provide more 'whole-of-government' advice is high. Currently the forum runs on the goodwill of sponsoring ministries and the chief science advisors themselves, with the Office of the Prime Minister's Chief Science Advisor providing limited secretarial support for the forum's joint activities.

This regular exchange of views, identification of issues, and an awareness of various policy agendas, all within the

environment of free and frank exchange of information, allows the forum to act as a good clearing house for best practice across government. It can be a point of challenge for science advice between peers. And so the forum can provide an important source of peer review within the free and frank environment.

Summarising thus far, the PMCSA and the chief science advisors work within the policy-setting environment, and need to be in a position to provide discreet and confidential advice. They can work with each other through the mechanism of the Chief Science Advisor Forum to peer review each other and develop a community of best practice for that environment. Because many of the chief science advisors retain links to the academic and research community, and will often return to that community as full-time researchers, they have incentives to maintain their professional integrity as independent academics. Once advice goes public in the form of reports or policy statements, their professional capabilities will also be on display and open to scrutiny. It is those external forms of scrutiny to which we now turn.

#### **Published research and the public record**

In a 2016 article, Hendy discusses the need for a public register of formal and commissioned science advice. His concern is that science advice or analysis may be withheld if it doesn't suit a policy agenda or is unfavourable to existing policy, or that advice may be cherry-picked if it does (Hendy 2016a). It is easy to see how this concern fits naturally within a general call for open and transparent government practice and processes. Open government suggests that all commissioned activities – analyses, reports, advice, bespoke software, etc. – should be open to scrutiny. If a government spends money commissioning something, we expect to be able to see who got paid, and the work that was done.

All government science reports, etc., that are posted online are 'harvested' by the National Library, and physically published documents are also supposed to be deposited with the library. The National Library holds the full *Transactions and Proceedings of the Royal Society of New Zealand* and the reports of various science

organisations, including the Office of the Prime Minister's Chief Science Advisor. So there is an existing administrative set of obligations that should fulfil some of the need to ensure access to published work.

The commissioning of formal science advice or any other activity should also be a matter of public record, and there are mechanisms that show the contracting and commissioning process, notably the Government Electronic Tenders Service (GETS). However, this is not a straightforward tool to use, as the Open Government Partnership notes (Open Government Partnership, 2018). Currently, there is no one-stop shop that allows straightforward 'track and trace' of advice from commissioning to release. There is something to be said for a more user-friendly facility that would allow the straightforward monitoring of activities.<sup>4</sup> There is clear room for improvement around these processes that would assist open government and ensure the proper archiving and ongoing availability of science advice.

But we should also be wary of this being a straightforward set of processes. Like science itself, policy processes are messy. Commissioned advice, like a piece of research, might end up being a dead end, or not quite fit for purpose, as the policy process advances and further facts are known. As Alison Wylie notes, science processes are constantly iterative, with a progressive refinement of questions, models and assumptions in the face of expanding data, evidence and changing questions (Wylie, 2002), and the policy environment isn't going to make this any easier. The whole issue of 'wicked problems' partly stems from the fact that policy processes can and do throw up as many problems as solutions (Rittel and Webber, 1973). There will not always be a straightforward link between science advice, data, evidence and the final policy implementation, making the wicked problems more wicked.

A static register of commissioned advice, then, would not capture the complex dynamics of the advice process: it would be incomplete, and potentially misleading, because of the absence of informal advice. The informal scoping and discussions on work streams frequently turn up initiatives

and activities that make further formal processes redundant, so a report that is not published might be 'withheld' for political reasons, but just as easily could have become dated, made redundant by the evolution of events or by the actions of other areas of the public service.

However, there does seem a need to make the commissioning of research, and the subsequent publishing of the results, more transparent. While informal advice might sit within the free, frank and fair conventions, a commitment to open government implies that formally

for a science advisor. Kenny et al. (2017) suggest that in other jurisdictions, such as the UK, Switzerland and France, advice for parliamentarians is focused on supporting arguments, and often on scrutiny and 'asking forensic questions' about policy. We suggest mechanisms for strengthening this capability below.

There are other institutions at work scrutinising and developing science advice outside the executive. The Office of the Ombudsman can and does work to ensure that government is open to scrutiny; the National Library, Archives New Zealand

[The Royal Society] is one that sits outside the more intimate and internal policy processes of government, but nevertheless is not restricted to defined subject areas.

---

commissioned advice, and the evidence that informs policy, will be available for scrutiny.

#### **Parliament, the Parliamentary Library and the officers of Parliament**

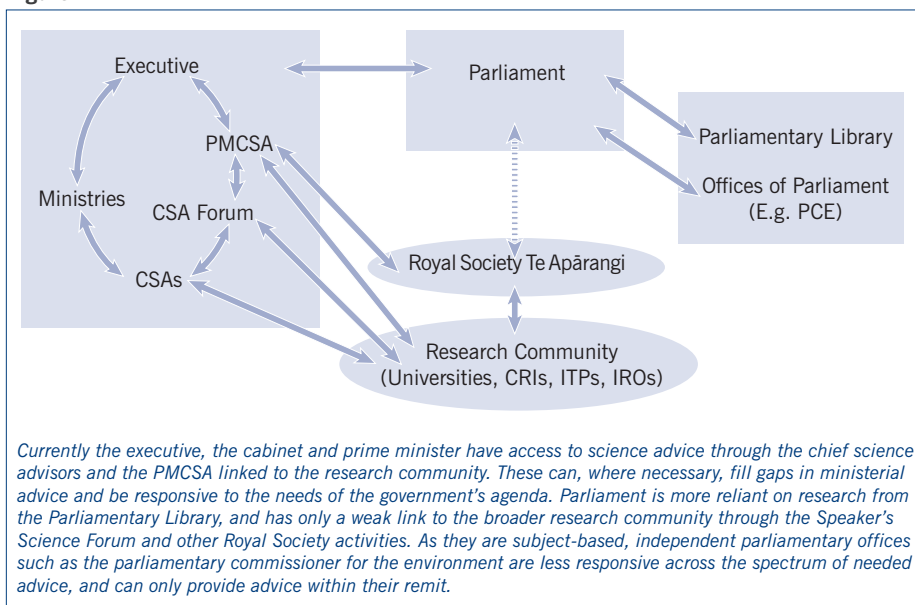
Another potential source of scrutiny of science advice to the executive should be a well-informed Parliament. Under the Parliamentary Service Act 2000, the general function of the Parliamentary Library is to provide 'information, research, and reference services' for parliamentarians and their staff. Inevitably, some of this is scientific and technical in nature. In the context of our discussions about the need for science advice to be scrutinised and peer reviewed, the services offered by Parliamentary Library staff undoubtedly assist Parliament to undertake its legislative and representative functions of scrutiny, including in areas where scientific and technical matters are of importance. The library generally eschews the provision of explicit policy advice, because of the risk that this may be seen as partisan. So, on the whole, the library does not provide 'advice' on policy issues, at least in the sense that we might mean

and the Public Records Act all have roles to play in preserving advice and records, including science advice. There are also other offices of Parliament that provide advice, criticism and peer review. The parliamentary commissioner for the environment is the most obvious office that provides advice of importance, much of which is based on science and research. However, the parliamentary commissioner for the environment is formally one step removed from ministerial and departmental policy discussions. While this independence is laudable, it may reduce the impact of the advice, all the more so when a commissioner's views diverge significantly from current policy agendas – as, for instance, in the case of a recent report on climate change (Gibson, 2019; Parliamentary Commissioner for the Environment, 2019).

#### **Royal Society Te Apārangi**

The Royal Society Te Apārangi currently has a legislated obligation to engage in various activities, and as section 6(e) of the Royal Society of New Zealand Amendment Act 2012 states, one of its purposes is 'to provide expert advice on important public issues

Figure 1



to the Government and the community<sup>5</sup>. The Royal Society has played an important role in providing policy advice, including working with the PMCSA at the time on fluoride, asbestos and folic acid fortification. Its role sits outside the more intimate and internal policy processes of government, but nevertheless is not restricted to defined subject areas. As Allen notes in her summary report of a 2014 conference on science advice to governments:

national academies are foundational to national science systems and thus an integral part of the science advisory model. Academies, by definition, have an academic independence that allows them to devise their own policy-relevant research questions or choose to focus on specific issues as requested by governments. A strong national academy can provide a formal structure for the development of science advice, usually operationalised in the development of in-depth reports that are issued to both government and the public. (Allen, 2014, p.6)

This independence from government can act as an additional and important check on internally generated government science advice. Ideologies or broad policy platforms might dictate research within government, but the community of scientists within a national academy can raise issues and highlight potential problems outside of the government

agenda. As Marc Rands and Dianne McCarthy note, learned societies like the Royal Society Te Apārangi are ‘an authoritative national interface between the research community and policy making’ (McCarthy and Rands, 2013).

This does impose on the Royal Society some obligations. It should listen and respond to voices within the science community calling for it to make comment on current issues. It should also actively scan, identify and respond to gaps in the advice system. One of us (Hendy, 2016b) has argued that the Royal Society has not always achieved this. For instance, despite prominent public commentary by Housing New Zealand in 2016 concerning the lack of safety standards for methamphetamine contamination, as well as public and media interest, neither the Royal Society nor the PMCSA prioritised this issue. Only once directly tasked with this responsibility, after a change of government in 2017, did the PMCSA produce its decisive report (Gluckman, Bardsley and Low, 2018). So there is an argument that suggests that the Royal Society needs to be more reactive and engaged with activity in the policy community. To ensure the society mobilises its academic resources appropriately requires coordination, awareness, and sufficient administrative resources for it to respond to issues of the day. While reports generated by the concerns of the science community are important, reports that are responsive to policymakers are also crucial.

Given our commentary above, it should also be clear that the Royal Society must be sufficiently diverse to enable delivery of the best advice, as well as the timely identification of issues of key public interest. Criticisms of the lack of diversity within the society are currently being addressed, with a more inclusive definition of excellence attracting a stronger pool of applications across demographics. This must be accelerated if the Royal Society is to properly meet the needs of the science advice ecosystem.

**Speaker's Science Forum**

One way that the Royal Society has been active is in coordinating the Speaker's Science Forum. This forum was initially a collaboration between the crown research institutes (CRIs) and the chair of the Science and Education Select Committee, and helped promote the activities of the CRIs to Parliament, with the speaker as sponsor. Subsequently, the Independent Research Association of Aotearoa New Zealand and Universities New Zealand have also become involved. The Royal Society offers a slate of topics that are then chosen in consultation with the speaker.

Such a forum potentially provides a point of entry for ensuring that parliamentarians are aware of the latest science, but is currently limited in scale and scope. Conversations have begun to explore the possibility of a ‘Science meets Parliament’ event analogous to the longstanding Australian events, now also happening in Canada, to expand the impact of such interactions. Kenny et al.'s review of three European institutions supporting advice to legislatures – the UK's Parliamentary Office for Science and Technology, France's OPECST and Switzerland's TA-Swiss – noted that they all use events and talks as part of their communication strategies.

The Speaker's Science Forum demonstrates the Royal Society's very real potential to coordinate with a variety of agencies, groups and researchers, and bring science and the current state of play in research to the attention of Parliament. If this programme of activities were enhanced, the Royal Society could help parliamentarians to be better informed commentators and critics of government policy. This could enhance



the peer-reviewing power of members of the legislature, and potentially inform debates around issues, empowering parliamentarians to question the science elements of government policy.

The Royal Society's publishing arm should not be ignored either. Much science of relevance to policy sits behind the paywalls of publishers – ironically, even government-funded science produced within universities and other state-funded research institutions. By summarising, sharing and communicating the best science of the day, the Royal Society brings work of relevance to the broader concerns of the public out from behind those paywalls, both for the public, and also for officials in policymaking settings at various levels of government. The Royal Society's publication of an open access journal in the social sciences is important in this regard, and may serve as a template for bringing other quality peer-reviewed work that might be useful to the public and policy processes out from behind publishers' paywalls.

The work of the Royal Society could, therefore, help build a well-informed and science-aware public, public service and legislature. The Royal Society's educational and outreach activities, its open access publishing and its promotion of science all support diversity in the science advice ecosystem, and those activities should be supported. But currently, the links and the reactive response of the Royal Society to policy are weaker than they might be.

#### **Advice and the research institutions**

The functions of the PMCSA, the chief science advisors and the Royal Society Te Apārangi rely heavily on critically engaged research institutions such as universities, crown research institutes, independent research organisations and elements of the institutes of technology and polytechnics sector. Researchers and scientists contribute to these processes of advice and offer their expertise, usually with little financial reward. University incentives aren't always in line with their staff supporting and assisting policymakers, or making a contribution to a report. The labour and resources utilised for these activities are often volunteered, and infrequently resourced to the extent they should be. Universities should be

open to supporting researchers working with policy advice processes; but the policy side also needs to respect and resource the demands on institutions. Rewarding and incentivising activities that support policy and democratic processes is a task for government and the research institutions themselves. Crown research institutes are in a similar position, with their requirement to operate in a commercial setting placing pressures on their ability to support these activities. CRI's might be similarly incentivised to support active contributions to policy by individual staff members.

Parliamentary Office of Science and Technology (POST), which provides advice services to parliamentarians (both MPs and peers) and parliamentary staff. Both France and Switzerland have organisations specifically for the provision of advice and assessments to the legislature: in France the Parliamentary Office for Scientific and Technological Assessment (OPECST), and in Switzerland the Centre for Technology Assessment (TA-Swiss).

Neither Australia nor Aotearoa New Zealand have direct funding to support science advice for legislatures, although the

As a conduit to the broad community of New Zealand scientists, the Royal Society currently manages with only three dedicated policy staff, and a great deal of goodwill on the part of its membership.

---

#### **The international context**

How does the landscape of advice in Aotearoa New Zealand compare to other jurisdictions? Much work has been done on this by a variety of organisations and individuals (Gluckman, 2018; Kenny et al., 2017); we offer a brief summary here that highlights some opportunities to develop.

Australia currently has a chief scientist, and chief scientists at state level. Although the Australian chief scientist provides advice to the prime minister and government, the role sits within the Department of Industry, Innovation and Science, and so is very innovation focused (Gluckman, 2018). Australia also has a lot of national academies, to the point where these have come together to engage in critical intersectional and cross-disciplinary work through the Australian Council of Learned Academies (ACOLA). It might be argued that Aotearoa New Zealand is better off in this regard, with a single national academy – the Royal Society – that can bring multiple disciplines together to work on a single issue.

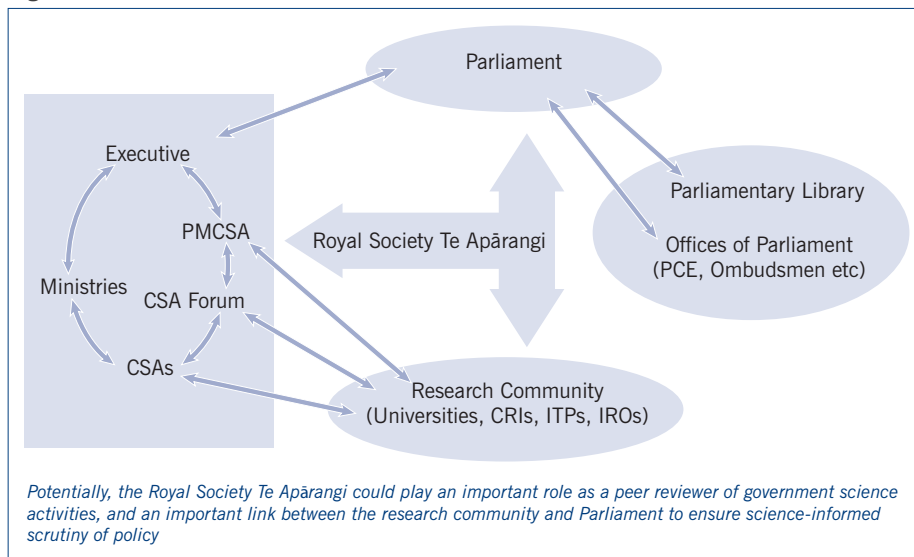
The UK has a full set of strong academies, and a government chief scientific advisor, but in addition the

Australian chief scientist and the Commonwealth Science Council support horizon-scanning work through ACOLA. This link to Parliament is largely missing in New Zealand, which suggests that stronger support for the connection between the research community and the legislature might be warranted.

Currently, the rather boutique Speaker's Science Forum is the only organised link between Parliament and the research community, alongside the Royal Society Te Apārangi's reports. It is worth considering that the UK's POST can produce reports and advice in response to requests from select committees and MPs. These reports are prepared by research fellows within POST, often early career researchers seconded on short-term contracts. This helps create better informed MPs, but it also creates researchers with an increased awareness of policy needs. These reports have proved popular with members of the UK Parliament (Kenny et al., 2017). One possible response along these lines is short-term research fellows sitting within the Royal Society acting with the oversight of the society to provide the necessary peer review and oversight. Alternatively, support



Figure 2



for better linkages between the Parliamentary Library and the research community could also fill this gap.

As a conduit to the broad community of New Zealand scientists, the Royal Society currently manages with only three dedicated staff, and a great deal of goodwill on the part of its membership. The PMCSA is required to deliver large-scale reports, provide science advice on a broad range of government policy initiatives, assist in coordinating advice during times of crisis, promote evidence-informed science to the broader community, be a leader within the science education community, and convene and provide secretarial services to the Chief Science Advisor Forum, while assisted by only three full-time staff and a part-time contractor.

In contrast, the UK's government chief scientific advisor appears to have approximately 80 employees. In New Zealand, the parliamentary commissioner for the environment, also tasked with scanning and identifying issues, creating reports and responding to policy initiatives with what is broadly science advice has 18 staff (Upton, 2018). The New Zealand Office of the Ombudsman has a similar number of staff to the UK Government Office for Science, around 80 (Boshier, 2017), and the privacy commissioner has 35 staff (Edwards, 2018). While the chief science advisors can assist the PMCSA at some level, they are often deeply involved in their own departments and projects. There has been considerable success in the coordination

of reports across the chief science advisor network and Royal Society where resources have been aligned.

### Summary

Science and science advice play an important part in the processes of government. There are critical insights that science can bring to government, and science can be good at detecting potential problems well before their impacts are felt on a day-to-day basis. But 'science' as a brand is open to abuse as much as use. 'Science' gets used to sell everything from vitamins to public policy. It has been a legitimiser for politicians both reactionary and revolutionary and misused to delegitimise critics.

The prime minister's chief science advisor and the community of chief science advisors will work to maintain a community of practice for robust science advice within the framework of free, frank and fair advice. By maintaining links with the academic community, and by the peer review of their outputs, they have a vested interest in ensuring the integrity and independence of their advice. The Chief Science Advisor Forum will continue to be developed by the current PMCSA as a source of advice from a diverse community, to build a cross-sector resource for all of government.

The Royal Society Te Apārangi has a legislated mandate to provide expert and formal independent advice. It is well placed to engage a broad community of research professionals in developing large-scale,

forward-facing pieces of advice, and to summarise the best science of the day for policymakers and the public. But it also has the potential to support the legislature more effectively. Crucially, there is a view that the Royal Society does need to be more responsive to current policy agendas and issues of the day. While the Royal Society has been a proactive source of 'alerts' that reflect the concerns of the research community, it could also take advice and direction on what issues to address from the policy community, Parliament and the broader public. Connecting the research community to Parliament through the Speaker's Science Forum and similar events is a start, but to move the Royal Society will need to develop other forms of engagement that reach beyond its membership, and it will need to develop additional mechanisms for listening and responding to a broader public.

The science advice system is an ecosystem of checks and balances, peer review, and to some extent competitive advice tendering. But in a world of limited resources and dispersed expertise, it also needs some coordination and interaction with the policy system to ensure that it delivers advice that is relevant and that is not rendered redundant by the activities of other agencies or developments in the policy agenda.

The various officers of Parliament, such as the parliamentary commissioner for the environment, need to be seen as active parts of the advisory ecosystem. Ways could be found to ensure connectivity of advice in such a way that independence is maintained, but duplication is avoided.

Crucially, the work of the Royal Society Te Apārangi, the prime minister's chief science advisor and the chief science advisors are all dependent upon research institutions that allow their staff to engage in policy-based work.

1 There is inconsistency in titles across ministries. Some full-time public servants have the title chief science advisor, others chief scientist. This partly reflects roles, partly historical quirks.  
2 The diversity can be both technical and sociological. So, we can be more confident of a science claim if two distinctive research methodologies or practices have come to the same conclusion: for instance, if archaeological evidence, genetic evidence, linguistic evidence and evidence from traditional world views all point to a similar conclusion, it is a pretty robust claim (Jeffares, 2008; Kirch and Green, 2001). Kirch and Green call this 'triangulation'. But we also use diversity to counter implicit bias: if researchers with differing social standpoints all come to a similar conclusions – if,

say, Maori, Pacific and Muslim researchers all come to similar or overlapping conclusions about a claim – then we also have good reason to think there is a robustness about the claim given the diversity of social standpoints of the researchers involved (Lennon and Whitford, 2002). So this 'inter-subjectivity' counters implicit biases, both technical and social.

3 And some not so plausible ones.

4 At the publication end of this process, informal discussions between the Office of the Prime Minister's Chief Science Advisor and National Library staff have opened the possibility that reports by key 'science' agencies could be grouped as a science collection within the online database.

This would go some way to the one-stop shop, and allow for some more active curation. The International Network for Government Science Advice (INGSA) is also investigating options for a single repository for published science advice.

5 <https://royalsociety.org.nz/what-we-do/our-expert-advice/expert-advice-and-practice-framework/>

Dr Andrew Cleland, Dr Ian Ferguson, Dr Roger Ridley and Dr Rachel Chiaroni-Clarke for comments on early drafts of this article.

#### Acknowledgements:

We thank Professor Sir Peter Gluckman, Dr Anne Bardsley, Dr Stephen Goldson,

#### References

- Allen, K. (2014) *Synthesis Report: Science Advice to Governments conference, 28–29 August 2014*, Auckland: Office of the Prime Minister's Science Advisory Committee and International Council for Science, [https://www.pmcsa.org.nz/wp-content/uploads/Synthesis-Report\\_Science-Advice-to-Governments\\_August-2014.pdf](https://www.pmcsa.org.nz/wp-content/uploads/Synthesis-Report_Science-Advice-to-Governments_August-2014.pdf)
- Armstrong, D. (2018) 'Free, frank and fearless?', *Public Sector*, 41 (2), pp.19–20
- Boshier, P. (2017) *Annual Report 2017/18: report of the ombudsman, Tari o te Kaitiaki Mana Tangata, for the year ended 30 June 2018*, Wellington: Office of the Ombudsman
- Boston, J. (2017) 'Do we need a commissioner for science?', presentation to a meeting of the Environmental Institute of Australia and New Zealand, Victoria University of Wellington, 11 May, unpublished
- Edwards, J. (2018) *Annual Report of the Privacy Commissioner for the year ended 30 June 2018*, Wellington: Privacy Commissioner
- Eichbaum, C. and R. Shaw (2007) 'Ministerial advisers, politicization and the retreat from Westminster: the case of New Zealand', *Public Administration*, 85 (3), pp.609–40, <https://doi.org/10.1111/j.1467-9299.2007.00666.x>
- Eichbaum, C. and R. Shaw (2008) 'Revisiting politicization: political advisers and public servants in Westminster systems', *Governance*, 21 (3), pp.337–63, <https://doi.org/10.1111/j.1468-0491.2008.00403.x>
- Gaston, N. (2015) *Why Science is Sexist*, Wellington: Bridget Williams Books, <https://doi.org/10.7810/9780908321650>
- Gibson, E. (2019) 'End forest tradeoffs for CO<sub>2</sub>: PCE climate report', *Newsroom*, 27 March, <https://www.newsroom.co.nz/2019/03/27/507676/end-forest-sinks-for-co2-says-environment-commissioner>
- Giere, R.N. (2006) *Understanding Scientific Reasoning*, 5th edn, Belmont, CA: Thomson/Wadsworth
- Gluckman, P. (2011) *Towards Better Use of Evidence in Policy Formation: a discussion paper*, Auckland: Office of the Prime Minister's Science Advisory Committee, <https://www.pmcsa.org.nz/wp-content/uploads/Towards-better-use-of-evidence-in-policy-formation.pdf>
- Gluckman, P. (2013) *The Role of Evidence in Policy Formation and Implementation*, Auckland: Office of the Prime Minister's Science Advisory Committee, <http://www.pmcsa.org.nz/wp-content/uploads/The-role-of-evidence-in-policy-formation-and-implementation-report.pdf>
- Gluckman, P. (2018) 'The role of evidence and expertise in policy-making: the politics and practice of science advice', *Journal and Proceedings of the Royal Society of New South Wales*, 151 (1), pp.91–101
- Gluckman, P., A. Bardsley and F. Low (2018) *Methamphetamine Contamination in Residential Properties: exposures, risk levels, and interpretation of standards*, Auckland: Office of the Prime Minister's Science Advisory Committee, <https://doi.org/10.17608/k6.OPMCSA.7723232.v1>
- Hendy, S.C. (2015a) 'Science for policy: the need for a Commission for Science', *Policy Quarterly*, 12 (3), pp.46–9
- Hendy, S.C. (2016b) *Silencing Science*, Wellington: Bridget Williams Books, <https://doi.org/10.7810/9780947492847>
- Jeffares, B. (2008) 'Testing times: regularities in the historical sciences', *Studies in History and Philosophy of Science Part C: Studies in History and Philosophy of Biological and Biomedical Sciences*, 39 (4), pp.469–75, <https://doi.org/10.1016/j.shpsc.2008.09.003>
- Kenny, C., C.-L. Washbourne, C. Tyler and J.J. Blackstock (2017) 'Legislative science advice in Europe: the case for international comparative research', *Nature*, 3 (May), pp.1–9, <https://doi.org/10.1057/palcomms.2017.30>
- Kibblewhite, A. and P. Boshier (2018) 'Free and frank advice and the Official Information Act', *Policy Quarterly*, 14 (2), pp.3–9
- Kirch, P.V. and R.C. Green (2001) *Hawaiki, Ancestral Polynesia: an essay in historical anthropology*, Cambridge; New York: Cambridge University Press
- Lennon, K. and M. Whitford (eds) (2002) *Knowing the Difference: feminist perspectives in epistemology*, London; New York: Routledge
- McCarthy, D. and M. Rands (2013) 'Learned societies: a bridge between research, policy making and funding', *Studies in Higher Education*, 38 (3), pp.470–83, <https://doi.org/10.1080/03075079.2013.773216>
- Office of the Prime Minister's Chief Science Advisor (2018a) 'Antimicrobial resistance: an imminent threat to Aotearoa, New Zealand', Auckland: Office of the Prime Minister's Chief Science Advisor, <https://doi.org/10.17608/k6.OPMCSA.7380050.v1>
- Office of the Prime Minister's Chief Science Advisor (2018b) 'Draft terms of reference for the Chief Science Advisor Forum', <https://cpb-ap-se2.wpmucdn.com/blogs.auckland.ac.nz/dist/6/414/files/2018/12/Draft-ToR-for-CSA-Forum-December.docx-2hjvfn.pdf%0D>
- Open Government Partnership (2018) *National Action Plan 2018–2020*, Wellington: New Zealand Government, <http://ogp.org.nz/new-zealands-plan/third-national-action-plan-2018-2020/>
- Parliamentary Commissioner for the Environment (2019) *Farms, Forests and Fossil Fuels: the next great landscape transformation?*, Wellington: Parliamentary Commissioner for the Environment, <https://www.pce.parliament.nz/publications/farms-forests-and-fossil-fuels-the-next-great-landscape-transformation>
- Rittel, H.W.J. and M.M. Webber (1973) 'Dilemmas in a general theory of planning', *Policy Sciences*, 4 (2), pp.155–69, <https://doi.org/10.1140/epja/i2002-10323-2>
- Upton, S. (2018) *Annual Report Parliamentary Commissioner for the Environment Te Kaitiaki Taiao a Te Whare Paremata*, Wellington: Parliamentary Commissioner for the Environment
- Weingart, P. (1999) 'Accountability: paradoxes of science in politics', *Science and Public Policy*, 26 (3), pp.151–61
- Wylie, A. (2002) 'Archaeological cables and tacking: beyond objectivity and relativism', in A. Wylie (ed.), *Thinking from Things: essays in the philosophy of archaeology*, Berkeley; London: University of California Press