



Rebecca Jarvis and Tim Young on marine science research

Edited transcript of The Policy Fix podcast interview with Dr Rebecca Jarvis and Dr Tim Young, recorded on 2 July 2019 at Auckland University of Technology city campus.

Nau mai whakarongo mai and welcome to The Policy Fix, a podcast by The Policy Observatory, AUT. Ko Keri Mills tēnei and today I'll be talking with AUT researchers Rebecca Jarvis and Tim Young who have just done a 'horizon scan': a survey of Aotearoa's marine science community, to identify key areas where more research is needed.

KM: Tēnā kōrua. We'll start with the horizon scan project. Could one of you describe this project for us?

RJ: Yes. Well, 96% of New Zealand is actually in the sea, and our marine environment is at risk. So we need to get organised to meet the challenges ahead of us. So what we did is, we invited the New Zealand marine science community to come together and collaboratively identify the key research priorities that can make the best contributions to marine science policy and management.

KM: And, why did you decide to do this? What were you hoping to achieve?

TY: Well, basically it appeared to us that there was a lack of scientific, targeted, and tangible research questions outlined for scientists, and students, and other people to focus attention on much needed areas of research. So we thought that it would be a really good idea to facilitate a democratic and inclusive research priority exercise to obtain important research questions that can deliver immediate impact, if answered. And we also thought that it was quite important to bridge gaps between policy and researchers and practitioners. So we decided to apply a technique based on a national survey, that hadn't actually been done in New Zealand before. We invited over 700 participants, and from that there were about 250 people who participated in the survey.

KM: In a nutshell, if you can, what were your findings?

TY: One of the most important things for me was to see that people across the board came together to identify the different priority areas collectively. We received over 300 questions, that we grouped based on common themes. Ultimately there were nine themes identified:

fisheries and aquaculture; biosecurity; climate change; marine reserves and protected areas; ecosystems and biodiversity; policy and decision-making; marine guardianship; coastal and ocean processes; and other anthropogenic factors. It was also really interesting to see that there were quite a lot of intersections among the different questions raised. I think what's really cool is that there's actually something in there for everyone. Whether you have interests in ecology, or policy, or even fishing, or just thinking about how we can better look after our beaches and provide guardianship.

KM: So that's obviously quite a long list of priority areas. We are going to zoom in on the two areas that both of your specific research is focused around. So if we start with Rebecca. One of the priority areas you identify is 'guardianship' - could you explain what that means?

RJ: Our oceans serve as a source of culture, food, livelihoods, trade, recreation and fun, as well as quality time spent with friends and family. Most of the air we actually breathe comes from the ocean. Guardianship, or kaitiakitanga, means stewardship and protection of the marine environment, while safeguarding marine resources for future generations. So enhancing guardianship means enhancing stewardship and protection of our marine species and spaces. This means recognising the different ways we view and value the marine environment, and how we can work together to make a difference.

KM: So how can we get this to happen more, or happen better: the involvement of citizens in science?

RJ: We need to understand how different people view and value the ocean and combine our different ways of knowing, mātauranga, local, experiential and scientific knowledges. Carefully targeted work is needed to better understand how we can effectively build such partnerships, and strengthen Māori, community and citizen guardianship of the marine environment. For example, our study identified the importance of developing a solid partnership of inquiry between western science and mātauranga Māori. It also identified the potential of building citizen science programs for maximising coastal and oceanic observations across New Zealand. And the role of local and community monitoring to detect changes in the environment which could inform local marine management and possibly even encourage more sustainable and environmentally friendly behaviours.

KM: Community monitoring. How does that work in practice, and how would scientists use the information that came from the community to help make better policy?

RJ: Local communities have lots of different local and experiential knowledge of their environments around them. Getting researchers, potentially even decision makers or communities together means that you can design the type of research programs that communities can then contribute to. Whether that's simple sampling, or just monitoring the state of the environment. And all of this information can get fed back into research, and in doing so give us a better understanding of what's going on across New Zealand.

KM: It's a cool idea that the community can be involved in the scientific gathering process, and it makes a lot of sense. Is there an issue around getting quality monitoring data, and if so how do you get around that?

RJ: So yes, there are some people who are a little bit nervous around community projects or citizen science, because they're worried about the quality of the data. But really it's just about the noise in the data and as with any good experiment, if you design it well then it's all good and you'll collect enough results to know exactly what's going on. And communities and local people can make fantastic contributions.

KM: What does noise in the data mean?

RJ: Noise in the data means, if there's any human error, which of course scientists also make, just any variability in the data, which means it's a little bit harder to unravel. But with any experiment there is often some sort of noise, that's just how science is. So as long as we are designing citizen science community projects with those people, that work to minimise the potential for that noise then we can find some really meaningful results.

KM: Do you know of any examples in New Zealand, and could you give us those examples if you do?

RJ: So I know there's a lot of projects that go on with Curious Minds, and the Participatory Science Platform, which really focus on doing that sort of thing, whether working with communities and especially schools and young people to get them out and get them involved.

KM: I'll flick a few questions at you Tim. So another of the priority areas is 'fisheries and aquaculture', which is your area. What are the biggest problems here?

TY: Fisheries and aquaculture supply over \$4 billion to New Zealand's economy per year. And fisheries and aquaculture are also an important source of food and jobs of course. And I think that there are numerous areas where gains could be made in order to better manage these sectors, and also to future proof them. For me one of the most important priority questions that came out of the survey was looking at how multiple stressors interact, and will impact food security in marine resources in the future. Personally as a fish and shellfish biologist, I see the overarching reach of climate change – we really need to have a better understanding of how climate change is going to affect our fisheries and aquaculture sectors.

In particular, global warming is starting to have major effects on sea-surface temperatures, and this leads to increased occurrences of marine heatwaves. Marine heatwaves are defined as periods where daily sea-surface temperatures exceed local seasonal thresholds, based on historical data, and it's when it exceeds these thresholds for at least 5 consecutive days. And marine heatwaves have increased globally over the last 30/40/50 years or so, and particularly so in New Zealand. For example, the summer of 2017-2018, we started experiencing some of the highest sea-surface temperatures on record, with these temperatures increasing over four degrees over the norm. Four degrees might not sound like much of a difference to some people, but if you think about that, four degrees is actually the difference in sea temperatures between summer and winter. And we don't swim in winter, but we do in summer, so it's actually quite a big difference.

And even small increases in temperature can have large impacts on marine organisms, especially for those organisms that are already living at their thermal maximum tolerance limits. So species in New Zealand, their distributions are largely dictated by the gradient in sea-surface temperatures from the north to the south and from the east to the west. And specific examples: the marine heatwave a couple of summers ago, was absolutely devastating for fish and shellfish stocks, for the country. For example, salmon in the Marlborough Sounds started dying. We farm species of salmon called the Chinook salmon, it's not a native fish, it was introduced here from the United States in the late 1800s. But this fish has a quite low thermal tolerance limit, about 17 degrees. And when the water temperature started increasing in the Marlborough Sounds that summer, above that threshold, industry was experiencing stock losses of up to about 20%. That was massive, and it actually resulted in industry having to start importing packaged Atlantic salmon from overseas, just in order to supply domestic consumer demand. Which is unheard of for the New Zealand salmon industry.

Also, the greenshell mussel industry experienced significant stock losses, and we're still currently trying to estimate the impact of those losses. And we also saw large impacts on commercial and recreational fish stocks, which started showing unusual changes in behaviour. We saw snapper and kingfish starting to migrate further south, to cooler waters, and there were reports from commercial fishers saying that snapper had started spawning six weeks earlier than usual, which is quite significant. And these effects also extended even to seaweed populations. Bullkelp, for example, in the South Island, started dying, and these ended up being replaced by invasive seaweed species.

KM: That's a scary list of impacts. In your horizon scan project what areas came up as places where we need even more research?

TY: Well we don't actually really know the full extent of how increasing temperatures are affecting the majority of our native flora and fauna. And we don't know how this stressor interacts with other stressors. A recent study involved a meta-analysis of global research, and it showed that seabirds, plankton, seaweeds, and shellfish, are *all* at significant risk, with major impacts on reproductive processes, on growth, on survival, and on species abundance. So we really, really need to know more about the localised effects of marine warming on New Zealand species. And we can do that through laboratory experiments, through field experiments, through surveying fisheries data. And there were other areas, that came out in the survey, where more research is needed. Particularly, for example, some that span the fisheries/climate change/biosecurity areas include understanding host-pathogen relationships of marine diseases, developing remediation strategies, and then some other areas like: how can we improve the management of fisheries to reduce environmental impacts? How might we try to reduce by-catch? And trying to understand how human activities on land are impacting commercial species of interest.

KM: Is there anything we already know we should do, but aren't doing, or aren't doing well in this space?

- TY: I think, generally speaking, we have the expertise, we have the research questions, but what we really need is the funding, and we need a collaborative effort to pull together, to actually try to answer those questions efficiently.
- KM: Back to both of you. I'd like to pick up on a couple of points you made in the "policy and decision-making" area of your horizon scan. You introduce that section by saying that existing legislative frameworks were developed in response to particular interests and sectoral needs, rather than the current and future needs of the ocean. Could you summarise the current legal framework over the marine environment?
- RJ: Well, complicated, springs to mind. As well as disjointed, fragmented. Basically over the past 50 years there's been lots of different acts and legislation for different purposes. For minerals exploitation, marine farming, marine protection and coastal management – but these are often being driven by the particular needs of those different areas, and so focus on different priorities and sectors. These frameworks haven't been integrated, or thought about holistically, and we're yet to develop a national oceans policy.
- KM: Do you think it's still possible to develop good policy in this space, with the laws as they are?
- TY: Yeah that's an interesting question. Our environment is degrading, there's no question, and we have a number of new and emerging threats on the horizon, so I think that it is inevitable that things have to change. I think we need to be developing an inclusive framework – one that fosters participation and collaboration, that really listens to different voices, and different values, but is centred around evidence-based research and also Treaty principles. There are numerous efforts currently underway, that are revolutionising the way that marine science is done in New Zealand, and these are leading to rapid knowledge advances. So yes, things are certainly changing in the science-to-policy space in New Zealand. And I personally think that we have a really good chance, with a supportive government, and other institutional initiatives, that we can really become leaders in the way we manage our marine estate. Most of us, I'm sure, we want to better protect and we want to better serve our environment and heritage, and the marine science community is in the middle of making this happen. And I really hope that, together, we can make New Zealand a model for ocean governance in the near future.
- KM: You identify this question as a key area for future research: "how can we improve the processes between science, decisionmaking and action, to improve our conservation and management outcomes?" Do you have any ideas for us to be going on with in this space?
- RJ: Yes, I do. Mostly focusing on working better together towards the future of our marine environment. And I think that the way to think about that is to think about us *all* doing marine science but in different languages. So researchers speak one language, and decisionmakers speak another. Practitioners and the public speak another language. So at best, we're all trying to learn each others' languages, and understand what each other are saying so we can better communicate. But at worst, people shout louder in their own language, without trying to learn the others. So we really do need to be humble, and be willing to learn from each other, learn each others' languages, build the trust and relationships that are needed to navigate these spaces.

And another thing we can do of course is get more translators on board – so people who can translate these spaces, and really navigate these spaces and help us all to navigate these spaces together. So that means people who can talk to policymakers about what policy needs they have, that could be better supported by evidence, that means people talking to practitioners about the sort of questions that they want to know, what evidence they need to inform action. It means talking to scientists about the different kinds of research they can do, and what people need more evidence for. And it means talking to the public about what they're most passionate about, and what questions they have. These people tend to be called transdisciplinary, or knowledge exchange specialists, knowledge brokers, or boundary-spanners. We definitely need more of them embedded in our research institutions, as well as in our government, in our Crown Research Institutes, and our industries.

KM: What's the response been so far from the horizon scan?

TY: The response has been really positive. We've received a number of nice emails, and some great responses from people in industry, from government, from international organisations, media and various groups. Members of the public as well, so it's been really great.

KM: We'll finish it there. Ngā mihi nui ki a kōrua.

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