

Work



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Otakuye Conroy-Ben studies water, considered sacred by Native American communities.

sciences – at the nation’s top 50 departments, according to data from the most recent comprehensive survey in 2012 (D. J. Nelson and L. D. Madsen *MRS Bull.* **43**, 379–383; 2018). The study also found that Native Americans – who in 2012 made up 1.2% of the US population – were completely absent from the top 50 departments in mathematics, mechanical engineering, economics, political science and sociology.

Although racial-justice initiatives around the world have sparked a renewed focus on the need to recruit and retain more people from minority ethnic groups in STEM, Indigenous researchers – and Indigenous knowledge – remain at risk of being overlooked. *Nature* spoke to four Indigenous academic scientists about the challenges these early-career researchers face, and how scientists can respectfully and effectively bring together traditional knowledge and Western science.

OTAKUYE CONROY-BEN RECOGNIZE THAT COMMUNITIES MAINTAIN DATA SOVEREIGNTY

I lived on the Pine Ridge Reservation in South Dakota during my early years. I still have family there and I am culturally connected. I started off studying chemistry at university, but switched to looking at the impacts of reusing waste water as a water source because I knew it would make a difference to tribal communities. My parents and grandparents instilled in me the importance of not forgetting where I come from. For the Oglala Lakota tribe, water is sacred. Researchers need tribal approval on every aspect of studies on water, including approval of the contaminants to be studied.

Most communities have data sovereignty, meaning that any data generated on our land belongs to the tribe. Researchers can generate data – whether that’s recordings of tribal elders, interviews or chemical concentrations in local water sources – but the information has to be approved by the tribal research review board and returned to the tribe, which will store it. When I proposed a study to monitor pollutant exposure and human-health indicators in samples collected from the sewage system, I worked with a number of tribal offices, including utilities, environment and the Indian Health Service, depending on the tribe.

There are painful examples of researchers not following such practices. The most notorious

RESPECT AND REPRESENTATION

Indigenous scientists seek inclusion for their knowledge and for themselves. **By Virginia Gewin**

Despite long-standing calls to increase diversity on university campuses, Indigenous researchers remain poorly represented in academia, particularly in science, technology, engineering and mathematics (STEM) fields. For example, Maori people make up about 17% of the population of New Zealand, but the percentage of Maori academic researchers is much lower. A 2019 study found that Maori researchers comprise less than 5% of the full-time academic workforce at New Zealand’s eight universities. Tara McAllister, a freshwater ecologist

and diversity researcher at the University of Auckland and a member of the Te Aitanga-a-Māhaki tribe, was lead author of that work and of a follow-on study in 2020. It found minimal change in Indigenous representation between 2008 and 2018 at those eight universities and at six Crown research institutes (T. G. McAllister *et al. J. R. Soc. N. Z.* <https://doi.org/10.1080/03036758.2020.1796103>; 2020).

In the United States, Native Americans held full professorships in just 6 of 15 STEM fields – chemistry, computer science, astronomy, physics, biological sciences and Earth

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case involved researchers from Arizona State University (ASU). Members of the Havasupai tribe in Arizona gave blood samples in 1989 for research on type 2 diabetes, only to find out later that the researchers had used the DNA samples for studies on schizophrenia, ethnic migration and population inbreeding without the individuals' approval. (The tribe sued ASU in 2004 and won monetary remuneration and the return of the DNA samples.) That set the benchmark for how not to conduct research with Indigenous communities. Because of that incident, several Arizona tribes don't want to take part in research with ASU or any other institute. Because I'm a tribal member, they can be more accepting of the research I want to conduct.

I advise anyone working with Indigenous communities to realize that it takes time. When I do research with some communities, it can take a year or two to receive tribal approvals, which means there is often not enough time for someone at a pre-tenure stage to focus on the issues of Indigenous communities. In addition, often the tribes own the data and place limitations on publication. If a community allows publication, it must be approved and edited by them first. My work is for the benefit of Indigenous people, but it can be challenging because I'm in a faculty position and need to publish to advance my career. That said, each tribe handles research differently. Early-career researchers should get a clear picture of what a tribe allows in terms of dissemination of research. Researchers should ask questions, such as whether the tribe needs to be anonymized or if it has a formal data-request process.

In the past five years, I've seen more researchers at conferences start their talks with a land recognition – a statement that acknowledges the Indigenous land they are on and offers respect to the local tribes. The president of ASU does a land acknowledgement, as does the ASU library. (Editor's note: it states, for example, that the university's four campuses are located in the Salt River Valley on ancestral territories of Indigenous peoples, including the Akimel O'odham (Pima) and Pee Posh (Maricopa) Indian communities.) My Native American colleagues have it in their e-mail signature. I don't know if there is a wrong way to do a land acknowledgement, unless you get the tribe wrong.

Early-career researchers who are members of Indigenous communities should question their prospective department heads, and senior faculty members whom they are considering as advisers, about their cultural sensitivity. For example, Native Americans have cultural and family responsibilities that might require them to take a month off in the summer. It's good to make sure potential advisers are aware of that.

Otakuye Conroy-Ben is a member of the Oglala Lakota tribe and an environmental engineer at Arizona State University, Tempe.



Indigenous scientist Bradley Moggridge has used social media to push for equity in research.

BRADLEY MOGGRIDGE RAISE YOUR VOICE TO INSIST ON INDIGENOUS EQUITY IN STEM

Being an Indigenous scholar is often a series of firsts. I was the first in my large extended family to graduate from university. I was the first Indigenous graduate from the environmental science programme at Australian Catholic University in Sydney. After getting my undergraduate and master's degrees in water research, I worked for research agencies, including the Commonwealth Science and Industrial Research Organisation. I then led an Indigenous Australian water unit for the New South Wales state government to highlight the cultural values of water. In 2016 I started a PhD at the University of Canberra, which I will finish soon.

Recruitment and retention of Indigenous scientists is an issue in academia. There's a troubling tokenistic aspect, almost like ticking a box, to having an Indigenous Australian on board. But this might be changing. There's now a concerted effort to encourage Indigenous children to go to university and to finish with a degree. It's a real challenge, however, to walk in two worlds. There are Western ways of learning, but you also have to maintain and protect Indigenous cultural integrity.

Most Australian universities have a reconciliation action plan (RAP), which lays out a series of targeted commitments to address race relations, equality and unity for Aboriginal and Torres Strait Islander communities. The University of Canberra's RAP is quite strong; it aims to attract, retain and support the graduation of Indigenous scholars, as well as keep them on track for a career path.

In addition, the university is working to embed Indigenous perspectives and pedagogies into the curriculum and to establish an Indigenous research institute. We are improving, but still have a long way to go.

I encourage early-career researchers to establish a presence on Twitter. I have used it to pick worthy battles. For example, the Australian Academy of Science posted a picture of a group of white and Asian people at the academy that said something about the future of Australian research. I tweeted, "Are Australia's First Peoples allowed to be a part of that future?" It was a little dig, pushing them on what they would do next.

They came to me for a chat, and I joined an advisory group on how to move forward. That led to an anonymous donor committing to funding two annual travel grants of Aus\$5,500 (US\$4,200) for Aboriginal and Torres Strait Islander early- and mid-career researchers.

Many diverse and poorly represented groups in science are vying for funding and attention. We have to make sure we aren't overlooked.

Bradley Moggridge is an Indigenous water scientist at the University of Canberra, Australia, and a member of the Kamilaroi Nation.

TARA MCALLISTER IDENTIFY RED FLAGS TO FIND A SAFE HAVEN IN ACADEMIA

During eight years of university, I was very aware that I was one of only two Indigenous people in my course of study, and I had no Maori lecturers for any of my science courses.

I was very lonely during my PhD. When lecturers found out I was Maori, they expected me to know everything about Maori people and to explain it all to my classmates. I was always asked to speak to incoming Maori students and tell them why the university was such a good place. I did that for a while, but then I realized I couldn't say that truthfully, and I began to decline those invitations.

Although I had long been interested in data on the number of Maori lecturers, I started writing papers on diversity, equity and inclusivity research only in 2019. So many Indigenous researchers have thanked me for digging out the numbers that substantiate their lived experience. Some academics have questioned the accuracy of the data in papers I have authored, but those data are reported to our government by the institutions themselves, so they are the best available. I'm slightly hopeful that if we continue doing this work and publishing articles that highlight how bad the situation is, we'll ultimately get more Maori researchers into university. Numbers are powerful and hard to ignore.

I tell early-career Indigenous scientists beginning their journey in mainstream institutions to find a safe haven with supportive people who share their values. Being an Indigenous scientist in some institutions can be difficult, exhausting and dangerous culturally and spiritually, because we are exposed to daily racism, and our culture and knowledge have been used superficially.

Before you join a department or choose an adviser, it's really important to talk to people of colour or those who are from Indigenous communities about their experience with that particular adviser. I know well-meaning scientists who want to bridge these cultural divides. Some will even try to incorporate Indigenous knowledge into their work. But they should be committed to doing this in a meaningful way by uplifting and centring Maori communities and knowledge. Recently, I saw a panel in New Zealand about decolonizing the academy – and all the speakers were white and non-Indigenous people. There is a fine line between creating spaces in institutions for Indigenous people and taking up those spaces.

Maori researchers maintain almost a whisper network of white researchers who don't do this well. I can always tell whether a non-Maori researcher genuinely cares about addressing the problems that Indigenous communities face, such as the ongoing degradation of freshwater environments and decline of our culturally important native species, or whether they are doing the research only to advance their own career. For example, the biggest red flag is when white scientists want to do research on us without involving us.

In addition, at certain times of the year, I get flooded with requests from non-Maori researchers who want a Maori name on a

funding application to tick the diversity box and boost their chances of success. That sits really uncomfortably with me. Often they have already developed the project, rather than involving Indigenous people or our expertise at an earlier stage.

If an Indigenous scientist has to pull out of a project because they are uncomfortable with their assigned role or if their contributions are sidelined, it can be helpful for them to send an e-mail to the non-Maori project leaders. In the e-mail, they should explain how a tokenistic role can negatively affect an Indigenous scientist's career. The e-mail should also outline how colleagues can do better next time. Indigenous scientists should do this only if they have the emotional energy. This is another place where non-Indigenous scientists could step up and take on some of this often unseen labour.

Tara McAllister is a member of the Te Aitanga-a-Māhaki tribe and a freshwater ecologist and diversity, equity and inclusivity researcher at the University of Auckland, New Zealand.

DEBORAH MCGREGOR ESTABLISH EQUITABLE AND RESPECTFUL COLLABORATIONS

I left my first nation's community to pursue my academic career, and I received a PhD in forestry in 2000 from the University of Toronto, Canada. I worked for ten years at the government agency Environment Canada (now Environment and Climate Change Canada), where I promoted the science developed by Indigenous people.

I wanted to help to address the big environmental challenges that Indigenous communities were dealing with, particularly water quality. At the time, outside academia, few people were talking about Indigenous science or traditional knowledge in the environmental field.

Now there is a push to bring Western science and Indigenous knowledge together. The best examples I've seen make sure there is knowledge exchange; they do not simply extract Indigenous knowledge.

It's crucial to understand Indigenous perspectives, including the history and ongoing impacts of colonization. I suggest people read Robin Wall Kimmerer's book *Braiding Sweetgrass* (2013) about how to weave together information from different knowledge systems.

I advise white researchers to take intercultural, anti-racism or anti-oppression training. People often don't see how their privilege might affect an Indigenous community.

When collaborative research projects work well, they establish an equitable relationship

between the non-Indigenous researcher and the Indigenous community, recognize the struggles of that community and value its strengths. If a researcher is working with Indigenous communities, it's important to understand that the most knowledgeable person in the community might not speak or think in English.

Most importantly, the Indigenous members have a say not just in defining the research questions and how the research will matter to the communities, but also in the data analysis and interpretation.

Often, however, Indigenous concerns are an afterthought. I'm now involved with the Intergovernmental Panel on Climate Change because the panel was criticized for not considering Indigenous knowledge in its vulnerability assessments.

Non-Indigenous climate scientists struggle with how to do that, so the lead authors reached out to me in summer 2019 to help complete the forthcoming assessment.

I am also working on Canada's climate assessment, a number of different reports coming out over the next year or so. The difficulty there is that it is hard to find peer-reviewed literature to support what communities are experiencing.

In addition, I'm working on the Indigenous Resilience report, which will document the adaptive capacity of native populations. Research exists, but it's not from the perspective of Indigenous communities. It's very hard to do rigorous research when you are the afterthought.

Still, I'm happy it's now on the radar. Outreach has to be done respectfully, equitably and rigorously.

I started at York University in Toronto, the third-largest institution in Canada, five years ago. I was one of five or six Indigenous faculty members. The university did what it called equity and diversity hiring, and doubled that number. But because universities often don't have support mechanisms for early-career researchers, they have trouble retaining people.

The frustration for people of colour is that we're not the ones who have work to do. It's the people with power who need to change how they think and what they do.

I have yet to see a panel in which white speakers say, 'Because of everything I've learnt, I will do this.' I haven't seen anybody let go of power, prestige or speaking engagements.

Deborah McGregor is Anishinaabe from Whitefish River First Nation, Birch Island, Ontario, and Canada Research Chair in Indigenous environmental justice at York University, Toronto, Canada.

Interviews by Virginia Gewin

These interviews have been edited for length and clarity.