

Is climate science gendered? A reflection by a female 'climate scientist'

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Abstract

In this personal narrative I consider my professional identity as a female atmospheric chemist and science outreach professional. In response to my experience as an invited speaker at a recent women's studies conference, I explore my attitudes towards feminism, as well as the encouragement of transgressive competence by climate scientists speaking outside of their direct area of expertise, and the potential negative impact of this on the public perception of climate science. I also observe a high ratio of female scientists involved in outreach about climate and polar science, despite these being male-dominated fields of research, and explore the potential impact that this may have on their scientific careers. While considering the different roles of men and women in climate science and related professions, I suggest that the emergence of anthropogenic climate change may have provided new opportunities for women to become engaged with, or gain literacy in, the natural and physical sciences. I conclude that the divide I'm most aware of in my professional life is that between the physical and social sciences, rather than that between genders.

Key words

climate change, climate science, transgressive competence, science communication, interdisciplinarity, identity

Introduction

The annual conference of the 2013 Women's Studies Association of New Zealand included a panel discussion on the theme, *What Does Climate Change Mean for Women in Aotearoa New Zealand*. I was invited to join this panel, based on my background as a natural scientist who has worked both in climate-related science and in communication about climate science with the public.

The title of the panel was a challenge for me – I did not immediately see how women in New Zealand would be affected substantially differently from men by climate change. Upon surveying colleagues (male and female) with the question, the initial responses resorted to humour – like me, none had seriously considered this issue before. Responses included that 'washing would dry faster on a clothesline' or that 'for women in the west of the country, there will likely be an increase in both annual average rainfall and the intensity of high-rainfall events. In the east, more frequent droughts. At the coast, continued rising sea-level'. The latter point being that the direct meteorological effects of climate change are the same for women as for men. From the perspective of a natural scientist, anthropogenic climate change is a serious threat that will have far reaching consequences for people throughout the globe, regardless of gender (IPCC, 2007).

In April 2013, a resolution was assigned to a congressional committee for consideration by the US House of Representatives 'Recognizing the disparate impact of climate change on women and the efforts of women globally to address climate change' (H.Con.Res. 36). This reflects the substantial work that has occurred in the field of gender and climate (Terry, 2009). The striking difference between these conversations, and those occurring within the climate

science community (pers. comm.), demonstrates the very separate, and concurrent, discourses on climate change in different academic and professional spheres (e.g. Weingart, Engels, & Pansegrau, 2000). Despite this apparent gulf, Lowe et al suggest that climate change may offer a new opportunity for interdisciplinary collaboration between social and natural sciences (Lowe, Phillipson, & Wilkinson, 2013):

If societal needs with significant applied science components are a necessary precondition for successful collaboration, then climate change could be our twenty-first century catalyst for renewed attempts at interdisciplinary working.

It is in the context of the potential for greater interdisciplinary dialogue, and with the assumption that Women's Studies was made up of academics in the social sciences and humanities, that I became interested in what could be learnt through engagement with the Women's Studies community. Having been asked to explore the role that gender may have played in my career development, I found that I needed to also reflect on other aspects of my identity. This paper presents some of these identities – as feminist, scientist, climate scientist, and educator – as a mechanism for uncovering the role that gender has played in my career, and may play in the larger professional climate community. As a result of my inexperience with the topic, I chose to adopt a personal narrative (Ellis, 1999; Fenstermacher, 1997; Stivers, 1993) for the conference paper, and refer to that also below.

Feminist? Scientist? Female scientist? Climate scientist? What's in an identity?

Prior to the conference, I did not describe myself as a feminist despite being committed to gender equality. Indeed, I lacked an understanding of what 'feminist' means in today's terms (e.g. Ryan, 2000; Wekker, 2004). Several studies have explored this phenomenon of women, born in the 1970s or later, who have egalitarian gender attitudes but do not identify as feminists. It is suggested this is related to their perception of the feminist movement, rather than a rejection of feminist principles (e.g. Peltola, Milkie, & Presser, 2004; Rich, 2005; Williams & Wittig, 1997).

My personal narrative started as a high-achieving chemistry undergraduate student. I wanted female scientists to be 'better' than their male counterparts so as to be sure to set good role models and expectations, and counter negative stereotypes. Rather than suffering from discrimination during this time, however, I believe that I benefitted from a move to encourage more women into science careers. This unspoken positive discrimination further encouraged my pursuit of excellence in order to ensure that successes were gained through merit and not gender.

My decision to pursue doctoral studies in atmospheric chemistry was driven by an observation that the environmentalists with whom I identified were not physical scientists, and were often accorded little credibility when arguing the detail of climate science. There appeared to be two sides disagreeing on politics and values, and using scientific arguments as ammunition, described by Pielke as 'abortion politics' (Pielke, 2007, pp. 39-53).

A transitional moment for me in the comprehension of the reality and severity of anthropogenic climate change was through dialogue with (male) professors, from an older generation, who did not identify as environmentalists in the way that I did. They described the maths and physics that drives the global climate system, and the subsequent implications of releasing greenhouse gases into the atmosphere. It was critical for me that they did *not* appear to share my perspective and (environmental) values but rather had become convinced of anthropogenic climate change from physical and numerical data. This realisation of the 'credibility' of the

scientific argument further inspired me to pursue a career in science. In making this choice, I was inevitably also ‘choosing’ not to pursue a range of other things, including social science and the analytical lenses which that would have provided.

My post-doctoral research was carried out with the British Antarctic Survey, as one of two women on an eighteen-person team that was isolated on a remote Antarctic base for ten months. To the degree that distinct social groupings formed during this period, they cohered around professional identities: specifically, technical v. scientific staff. Historically, women employed at that Antarctic station generally occupied science-related positions (such as scientist, meteorological observer, or doctor) rather than technical positions (such as mechanic, engineer, electrician, carpenter or plumber). It was therefore not uncommon for women to be scientists. I became extremely comfortable living and working in a very male-dominated environment, and observed that in many ways the two women held a lot of power, especially in social situations. This experience is documented in studies on the social psychology and dynamics of small communities in isolated environments (e.g. Harrison, Clearwater, & McKay, 1989, and references therein). In Antarctica, therefore, I identified as a scientist (one of the two predominant social groupings) and also as a female (a significant minority group among both scientists and technical staff). Contrary to my experience elsewhere, the combination of these identities (‘female scientist’) was not unusual in this context and therefore was not important to my sense of identity while I was in Antarctica.

My final consideration of identity concerns the term ‘climate scientist’. I am formally trained as an atmospheric chemist – a sub-discipline that is of direct relevance to climate science. ‘Climate scientist’ is therefore not such a large jump, and is a far more accessible title for non-experts. However, this title inaccurately conveys my training and invites questions on topics on which I do not have expertise. This is a more general problem in this field: indeed, scientists with very different areas of expertise related to studying the climate could all be labelled ‘climate scientist’ and, upon being asked a question slightly outside their respective areas of expertise, could each offer quite different answers. By choosing the ‘accessible option’ in initial labelling, therefore, we inadvertently make it difficult for members of the public to recognise and differentiate between areas of expertise. This poses a dilemma for scientists who would like to be communicative of their climate science but are not comfortable ‘transgressing’ (Nowotny 2003) beyond their specific area of expertise. It may also produce public doubt and climate-change scepticism as transgressing experts may give different answers to the same question.

Polarisation: Science v. outreach

A few months after my return from Antarctica, I presented our results at the American Geophysical Union Fall Meeting in San Francisco (Salmon et al., 2005), an international scientific conference where science of relevance to climate change was high on the agenda. A small circle of protestors formed every day, outside the conference. They were climate sceptics who believed that the scientists attending the conference were colluding in a conspiracy theory around anthropogenic climate change, and that there was in fact no evidence for this phenomenon. It shocked me that the scientific discipline in which I had trained, and the process of scientific inquiry in general, was so mistrusted and, from my perspective, misunderstood. Further, I realised that if the views expressed by the protestors were, or became, widespread, the evidence being observed and reported by scientists would not result in the kind of social and political response that I deemed necessary. This event catalysed a decision to focus on climate science outreach (direct communication by scientists to non-peer audiences), and to engage in dialogue that might address the different perceptions of climate scientists that were held by the public.

This change in career focus led to my employment as Education, Outreach, and Communication Co-ordinator for the International Polar Year 2007-2008 (IPY), a collaborative and interdisciplinary research effort focused on the Arctic and Antarctic that involved scientists from over sixty countries and approximately 50,000 participants. In this capacity, I worked with educators, media officers, artists, indigenous communities, politicians, musicians, journalists, and writers, as well as polar scientists, all of whom were both passionate about education and communication, and deeply concerned about anthropogenic climate change (Salmon et al., 2011). All of these partners were leaders in their communities, and in all cases, women dominated these groups. This remained true even within the outreach committees of physical scientists where women were in a significant minority.

In order to effectively communicate issues around polar and climate science, the committees of non-scientists (such as artists, teachers, and journalists) had to significantly advance their scientific literacy. Building on this insight, I hypothesise that the existence of anthropogenic climate change may have stimulated a greater scientific literacy amongst female-dominated groups working in this area such as education and communication professionals.

The rest of this section focuses on scientists involved in outreach. The factors that motivate scientists to engage in public outreach activities have been studied relative to attitude, discipline, career stage, and academic productivity (Jensen, 2011; Jensen, Rouquier, Kreimer, & Croissant, 2008; Poliakoff & Webb, 2007). Gender differences do not feature prominently in most of these studies even though these factors may indirectly lead to gender differences. The sparsity of gender-related analyses in this field, and conflicting observations, leads Dudo (2013) to conclude that the relationship between gender and public communication with science and technology is unclear.

In one of the few studies specifically focused on the relationship between gender and outreach, Crettaz von Roten (2011) found that male scientists carry out outreach activities more often than female scientists, even though attitudes towards outreach are similar across gender. My experience in polar and climate-related science has differed significantly, and interestingly, from this. The proportion of women engaged in outreach in these fields is much greater than their proportion in the field as a whole. For example, almost half (24 out of 52) of the Antarctic science experts featured at the 2012 *New Zealand IceFest* in Christchurch were women (New Zealand IceFest, 2012), although all of these women reported that women scientists are in a minority in their workplace (unpublished data). In my own experience, it was noticeable that the IPY science programme was being led by men (with a few individual exceptions), and that the outreach programme associated with that science was championed and dominated by women (again, with a few individual exceptions). In addition, outreach efforts were usually voluntary and had few professional rewards. In contrast, although scientific research is also often carried out beyond official work hours, this is rewarded by publications that lead to substantial career recognition and promotion. Given the (relatively low) value in which outreach and education is commonly held in the science community (Jensen, Rouquier, Kreimer, & Croissant, 2008), the over-representation of women in polar and climate-related science outreach may therefore indirectly hinder their conventional career progression in science.

At its core, climate science is driven by fundamental atmospheric physics, which subsequently has an impact on highly interlinked physical, chemical, and biological processes, sometimes collectively described as 'Earth System Science'. Historically, more men have studied physical sciences than women. It is therefore not surprising that there are more male scientists studying climate change. But what accounts for the fact that women figure so prominently in outreach, given their minority status within climate science? My tentative hypothesis is that women are more inclined to want to 'make a difference through connecting with the community'.

(Male scientists, for example, may also wish to make a difference, but choose to do so through dialogue with different sectors such as policymakers or scientific peers.) This hypothesis clearly requires further investigation and (if confirmed), would raise the question: why are women more likely to be so inclined?

Concluding remarks

Lowe et al. (2013) propose that climate change poses both a scientific and social challenge for mankind that can only be addressed with multi-disciplinary perspectives. Indeed, the last decade has seen huge growth not only in climate science, but also in, for example, policy (Aldy, Barrett, & Stavins, 2003), psychology (Corner, 2012), and communication (Kahan, 2013) related to climate change. If, like me, women find themselves more attracted to careers that they feel might 'make a difference', then the existence of anthropogenic climate change could have engaged more women globally than would have otherwise been engaged – in a range of roles including scientist, educator, activist, communicator, and policy-maker. It may therefore have also provided a mechanism for more women to become more scientifically literate. Taken further, it could be argued that the emergence of anthropogenic climate change may have therefore attracted more women into the physical sciences. Clearly, further data would need to be collected to verify this hypothesis.

My lack of training in the social sciences in general, and feminist theory or women's studies in particular, resulted in my feeling poorly equipped to directly address the question of the impact that climate change has had on women in particular. However, I argue that this is an on-going tension between the social and physical sciences, rather than a gender issue. In order to tackle the challenges associated with climate change, a greater appreciation of research approaches in multiple disciplines is required, in all directions. That is to say – not only must natural scientists learn to appreciate the 'politics of climate change' (Lowe et al., 2013), but there is also a need for non-scientists working in the field of climate change to understand the scientific method that is used to obtain the data (and its strengths and limitations), as well as the assumptions and probabilities that are inherent in predictions about future climate.

A more gender-relevant question that emerged in considering this paper is why there is such a high proportion of female polar and climate scientists who are involved in outreach compared to the ratio of female scientists in this field overall. More research is required to explore this question. Such a gender disparity, if substantiated, may be related to a greater desire among women to 'make a difference through connecting with the community'.

While climate change is a serious reality that we all, male and female, have to deal with, it has also, I would argue, provided an opportunity to break down some walls and challenge stereotypes. My personal experience suggests that working in this field can be empowering for a woman – both as a minority amongst scientists, and as a community member trying to stimulate change through education. In answer to the panel question, therefore, I argue that climate change could mean greater opportunities for women, in a range of personal and professional roles, in Aotaeoroa New Zealand.

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