60. From climate scientist to climate communicator: a process of evolution

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I was never trained in the art of science communication. Instead, I was forced to learn to communicate to the public and policymakers through trial by fire. Back in the late 1990s, while I was still a junior postdoctoral researcher, I found myself under attack over a graph my co-authors and I had published. I'm speaking of the now iconic "Hockey Stick" graph (Mann, Bradley and Hughes, 1998). The curve told an unmistakable story, namely that the current warming spike is unprecedented as far back as we can go. Our continued burning of fossil fuels is the culprit. That made the Hockey Stick a threat to fossil fuel interests profiting from our societal addiction to oil, coal, and natural gas.

As detailed in my book *The Hockey Stick and the Climate Wars* (2012), fossil fuel interests, and front groups and politicians doing their bidding, attacked both the Hockey Stick and me. Despite the numerous independent confirmations of my findings by the U.S. National Academy of Sciences and dozens of other assessments, the effort to discredit this research – and to discredit me personally – has continued. Whether I liked it or not, I would ultimately have to enter the fray. In order to defend myself and my science, I would be forced out of the comfort of the laboratory into the rough-and-tumble of the public sphere.

As scientists in the public sphere, what *is* our role? There is a wide range of views among my colleagues. At one end, you have scientists like the distinguished former director of the NASA Goddard Institute for Space Studies, James Hansen. Hansen has engaged in civil disobedience, facing arrest along with actress Daryl Hannah in 2009 to protest mountaintop removal coal mining. He was arrested again in Washington, D.C. in 2010, protesting the construction of the Keystone XL pipeline, a project that would open the floodgates for the distribution of dirty "tar sands" oil from Canada to the world, something Hansen declared would be "game over" for stabilizing greenhouse gas levels below dangerous limits. Hansen has publicly campaigned for a carbon tax.

One colleague, Ken Caldeira of Stanford University, expressed concern "about the presentation of such a prescriptive and value-laden work" by Hansen. Yet, Caldeira himself has publicly advocated for a dramatic scaling

up of nuclear energy. One might argue that too is rather prescriptive and value laden. It would appear that what is merely policy informative to one person is policy prescriptive to another. Is this going too far as a scientist? Should we avoid commenting on the societal implications of our science? Does speaking out jeopardize our credibility?

There was a time when I believed that to be the case. Back in 2003, when asked in a Senate hearing to comment on a matter of policy, I readily responded that "I am not a specialist in public policy" and it would not "be useful for me to testify on that." But, because I have been educated, if unwillingly, in the realities of the public debate, I have arrived now at a very different viewpoint. If we scientists choose *not* to engage on the societal implications of our scientific research, I now feel, we leave a vacuum that will be filled by those whose agenda is one of short-term self-interest at the expense of the greater public good. There is a great opportunity cost to society if scientists refuse to engage in the larger conversation – if we do not do all we can to assure that the policy debate is informed by an honest assessment of the threat.

Yet, it is not an uncommon view among scientists that we compromise our objectivity if we choose to wade into policy matters or the societal implications of our work. It has been argued (e.g., *Unscientific America* by Chris Mooney and Sheril Kirshenbaum, 2009) that the greatest scientific communicator of the modern era, Carl Sagan, was blackballed from the National Academy of Sciences, in essence, because many of his fellow scientists looked down on his efforts to popularize science and to speak to its societal implications.

It would indeed be problematic if scientists' views on policy somehow influenced the way go about doing their science. But there is nothing inappropriate at all, in my view, about drawing upon our expertise as scientists to speak out about the very real implications of our research. My colleague Stephen Schneider of Stanford University, who passed away in 2010, used to like to say that being a scientist-advocate is not an oxymoron. Just because we are scientists does not mean that we should check our citizenship at the door, he used to explain (his final book, *Science as a Contact Sport: Inside the Battle to Save Earth's Climate*, is a must-read for anyone interested in the nexus of science and policy). The *New Republic* once called him a "scientific pugilist" for being a forceful advocate for action, I myself have sometimes been characterized this way. But fighting for scientific truth and an informed discourse is nothing to apologize for.

The great physicist Albert Einstein understood the ethical obligations of being a scientist. Einstein wrote a letter to Franklin Delano Roosevelt (FDR) warning of the danger were the Nazis to develop atomic warfare before we did, leading to the famous Manhattan Project and the development of the atomic bomb by America. The unfortunate reality is that FDR did not immediately heed Einstein's warning. It largely fell on deaf ears. In his exasperation,

Einstein actually wrote *four* letters to FDR, each more urgent that the previous, urging the president to act. One could well say that Einstein was an advocate. One might well label him an activist, or even an agitator.

How will history judge us if we see the threat unfolding but fail to communicate the urgency of acting on what may well be the greatest challenge human civilization has yet encountered. I surely don't want that to be our legacy. I believe that it is our moral obligation to ensure that we, as a civilization, do not leave behind a degraded planet for our children and grandchildren. So, today I expend much of my effort seeking to inform the public discourse over climate change and what we can do to avert a crisis. It's a very different life from the one I thought I'd signed up for when I chose to double major in applied math and physics in college, and to study theoretical physics in graduate school. Little did I know then that I might find myself at the center of one of the most contentious political debates in modern history.

Had it not been for the Hockey Stick, I would likely have spent my career pursuing my true passion – scientific research. It's why I got into science in the first place. I enjoy crunching numbers, seeking patterns, solving problems, and sharing my findings with fellow scientists at conferences and by publishing them in the peer-reviewed literature. That, and teaching students and training postdoctoral researchers – the life of a typical academic scientist – is what I had set out to do.

But I ended up on a very different trajectory, one that would place me at the fractious climate debate just as it was ramping up in the late 1990s. To survive, I had to learn how to communicate effectively. Only then could I possibly hope to combat a well-oiled fossil fuel disinformation campaign focused on discrediting me and my research.

Those early experiences were mostly a matter of defense, with me responding to attacks on the editorial pages of right-leaning newspapers, congressional witch-hunts and legal assaults by fossil fuel industry-affiliated groups. But over time I understood that I had an opportunity to speak to much more important larger issues – the reality, and threat of climate change, and the opportunity we still have to avert a catastrophe. I had been given an opportunity to influence the societal conversation about the greatest challenge we face as a civilization – a great privilege indeed. And the more effective I became as a communicator, the more opportunities I would be granted by media organizations to get my message out. To borrow a sports metaphor, I came to understand that the best defense is indeed a good offense.

My life today is very different from the academic scientist career I had envisioned. While I still do research and attend scientific meetings, publish scientific articles, teach and advise graduate students and postdoctoral researchers, much of my time these days is spent on public engagement and communication. That takes many forms.

I do hundreds of media interviews a year, making regular appearances on national television and radio shows, and doing about 50 speaking engagements, panel discussions, and events a year. I've given congressional testimony on numerous occasions and have appeared in various documentaries and films. I've authored or co-authored four books (currently working on a fifth). I have a regular column in *Newsweek* magazine, and write dozens of op-eds and commentaries a year in venues such as *The New York Times*, *The Washington Post*, *USA Today*, *The Wall Street Journal* and *The Guardian*, as well as science-focused publications like *Scientific American* and *New Scientist*. Recognizing the importance of social media in reaching younger audiences in particular, I am also active on social media, including Twitter (with more than 120 000 followers), Facebook and now Instagram.

I've also advised politicians and celebrities from California Governor Jerry Brown to actor Leonardo DiCaprio to science celebrity Bill Nye "The Science Guy". I view the relationships I've developed with these thought leaders as my greatest opportunities to influence the public discourse. Leonardo DiCaprio's Oscar acceptance speech several years ago was devoted primarily to raising awareness about the climate crisis. It was heard by 34.5 million people and resulted in the largest increase in public engagement with climate change ever as measured by Google searches on the topic. I assisted DiCaprio with his 2015 speech at the United Nations, another galvanizing moment for public and policymaker engagement on climate change. I embrace the conclusion of a recent PLOS study that "the scientific community must adapt to the 21st century dynamic communication landscape and ready itself for the next opportunity to harness the agents of change" (Leas et al., 2016).

What all these activities mean is that I no longer devote the bulk of my time and effort to actually doing scientific research – the very thing that attracted me to the world of science from my youngest days. But it's a sacrifice I'm happy to make. I've been given a precious opportunity to work to ensure that our civilization is informed about the threat posed by climate change and the options we still have to do something about it. I wouldn't trade that opportunity for anything.

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