The role of science in public discourse: An interview with Michael Mann (Part I)

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This interview with Dr. Michael E. Mann continues our series on education for climate neutrality. Mann is a full professor of geosciences, director of Penn State's Earth Systems Science Center, the author of *The Hockey Stick and the Climate Wars* and co-author with Lee Kump of *Dire Predictions*, and the co-recipient of the 2007 Nobel Prize for his contributions to the Intergovernmental Panel on Climate Change. He is also a prominent university and public science and climate change educator and communicator.

As we've noted before, sustainability education has become almost inextricably linked to climate change. In fact, since we started the series, the most recent Penn State Strategic Plan incorporates both climate change and sustainability as key components. In this series, we started with two questions: *Should we have education for climate neutrality? What sort of ethical or political orientations get smuggled in or nudged out?* In this interview, Mann answers both of those question by addressing the political and social nature of science and science education, the role of science and critical thinking in a democracy, fossil fuel research, investment, and divestment, the Papal Encyclical *Laudato Si,* and other issues. The interview ranges far. It is split into two sections with the first going up today and the second being posted next Monday. You can also read a more heavily edited version of this interview in Reports of the National Center for Science Education, 36 (1).

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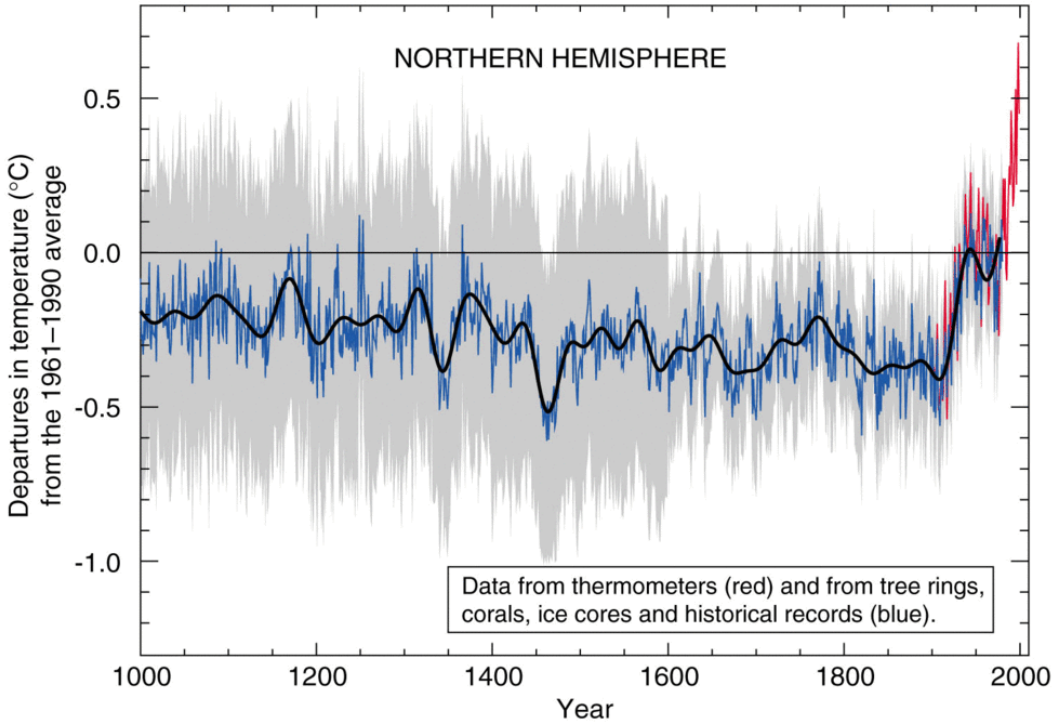
Peter Buckland: Over the last fifteen or twenty years you have gone from being some guy doing statistical representations and computer models of climate data to being a public spokesman for climate science in particular and science in general. How have you grown over that time and who has shaped you?

Michael Mann: Thanks. It's a really good question. When I decided to major in physics and applied math and I went on to a Ph.D. program in theoretical physics, I ended up working on the physics of climate. Not in my wildest dreams or imagination did I think I would find myself at the center of a fractious public debate like the debate over climate change. It was just a sequence of somewhat random events that led me there. Ultimately because of this curve that my partners and I published—"the hockey stick" which is a reconstruction of temperature changes going back the last thousand years and has become iconic in the climate change debate—I found myself at the center of that debate sort of involuntarily. And I found myself under attack by those looking

to discredit that work in a somewhat cynical effort to claim that they had discredited the entire case for climate change. As if it rested on one paper.



"The hockey stick" is a graphic reconstruction of temperature over the past 1000 years. It shows that global temperature gradually cooled over the last 1000 years (the stick's handle and shaft) with a sharp upturn in the 20th Century (the stick's blade).

But I had to make a decision. Was I going to retreat from that debate and into my lab and just double down and focus on the science and eschew any role in the larger debate? Or would I embrace this? And if that's what you want me to do then that's what I'm going to do it. Even though that's not what I signed up for, if I'm put into a position to defend my science as a proxy—no pun intended…

PB: Because you use proxy data.

MM: We use proxy data. If you want to use my science as a proxy for the validity of the science of climate change, then that's a worthy battle and it's one I'm willing to fight.

PB: I wonder if there were any teachers in high school or in college who made it possible for you to make the decision to stand up.

MM: Absolutely. At every stage. I think from early on in my high school science classes. I had the luxury of going to school in Amherst, Massachusetts which is a progressive college town. My science teachers were great science teachers but they also viewed science in a larger philosophical context. Things undoubtedly came through about the role of science in public discourse. Why is science important? Why is it important for scientists to participate?

PB: So there was an active citizenship role?

MM: I think there was. It was implicit in the cultural ethos of growing up in a town like Amherst. It always existed at some level. It was having great science teachers but also teachers who perhaps in subtle ways instilled a larger role of science in society. I'm not afraid to say they probably had a progressive agenda that guided the way they thought about this and how they taught. I probably absorbed some of that. And it continued into college.

I majored in physics at UC Berkeley. Physics isn't exactly a discipline you think of as a hotbed of activism. But it was almost fortuitous that I was studying physics at UC Berkeley in the mid- to late-1980s. That was the height of the debate about the Strategic Defense Initiative. Star Wars. You know physicists were at the center of contentious policy-relevant science.

PB: Edward Teller.

MM: Teller was in my department. Another physics professor was very much at the other end of the spectrum and was extremely active in anti-Star Wars efforts. In fact, he was infamous to some for cancelling physics class because there was a protest going on. He cancelled the introductory physics class so that hundreds of students could go ahead and participate in a protest. The physics department at Berkeley was fundamentally divided over politics.

PB: Politics creeps into science with socially important issues. You had a piece in *The New York Times*, "If you see something, say something." When it's high school teaching, a first-year college seminar, or your basic college science course in science, how do you think science teachers can or should navigate social tension?

MM: That's a great question. And if I had a simple answer I'd give it to you. I think we have to be true to what science is and be philosophical about that. One of the critical things we have to appreciate is that science is done by human beings. We try too hard sometimes to pretend that science exists in this sphere that is external to our humanity.

PB: As if facts are free-floating things separate from our values.

MM: Right. And our critics will use that to say, "We can't trust these scientists because their values are embedded in how they do their science."

PB: And then they will do the same thing.

MM: Exactly. I think we have to be honest that that's true. It should be true. It would be odd if the way that we viewed the discipline of science wasn't in some way reflective of the way we view all matters as human beings. We have a stake in this game. You know we aren't studying these things for their pure sake. We study science because it matters in many ways and sometimes matters to some fierce debate over policy.

PB: Should that come into the classroom somehow?

MM: Sure. We should recognize that every human pursuit is going to be influenced by our values. One of the things that leads to scientific breakthroughs is trying to remove yourself from preconceptions and think in ways that other people may not have thought in the past. And to have an appreciation of that, that our scientific thinking might be conditioned by culture requires some self-reflection. I think recognizing the role that culture plays in any pursuit is important. We should question assumptions. How is this laden in assumptions that I may not have even thought about? What happens if I remove those assumptions? What if I make different assumptions?

There's a culture in science. The critics will rightly say there are these paradigm shifts where all the scientists seemed to believe one thing and then changed like with Wegener and plate tectonics. All the scientists seemed to have had a consensus. But there have been several points where the consensus in science has been wrong. Of course there have been many more where the consensus has been right. And it's a thousand to one or a million to one. For every Wegener and Copernicus and Galileo there are a thousand others. In the words of Carl Sagan: Yes. They laughed at Copernicus or Galileo. But they also laughed at Bozo the Clown.

PB: The exceptions prove the rule?

MM: Right. I think that the scientific community is receptive to that. And the way you get ahead in the scientific community is to think outside of the box. It's by coming up with a new angle. You don't say, "Well, the

scientists are already right. Everyone who's already published before is right." It doesn't get you a paper in *Science* or *Nature.*

Just as in society at large, there are people in science who are risk averse and risk takers. There has been a recent discussion about scientific reticence and how scientists will err on the side of conservatism. They will err on the side of Type I errors instead of Type II errors. And that may not be serving us very well on issues like climate change.

PB: But it's socially very safe to do.

MM: Absolutely.

PB: What's interesting is how that plays out when you combine that with political safety for teachers. What if you have parents getting upset with you? What if your administrator is upset with you for what you are doing? Are you trying to make kids activists? It gets multiplied. And you teach undergraduate students and you're an adviser for graduate students too. So how do you work some of these risky issues out?

MM: I teach a first-year seminar. Every student in the College of Earth and Mineral Sciences has to take one. I personally love them. I love interacting with kids who have just arrived at Penn State. A lot of them are intimidated. They're scared. And this course has a small faculty to student ratio. It's an opportunity in a one-on-one or small-group level that isn't possible in the other courses they are taking like an introductory physics, chemistry, or biology course. So I enjoy that.

Technically the course is about climate change but there's only one skill I want them to come away with. Critical appraisal of sources of information. I want them to come away with a sense of skepticism. Frankly, when they come in to answer a question, they will go out on the web. They'll Google it.

You live by the Google. You die by the Google. And there's rampant misinformation and disinformation. It's a Wild West frontier we have to navigate. I want them to navigate it critically, to have some of the tools necessary to evaluate a source. Who is this source? Who is funding them? Do they have a conflict of interest? Do they have a perspective or an agenda? Who are trusted voices when it comes to issues of science? We have a National Academy of Sciences, science societies and organizations that exist for a reason. And I want them to figure these things out.

I'll give them the global cooling claim. It's one of the great canards. I'll have them Google that and they will come up with all kinds of stuff. There's a dynamic nature to it. Any moment you search who knows what's going to come up. Who knows that George Will column has just appeared? And they will come back with all kinds of stuff. They are not penalized for the opinions they express. The metric I apply is whether they are applying the tools of critical assessment and reasoning. They could forget everything I teach them about climate change. I want them to retain some of those tools.

PB: Is this like Carl Sagan's baloney detection kit?

MM: Absolutely. No question.

PB: Sagan believed that good science was essential for shared life for good decision-making. I think of Thomas Jefferson's statements on education for a free society. Free people need to be well-informed people.

MM: He was a scientist. A lot of people don't realize that.

To be continued.