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TNR Q&A: Dr. Stephen Schneider

One of the world's leading climatologists discusses the line between science and activism.

Marilyn Berlin Snell November 9, 2009 | 12:00 am

Not many Ph.D. students expect their research to generate outrage among Washington pundits decades later, but, as it turns out, that's exactly what happened to Stephen Schneider. Back in 1971, Schneider was studying plasma physics at Columbia and moonlighting as a research assistant at NASA's Goddard Institute for Space Studies. There, he co-authored an article for *Science* arguing that the warming effect caused by rising amounts of carbon-dioxide in the atmosphere would be swamped by the cooling effect caused by aerosol pollution like dust and smoke.

As it turned out, Schneider and his colleagues had made a calculation error--they neglected to account for the fact that aerosols were regional while CO2 was global--and their prediction of global cooling was later shown to be mistaken. Normally, that mistake would be unremarkable--a textbook example of how science advances and corrects its errors. Yet the paper is still, to this day, fodder for conservatives like George Will, who often bring up Schneider's earlier predictions as a reason why we shouldn't believe today's scientific consensus that the Earth is warming.

Nowadays, Schneider is one of the world's most prominent climatologists--in addition to his work as Professor of Biological Sciences and Interdisciplinary Environmental Studies at Stanford, he has been heavily involved in the Intergovernmental Panel on Climate Change (IPCC), a scientific body tasked with assessing the climate risks facing the planet. (Its most recent report, in 2007, concluded that most of the twentieth-century increase in global average temperatures was "very likely" due to human activities, and that world temperatures could rise between 1.1 and 6.4°C during the twenty-first century.) Notably, Schneider is also something of a scientific pugilist, known for his willingness to debate climate deniers and agitate publicly for sharp reductions in global greenhouse-gas emissions.

Schneider, whose new book, *Science As A Contact Sport [1]*, just came out, sat down with *The New Republic* recently to talk about the current state of climate science, the difficulties in assessing risk, and how he balances his activist and scientific personas.

Given your early mistake about global cooling, why should we believe that scientists are better now at figuring out climate change?

There's always the possibility of error. There's always the possibility you left something out. But what we now have is an accumulated preponderance of evidence and that's why the confidence is so much higher now than it was then.

And also continued uncertainty.

There is always uncertainty as well, but as scientists we're always trying to move the needle toward more confidence. More confidence does not

mean 100 percent confidence. The only thing the IPCC ever said it was 100 percent confident in was that it has been warming over the last 150 years. Some try to frame climate change by saying that as long as there remain open elements, it isn't "proved." That's a fraudulent frame. Nobody in this world--in medicine, investment banking, military security, environment--is ever 100 percent sure of anything in a complex system.

When I'm asked, "What is the probability that the Greenland ice sheet will melt if temperatures rise X degrees?," I speak in percentages. My very good friend and colleague Jim Hansen says, "One degree." I don't think Jim knows that. I don't think I know that. The problem is too complicated for us to know that, so I frame it as a risk management problem: One degree? 25 percent chance. Two degrees? 60 percent chance. Three degrees? 90 percent chance. Is that the truth? Of course not. That's as honest as I can be based on my subjective reading of the evidence. However, just so you don't think I'm an optimist relative to Jim, I also think there's a 5 percent chance that it's already too late.

What are some of the ways the IPCC's risk assessment changed between 1990, when the First Assessment Report was published, and now?

As lead author on the climate science for 1995's Second Assessment Report, I said that we needed to start quantifying what we meant by various kinds of uncertainty. What do we mean by "likely." What do we mean by "high confidence"? Well, my colleagues almost bit my head off! "You can't do that! It's not real science. Real science is empirical. Real science is modeling." I said, "We're not doing science, guys. We're doing science *assessment*." Most scientists are toilet-trained to do science. That's okay, but that's not IPCC's job. IPCC was *not* asked by

governments to do new science. It was asked to assess the existing literature base for quality and credibility, because there were so many false claims. The coal industry was saying, "Nobody knows anything." Greenpeace was saying, "The evidence is already too much." Scientists were saying, "We don't know everything, so let's not say anything." And the governments were saying, "We have to have some idea what the risk is."

You cannot address the problem of what to do, which is risk management, without addressing the problem of risk, which is probability times consequence. The fact that the event is in the future and the probability is subjective does not stop it from being expert. It's still the judgment of people who understand as much or more than anyone in the world about how that system works. For the Third Assessment Report [in 2001], we were able to get an independent group to write a guidance paper on uncertainty. This was important to me because I knew that if we did not tell governments how likely climate change is, they would not listen to us about doing something about it.

You talk about subjectivity, but isn't science supposed to be objective?

No. Science is truthful, which doesn't necessarily mean objective. How can science be objective about the future? How much data do we have for 2100? Try zero. We have data for 2009 and previous years. We take that data, analyze where we think it's high quality, analyze where we're not so sure of the quality, show how well the data explains multiple phenomena from the past, and ask how closely related those phenomena are to the future.

Then we build a model. It could just be a set of rules between how many

watts of energy per square meter of heating we get between winter and summer and how much the temperature differs between winter and summer. That's a model. Then we use it to predict how many watts per square meter from a doubling of CO2 in the atmosphere. Now, this model is not very good. We know enough to know it's not very good. But that's how you start thinking.

We then codify our knowledge in terms of the equations that best describe our understanding of each subsystem--atmosphere, oceans, chemistry, ecosystems, demography, economics, technology, etc. Every time we add a model, we add more uncertainty. This is called 'theory,' and *everybody* does theory, even data people. Then we create a super model, what we call an integrated system. None of the factors is known perfectly. But if we plot it as a bell curve we can bracket the answers. That's why the IPCC says, "One to five degrees warming [by 2100]" for example. That is an expert judgment; it's subjective, but built on objective modeling and data.

Our job is to examine our knowledge of the system and then make a diagnosis based on the way our models have predicted past events. If the models have done really well, we have more confidence. If they've done badly, we have low confidence. The models have done really well on temperature over a long time period so we trust that. They've done really badly on precipitation in the short run. We don't trust that. So, we order the relative degree of credibility--not just in the model itself but in what the particular model predicts.

Therefore, the IPCC can say with very high confidence that we're going to warm up a lot, and that warming will create fires and rising sea levels. Yet it has very low confidence in which year the fires will start to take off, where they will happen, and how severe they will be. But those are not

inconsistent.

Once we build our climate models, we must always make a subjective judgment, because it is going to be a prediction outside the realm of direct verifiability. We have to be able to predict whether this is a potential catastrophe for humanity. We can't just hang around and wait.

In your book, you suggest a kind of continuum: from objective data to subjective determinations based on the data, and then to value judgments.

Right. What to do about what we know--that's a question of values. But it's values informed by science. In 1973, I got a call from the Council on Foreign Relations wanting me to talk about policy. I told them that if we're using the atmosphere as a free sewer to dump our tailpipe wastes, and it's going to cause change that could harm agriculture, ecosystems, ice sheets, and sea level, then maybe a smart move would be to slow down the rate at which we pollute. That's a value judgment, and I've been making them from the beginning. I'm a very risk-averse person and I worry much more about the planetary life support system than the bottom line of the coal industry.

How then do you defend against charges that you're an activist?

I am an activist. I want the world to be a better place, and I define specifically what I mean by that: If one group, the rich, benefits from an activity like dumping their waste in the atmosphere and the other group, the poor, are hurt by it and don't get much benefit, that's an inequity. Therefore, in my value system, that's a higher criteria for action than aggregate dollars. I don't have aggregate dollars as my moral principle. I

look at who's responsible. But I never say that without admitting that those are my values. So, that's activism.

What's the difference between being a climate-change skeptic and a denier?

Every good scientist is a skeptic. In fact, I would argue that every good citizen is a skeptic. We have to learn to discern, and listen to the quality and logic of an argument.

For example, we don't understand to this day why smoking causes cancer, so we still retain an element of skepticism. But the data associating smokers with cancer is so statistically overwhelming that you would have to be a fool or a liar to deny it. It's exactly the same in climate science. There's an overwhelming preponderance of evidence that it's warming, that the last thirty to forty years have been mostly due to human activities, that it's raining more in higher latitudes, that there are more droughts and flooding, that ice is melting rapidly.

Then there is what's going to happen to precipitation in Kansas. We don't know. So the deniers come along and say, "We don't know the precipitation in Kansas. These models are no damn good. It isn't proved." That's like saying "There are thirty-five tobacco studies; thirty-three of them show a dramatic statistical significance between smoking and cancer; two of them are equivocal. But until those two are resolved, it isn't proved. Let's not regulate cigarettes."

What else is in the climate denier's toolkit?

"Theory not fact" is a favorite polemic. "Models not data" is another. There's also "chartology," where endpoints are cherry-picked to fit particular purposes. They pick the highest value of temperature many

years ago and the lowest value now and draw a line through it and say there's no warming trend. You can cherry-pick endpoints to exaggerate in either direction. That's not how good science operates.

Another one is, "We have more scientists than you." In 1998, a group [Oregon Institute of Science and Medicine] sent out blanket emails to members of scientific societies--including medical societies, meteorology societies, etc.--and attached a petition saying, "We don't believe in global warming." Seventeen thousand people signed it. The IPCC had only maybe two thousand people associated with it. So they said, "Many more scientists don't believe it." But those who signed the petition are not [climate] experts and their opinion doesn't matter.

Do you like the role you've come to play as the scientific pugilist?

I hate it. But my capacity to put down dishonesty is very good. I would rather that people have an honest and open debate--as in, "Excuse me, but I don't really understand how you think this is unique and human-induced when it's been warmer before." That's a legitimate question. But the deniers do not like to argue with me and almost never do when I'm there.

In your book you note that you've sometimes been disgusted at how national interests trump planetary interests, but you also think we can overcome political inertia. How?

You overcome political inertia the way we've overcome it. California now has a climate policy, for example. You move very slowly. We've been talking climate policy in a serious way since 1988. We've got California. Now we have Waxman-Markey [the climate bill that passed the House

this past June]. Sure, it's going to be weak. It's not enough, but it's a move away from the wrong direction.

Oklahoma Republican James Inhofe, the most prominent global-warming denier in the Senate, has threatened to crash the upcoming climate negotiations in Copenhagen to make it clear to international leaders, he says, that the United States will never pass climate-change legislation.

Good. Let him. You think he isn't going to be booed off the podium? They'll hoot him down! I love to call him the Prevaricator Pro Tem.

What do you want to see happen at Copenhagen?

I want us to acknowledge that we need international cooperation; that poor countries have a right to develop but cannot expect to use traditional technologies to do it or we will pollute ourselves to death; and that rich countries, which created most of the initial problem, have an obligation to help those countries leapfrog over the industrial revolution to high technology.

I don't *care* how much we cut by 2020 in terms of percentage points below 2005, which my environmental friends have focused on as *the* most important thing. Instead of getting hung up on what percentage we're going to reduce, why don't we talk about how many tens of billions of dollars each country is going to spend every year on helping ourselves out of the problem, and what cooperative strategies we can enter into with China, India, Indonesia, Brazil, and Mexico? Between our companies and their companies, we would share profits and patents.

I want policies and measures, not targets without teeth. I argued this in Kyoto and got shouted down. I wanted an international carbon tax, with

revenue recycled to poor countries and directed toward inventions to get us out of the problem. Oh man, everybody hated that!

Will those of us arguing for such policies and measures succeed? I think partly. We will have weaker targets than any of us would like to see. We will have weaker policies than we'd like to see, but much stronger than we've ever seen before.

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