Healthy Solutions to Climate Change

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Edited Transcript— Amanda Staudt

Thank you so much for inviting me here. It's very exciting to be here, and it's really an honor to share the stage with Dr. Epstein. I was telling him before we started that when I was an undergraduate he came and gave a guest lecture in one of my classes at Harvard, and that was my first introduction to the impacts of climate change on health. And Dr. Epstein was quite at the forefront of thinking on that at the time and, you know, and still is at the forefront of thinking on these issues, so it's really a pleasure to be able to share the stage with him today.

Okay, as Geoff mentioned, today is a very exciting day. The U.S. government released a long-awaited and very impressive and comprehensive report on climate change. Unfortunately, I had to provide my slides to you guys before the report came out, and it was embargoed, so I couldn't include any of the results from that report in my remarks, but I may try and mention some of the findings from that as I go along.

They had a press conference at 1:30 today with John Holdren, the President's science adviser and Jane Lubchenco, the head of the NOAA, among other scientists who helped author the report there. This is a very exciting opportunity in that it kind of finally puts together a comprehensive look of how climate change is already impacting the United States. It's very clear about that. And then it puts forward two choices in terms of our future: a lower emissions pathway, and a higher emissions pathway, and it's very clear about the fact that taking action soon to reduce our emissions can reduce the impacts, the severity and the impacts and the cost as we go forward. So I urge you to check out that report at your earliest convenience. I'm sure it will be all over the news.

So my job this afternoon is to help set the stage, provide some of the broader context. And what I'm going to do is focus on a sampling of some of the recent science, and in particular focusing on some of the scientific findings that I think underscore the urgency of the issue right now. Because I work for the National Wildlife Federation, there will be a little bit of a flavor of wildlife and conservation. I'll give you a little bit of input from that community as well. So let's get started.

So, you know, to start off, I would say there's absolutely mounting scientific evidence -- actually, when I first put this together I put “overwhelming scientific evidence,” and I thought, "Well, maybe that's overstating it," but, I mean, certainly the evidence is growing and growing. And if I were to sort of characterize the flavor of a lot of the studies that have been coming out since the IPCC in 2007, I would say that we see an increasing sense of urgency in their findings. There's a sense that climate change is happening faster than what we had anticipated even a few years ago, and I'll present some studies that illustrate that point.

Second, I would say that there is an increasing awareness that many of the changes are going to be irreversible. I don't know about you, but even as someone who's been thinking about climate change for a long time, I’m starting to have the sense that, “Okay, we're just get our hands around this problem. We're going to solve it. We're going to kind of go back to normal.” And that really isn't the case, and there have been several studies that have very clearly made that case recently.

Third, I think there is an increasing awareness that we are already be being impacted. In particular, the increasing severity of weather and climate extremes, droughts and floods and rainfall and hurricanes and wildfires are all ways that I think we are experiencing global warming in our day-to-day lives already. And I'm actually not going to talk about this, because Paul has a lot of it in his talk, so I figure we wouldn't overlap there but, you know, I think that is another feature of a lot of the scientific studies that are coming out.

And then finally, all of this sort of brings an increasing attention and emphasis on solutions, and so I'm going to end my talk by giving a little bit of a flavor of some of the discussion around particularly the Waxman-Markey Act that's being discussed in the House right now.

Okay, so let's talk about the urgency, and I like to put on my picture of a pot just about to boil over, because I kind of feel like that's where we are. I have two little boys, and whenever I'm cooking pasta I always get to this point, because I'm watching them and not paying attention to my stove. And it's like, if I can just get there in time I will not make a complete mess of my stove, and I kind of think we're at that point now. We need to get there just in time so we don't make a complete mess and get that pot off the stove and start taking some action. And what are some of these studies that are starting to underscore the urgency?

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Well, one fact is that the emissions appear to be increasing faster than the worst-case scenario. So this plot shows, in the colored lines, the projected emissions, and the black line shows the actual emissions of carbon dioxide over the last decade or so, and you can see that over the last four or five years, that we've had an uptick in our rate of emissions. In fact, the emissions are increasing at a rate of 3.3 percent a year right now.

The authors of this study found that there were several reasons for this increase in emissions. One is that the developed world isn't reducing their emissions as quickly as anticipated. They're not increasing their efficiency and moving to renewables as quickly as anticipated. Second, there are more and more emissions from the developing world and they're increasing faster than expected. And third, the one that I think is a little bit scary because we can't do much about it, is that some of our natural sinks are less efficient than what we had thought.

So as you may know, a large fraction of the carbon dioxide that we emit into the atmosphere is absorbed in the ocean and the terrestrial biosphere, and there have been recent studies that have shown that the uptake of carbon dioxide into the ocean is not as great as what had been anticipated. So the blue line shows the expected uptake, and the red line shows the actual observed uptake, and you can see that there's a significant disparity there between those two levels. And what this indicates is that, you know, if we have less carbon uptake, as we continue to put carbon into the atmosphere we have the potential for more warming. And, of course, putting carbon in the ocean also leads to ocean acidification, which is another issue I'm not going to talk about, but I'll just point that out that this is all kind of related.

Okay, another piece of evidence that global warming may be happening faster than we expected is the Arctic sea ice story. The blue line shows what the scientists had thought that Arctic sea ice decline would look like over the next 40 years. The red line is the actual observations of what happened. And you can see -- especially if you look at 2007 and 2008, which I've added in after this plot was produced -- that there is significantly less ice than what the models had anticipated. And, in fact, there are two recent studies that have looked at this, the recent years of 2007 and 2008, and one found that the minimum in 2007 would not have been possible without the sustained warming that we've had over the past few decades and the long-term ice reductions. So there had been some discussion that maybe we are just seeing some natural variability, but a recent study came out and said, "No, no, this really is global warming." And a second study recently came out and said that the total volume of ice in 2008 was likely a record low. So even though the area was a little bit higher than 2007, if you take into account the whole volume, it's actually lower.

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Well, this is particularly problematic for polar bears -- and also walrus and sea lions, which don't seem to get as much press -- because they depend on sea ice to hunt for their prey. But it's also concerning for us because, as we lose our sea ice, we have a reduction in albedo, which is the reflectivity of our planet, and that means that when the sun's energy hits our planet, more of it stays here instead of being reflected back to space. So this is another way in which we could be increasing the speed of global warming.

Okay, a third example where the impacts seem to be perhaps worse than anticipated, and this is in terms of forest mortality. This study came out just recently, and they looked at forests that are old-growth forests that haven't been affected by development or humans too much, and they found there's widespread mortality in these forests. All the red dots and the size of them indicate places where the mortality has increased because of increased heat stress and because of increased drought stress, and unfortunately, the young trees are not keeping up, so we're actually seeing a thinning of our forests in these places. If you add on to the fact that we're seeing a factor of four increase in the number of wildfires in the western U.S. and the area burned by those fires is a factor of six greater since the mid-1980s, it really starts to add up that our forests are under attack. And probably the most dramatic image of our forests under attack is the widespread pine beetle infestations. All these rust colored trees have been infected by pine bark beetles, and the infestation right now is affecting millions of acres in the western United States.

So our forests are really under attack ,and the thing that's a little bit concerning about this for me is that when you lose your forests you are actually releasing the carbon that was stored in those trees back into the atmosphere. So here's yet another way that we could be accelerating the warming. And it's something to consider as well as we think about policy and looking to our forests as a place to continue to sequester carbon, we need to do that in a way that's mindful of the fact that our forests are being affected by global warming at the same time.

All right, so those are a few examples. One more, sorry: melting permafrost. So in the frozen tundra in the Arctic and on the bottom of the Arctic Sea, there is a lot of methane stored, and melting of that permafrost can actually release that methane into the atmosphere. But the picture on the left is of Dr. Katie Walter. She's a professor at the University of Alaska in Fairbanks, and what she does is look for lakes where there's been melting, that have been created by melting permafrost, and as that permafrost had melted the lake is created and methane is released. In the winter time the lakes freeze over, and so the methane

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is bubbling up from the bottom of the surface of the lake, and collects between the top of the water and the bottom of the ice. And so what Katie has done here is poked a hole on top of that ice and released the methane and set it on fire, and actually there's a video of this where she pokes again and it like flames up. And it's a really dramatic vision of how our planet is starting to release some of its stored greenhouse gases into the atmosphere.

The map on the right shows places in the Arctic where these thermokarst lakes -- these lakes where there could be methane -- are, and the status of the permafrost is indicated in the color. So you can see there's a wide area of places where this methane release could take place. In fact, it's estimated that the lake bottoms have as much as 10 times more methane than is currently found in the atmosphere. And if you don't know, methane is a greenhouse gas that's about 20 to 25 times more potent than carbon dioxide, so a little bit of methane can go a long way.

There's also methane at the bottom of the Arctic Sea or Arctic Ocean, and there's been a study to examine whether that methane might be destabilized and released into the atmosphere. And they focus on this area off the coast of Siberia, so the next map is going to be looking at just that box. Okay, so now you're looking down on the box, and there's the coast of Siberia in gray, and what they've done is gone back twice over a period of ten years and measured the methane at the bottom of the ocean and the ocean surface and in the atmosphere. And what they've found are these plumes of methane being released from the bottom of the ocean into the atmosphere, and the speed of this release is about 10 times faster today than it was a decade ago. So the chances of a massive methane release are actually pretty low, but the fact is there's a lot of methane stored there and so the risk involved is very high. So that's why we are particularly concerned about this potential change in our climate.

All right, now I want to talk a little bit about some irreversible changes. And I put this picture up here because I think aridifcation, or drying out, is going to be one of the most serious ones that will be affecting people and ecosystems. There are several studies that have come out in the last couple of years that have looked at the shift to more semi-arid conditions, and this is one done by Susan Solomon, et al, that came out in the proceeding of the National Academy of Sciences. And what they did is they looked at how our climate will change over hundreds and thousands of years, and they looked at different stabilization levels of carbon dioxide in the atmosphere. And what they identified were several regions around the world -- these bright red and pink colors -- where there is a pronounced drying out in the dry season. And the Southwestern United States is one of those, and there's already been

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some papers coming out that say that area is beginning to dry significantly. And so let me show you the map that goes along with this -- or this chart, I'm sorry. If you look across the top it shows you the quasi-equilibrium carbon dioxide concentration, sort of carbon stabilization levels, and then the lines indicate the level of drying that would be associated with that stabilization.

So, if you stabilize at 450, this is the southwestern United States, you would see a drying of something like 15 percent, and this area indicates the range of observed past droughts. So, basically, stabilizing at 450, which is where we're going right now, would create a semi-permanent situation like the dust bowl. It's a little complicated, but basically what the study comes out to say is that the southwest United States and several other places around the world are on track to be converted to semi-arid conditions permanently.

Sea level rise is another change which is effectively irreversible in our lifetimes, and on top of that, I think the projections are starting to be higher from what kind of sea level rise we'll see this century. The IPCC, in 2007, the range that they gave in their report was between seven inches and 23 inches. And some recent studies since then have actually taken into account the rapid melting that's been observed in Greenland and Antarctica in recent years. So if you project forward or extrapolate the recent melting, you'd actually get a range that's much higher, something like 2 1/2 to 6 1/2 feet. The minimum you would get if you extrapolate the recent trends is greater than the maximum that IPCC put forward.

Now you might say this recent trend is not going to keep going that way, that perhaps it doesn't make sense to extrapolate it, so there's another study that looked at this another way. And they went back and looked historically over the last 2,000 years using paleo records at temperature and sea level, and they did a correlation, and then they plugged into that correlation the temperatures projected for 2100. And what they find is a range of sea level rise in 2100 of between 2 1/2 and 5 1/2 feet. And, you know, what I take away from this is that that 1/2 foot to 2 feet range is very, very conservative, and in fact, the report that came out today from the CCSP, they focus on a 2-3 feet sea level rise by the end of the century, and acknowledge that it could be as much as 4-6 feet. So this is, you know, if this happens it's effectively an irreversible change.

I want to show you some of the modeling that we did for the Chesapeake Bay region, and show you how that region would be dramatically impacted. This is the Blackwater National Wildlife Refuge, which is on the Eastern Shore. It's a very famous place for waterfowl -- the

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Canada goose, as well as a number of fish, use it as a breeding ground. If sea level rise were to increase just over two. A sea level rise of just about two feet, this is what it looks like. Most of the marsh and other land that's a part of a wildlife refuge is underwater. It's open water. You can go back and forth for you, and you can see it's a pretty dramatic loss of land in that case.

Species extinction: This is another basically irreversible change to our planet. So here's a map of two different temperature pathways. One, if we stabilize it for 50 ppm, and another if we go on a business as usual pathway. And let's look at the impacts on global species and habitat in North America. Already at the warming we've had so far, we are already seeing increased extinctions of mountain amphibians. If we continue as we are likely to do, to stabilize around 450, we are going to see habitat or we're going to see species committed to extinction of around 9 to 31 percent, and the habitat in North America for cold water fish, about 8 percent of it will be lost.

If temperatures continue to increase, if we don't do anything to reduce our emissions, we're looking at up to 50 percent of species globally committed to extinction, and I personally think that's just unacceptable. How can we allow half of our species on the planet to be committed to extinction? Also, a major decline in the prairie pothole habitat; that's the main breeding ground for waterfowl in the United States and in Canada as well.

Okay, so let's talk a little bit about solutions. And I'm not going to go into a lot of detail about this because it's not really what I focus on, but I think it's important to recognize, you know, that there's a lot going on right now in terms of solutions, and what I've presented so far is a little depressing, but I think there are a lot of good opportunities for moving forward, both on the mitigation side and moving to renewables and reducing our emissions, and on the adaptation side. And what I show on the right here, is one of the options for helping wildlife adapt to climate change: creating corridors where our wildlife can migrate to new habitats if their current habitat becomes unsuitable.

I just wanted to talk a little bit about the American Clean Energy and Security Act. That's the bill that's currently being discussed in the House right now. This is what the bill puts forward in terms of its emission pathway. The red line shows business as usual. The green line shows the reductions expected with the emissions caps under the cap and trade system, which gets down to about 15 percent below 2005 by 2020 and 73 percent below 2005 by 2050. Then the bill has some other complementary measures, encouraging the use of

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efficiency and renewables and such, which it's thought could improve the emissions reductions, especially in the short term, and get the 2020 emissions to as much as 33 percent below 2005 levels. This is largely achieved with a cap and trade system that puts a cap on emissions and then sells allowances for big emitters to emit carbon dioxide. And one of the features of the bill is that it then allocates the income from those allowances to various public goods, and I thought you might be interested in seeing how the bill does its allocations right now. This is the version that came out of the House Energy and Commerce Committee at the end of May.

You can see a big part of the allowances goes to the fossil fuel transition. That's mostly helping the electricity sector make the transition. There's a big amount that goes to encouraging R&D of green technologies, also some money that goes to helps low-income consumers who might not be able to afford the increase in their electricity bills under the cap and trade system. And then little bits that go to some other public goods, including natural resources which is in red. I highlight that just because that's the one that we've been thinking about a lot at the National Wildlife Federation.

I want to talk a little bit about how they do the natural resources. It's actually allocated to a range of different agencies, states and tribes, and it averages out to be about $1.7 billion a year that's divvied up in this pie through 2030. And you can see a whole bunch goes to the states and then, as I mentioned, these different agencies, and this money is dedicated for helping natural resources adapt to climate change, those changes that we can't avoid. And it really is an opportunity to transform conservation.

I'll just say that the conversation community right now is actively wrestling with how global warming will affect their mission. For many years, perhaps the whole history of conservation, the emphasis has been on returning our wild lands to some previously pristine state, and that just is not a reality anymore. You know, we're dealing with completely new climate conditions, and so now we have to think in the conservation community about how we change everything we do to make sense in a changing climate. So this dedicated funding would be the first to really focus on helping species habitats, ecosystems, etc., survive climate change, and it also includes a piece for ocean acidification. And it requires the development of adaptation plans at the state level, federal agencies, and a national one that brings that all together. And right now many of the states and federal agencies are actively in the process of putting together these adaptation plans in anticipation of the fact that they're going to be required to do it at some point.

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So that's a little flavor about where things are right now. I just want to end with some personal reflection. This is actually me with my kids and a coworker at a rally last year in support of the Senate Warner-Lieberman Bill and for me, I just think this is a really historic opportunity. Everything is sort of coming together. We have increasing certainty and awareness about the urgency from the science, so we know we need to reduce global warming, pollution. At the same time we have this opportunity to repower America, advance a clean energy economy and also protect wildlife for our children's future, and that's really why I'm in this game at all. I think it's just so important that we be taking action now as soon as possible to start, you know, providing a better world for our children going forward. So I will end there. Thank you.

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