

# Life, Liberty and Climate Data - Dr. Justin Mankin

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## SPEAKERS

Doug Parsons, Dr. Justin Mankin

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Doug Parsons 00:00

Hi everyone this is America Adapts the climate change podcast Hey adopters, welcome back to an exciting episode. Joining me is Dr. Justin Mankin, a climate scientist and associate professor at Dartmouth College, Justin wrote a provocative and fascinating article in The New York Times about climate data. Most of the climate data is generated by government entities and therefore is considered a public good and service private firms, some of which I've covered in this podcast have increasingly tapped into this climate data to provide climate modeling services, Justin argues we should consider climate data like this a public good and make it available for adaptation planning for free. It's a fascinating discussion and we dig into what it means to privatize this information. We also discussed the need for a national adaptation plan, and we learned something important work his students are doing in the climate modeling space, I promised that I would cover climate modeling more and here we go. We dig into many of the ethical issues that are quickly arising. We all need to have these conversations as governments and the private sector increasingly turned to this climate data for adaptation planning. Before we get started, let's talk about us all going to New York City. And that means attending the 2024 waterfront conference, this fantastic event is hosted by the waterfront Alliance, a US Space nonprofit organization with over 1100 partners. This conference is all about real change for our waterfront and coastlines. Now in its 17th year, the waterfront conference has become the go to forum for discussing and strategizing on the challenges faced by our entire nation. If you go and I hope you do, you'll be joining over 600 participants including policymakers, community leaders, scientists, engineers, architects, academics, environmental advocates and professionals from labor, real estate insurance and finance sectors. And yes, podcasters will be there. The event explores everything from climate change solutions to sustaining robust coastal economies, ensuring equitable access to our waterfront and waterways and fostering a healthier open space environment. I'm very excited to be participating in the waterfront conference. I'll be there moderating sessions participating in the breakouts in hopefully meeting all of you who participate. It's happening may 21 2024, from 8am to 6pm, at the Museum of Jewish heritage in New York City, and they are offering something special for my listeners a 10% discount on your tickets, just use the code America at checkout. Plus, there's special rates for students in nonprofits. So whether you're a policy junkie like me, an environmental advocate, or just someone who cares about the future of our planet, this

conference is for you. For more information on the waterfront conference and the incredible work of waterfront Alliance, head over to [waterfrontalliance.org](http://waterfrontalliance.org) links are in my show notes, guys, it's New York City. I shall be returning to this incredible Persian restaurant I went to in the East Village a few years ago. Join me. Okay, hopefully I'll see you there. Alright, let's join Dr. Justin Mankin, and talk about climate data as a public good. Hey, adapters, welcome back to a very exciting episode. Joining me is Dr. Justin Menken. Justin is a climate scientist and associate professor in the Department of Geography at Dartmouth College. Hi, Justin. Welcome to the podcast.

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Dr. Justin Mankin 03:09

Hi, Doug. Thanks for having me.

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Doug Parsons 03:10

I love talking to professor's and so why we are talking is I actually read this provocative column that you wrote for The New York Times. And we're gonna get to that we're gonna get to the contents of that. But it was just a fascinating article. And then you and I had a pre recording call, where we able to dig a bit more about things that we can talk about. But first, I want to ground my listeners, what do you do there at Dartmouth,

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Dr. Justin Mankin 03:33

I run the climate modeling and impacts group here at Dartmouth College, which I established in 2018. When I started on the faculty, our group is really motivated by what a world with global warming looks like and trying to do. The accounting that clarifies what that world looks like understanding what the impacts of climate change mean, for all the things we value, our food, our water, our well being economically and from a kind of a health perspective. And a lot of our work kind of historically has been prospective thinking about what the future looks like. And increasingly, what we've started to turn to is more retrospective analyses where we're actually doing the documentation of what climate impacts have wrought. And understanding that the genesis of those impacts and really doing a rigorous documentation of their impacts

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Doug Parsons 04:29

that you've explained a little bit of it here, but you're a climate scientist. And I had Dr. Katharine Hayhoe on once before, and I think I referred to her as a climatologist, and she corrected me and said, she's a climate scientist. Could you just elaborate a bit more what it means to be a climate scientist versus let's say a climatologist?

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Dr. Justin Mankin 04:47

Yeah, I laugh because my PhD advisor love to make that correction to and it's something that's really shaped my understanding of what we do as distinct from climatology, which I think has a its origins in deep, deep roots in geography, which is kind of the statistical analysis of weather.

Right? climatologist my advisor Noah Diffenbaugh used to say is somebody who likes to take 30 numbers, add them together and divide by 30, right kind of characterizing long term weather in a location, a climate scientist. And there are many definitions. And I think what constitutes climate science as a domain of inquiry is really expanding rapidly can include all components of the Earth system, and how that shapes, climate or how climate shapes those particular elements of the air system, whether it's the cryosphere, the ocean, the land surface, or the atmosphere itself, I kind of think of it much more as an earth systems, characterization of climate. Fantastic.

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Doug Parsons 05:48

And again, before we get to the paper in all the topics that we're going to cover in there, I want to ground my listeners in some fundamentals first, and so a lot of them have been exposed to this concept of climate models, climate data in previous episodes, but not all of them. And I'm just if you could give us that 30,000 foot view, what is a climate model. And I'll be interesting if maybe your definition is a little bit different from maybe I've had some policy experts come on and talk about climate models.

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Dr. Justin Mankin 06:13

I think of a climate model as a theory of climate. The power of a model is that it forces you to formalize relationships among a system to do diagnosis and create understanding to way of communicating expertise to non experts provides the ability for forecasts or predictions under some conditions, right. So as a modeling as an exercise is really pretty varied. I think climate model is often a theory of climate that's formalized as a computer program. And so what we're talking about when we're talking about modern day are system models, like the ones that inform the climate assessments, undergirding the Intergovernmental Panel on Climate Change, or IPCC, those models are really sophisticated computer programs that are an increasingly national scale endeavors, they're kind of the scope of building them and running them and interrogating them is beyond what could be pursued by any one research group that's all exploded, and just in terms of the number of people involved, and so they're their national scale investments at this point, kind of the most sophisticated climate models that said, a theory of climate can take a host of forms, from a zero dimensional energy balance model to a model of reduced complexity, like the finite amplitude impulse response model that's come out of the UK, that's actually become really important in scenario generation. But the ones your listeners are probably most thinking of are these earth system models, which are really representing the fully coupled nature of the Earth system, from its atmosphere, to the ocean, to the cryosphere to the land surface, to the dynamic interactions in terms of energy and biogeochemistry, kind of governing the dynamics of that system, and therefore of the climate that we experience. A climate model is a model of the climate system, it is a simplification of the climate system so that we can probe it and run experiments with it. Given that we can't conduct experiments on our Earth itself. You could argue we're conducting an uncontrolled one right now. But yeah, the model is a computer program in order to conduct experiments and generate understanding. We're going to talk about this article that you wrote this column. That was fantastic. And the title of the column was the people have a right to climate data. And that in itself is bold statement. And you don't necessarily have to get into the specifics of everything that covers but what inspired you to write the column? Yeah, the inspiration was kind of a, I think a few things coalesced, in order to kind of inspire me to sit down and write this. I wrote an

original draft. In December of 2022, after hearing a lecture from a really wonderful, prominent scientist in my field, Adam Sobelle, who's, I think, been at the forefront of both documenting how scientists think about their science around climate change in the form of his really wonderful podcast, *Deep Convection*, which I'd encourage all America adept listeners to go and check out I think, Adam, he was giving this very prestigious lecture called the Attorney Lecture at the American Geophysical Union meeting and in 2022. And then he was talking about the rise of climate risk science as a domain of inquiry is something that people are studying, but mostly from the private sector side of things. And he was talking about the work which his work is a lot on the tropics and in particular tropical hazards like Hurricane Genesis and tropical cyclones. He was talking about how he had been working with the reinsurance industry. So these are the insurance conglomerates that insure the insurers. And it makes sense that the reinsurance industry would be a major employer of geoscientists given that insurance is in part about hedging the economic costs of hazards, whether those are kind of Earth hazards, like earthquakes, or atmospheric ones, like hurricanes. He was just mentioning how far ahead the reinsurance and kind of private risk industry was in terms of trying to interrogate and characterize the risks that climate change poses to people and our well being. And he was making a call for just more work in the academy to be done right by professors like me to understand what climate risks portend and how to understand them and how to get the that information into the hands of people that can then act on it right? How do we inform the decisions that climate change necessitates? I went home from that talk both inspired, but also I wanted more clarity on Okay, well, what's the public role in something like this? Right? If climate risk science is just the province of the private sector, what does that mean for who's left behind. And the other kind of factor that had been happening is that in my group, we've been doing a lot of documentation of climate impacts to date, we live in a world where global warming has occurred. And it's hurt people and given data, we can go and start to do that interrogation and figure out the Genesis and consequences of climate hazards. So we've been doing that work. And in doing so we found that the costs of climate change are far higher than we previously understood, particularly in terms of how it's impacting our economic well being. We also found that our ability to document that has been limited by data availability. And so there's kind of an inherent spotlight effect. And so there's this embedded inequity in the causes and consequences of global warming, in that the people most vulnerable to global warming are enduring its impacts. First, those are the same places and people that are arguably least culpable for global warming. They are also the places where we're least able to document those impacts, right there data poor places, with vulnerable people, enduring climate impacts, and therefore we're kind of at least well prepared to develop meaningful interventions to mitigate the risks of climate impacts. I had been seeing that kind of quadruple whammy of kind of the tragic inequity embedded in global warming and my own work, I had heard Adams call for kind of greater investment in academic kind of public sector science, to think about climate risk sciences as a legitimate domain of inquiry. And I was like, well, somebody needs to say that it's a public good. And make that case why it is that private firms profiting from public climate science could maybe be putting people at risk. And I sat down, and I wrote an original draft of it that I think was pretty down on the private sector. I think it was maybe a bit unfair. And so I sat on it for about a year. And then I finally had some time this past fall and dusted it off, particularly because I had been contacted by a bunch of folks in private investment and in reinsurance about papers that I had published, where they were looking for my results. And they wanted me to help them understand what my results implied for their businesses, and have me help them draw those implications, presumably, so that they could turn around and use that science and repackage it, potentially for clients for sale. And so that kind of created a moral ambiguity for me. And so I was inspired to kind of pick up the piece again, and redraft it with a slightly honed argument and sent it into the editor at the New York Times who I'd worked with in the past.

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Doug Parsons 14:28

Okay, can I think it's really interesting, can you share the anecdote within the column about AccuWeather? And the railroad company, just I mean, really quickly, but just, I thought that was just a incredible real life example of what could potentially really create some resentment out there. Yeah, the

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Dr. Justin Mankin 14:44

friend of mine actually pointed me to that example. So that wasn't something I just happened to watch that CNBC interview, but essentially, the anecdote I presented was about the fact that AccuWeather which is a commercial weather company that leverages both publicly available data was produced by the National Weather Service, which is under the aegis of the National Oceanic and Atmospheric Administration. The CEO of AccuWeather, was in an interview with CNBC and essentially touted this story. And I guess he's told this story more than once. But he essentially tells the story of how they warned a rail company which had been a paid subscriber to their highly tailored weather forecasts of a tornado that was about to strike and present a risk to set a train that they were that they were moving across tornado alley, and their weather forecasts actually saved a derailment, right? They stopped the train as CEO, he tells the story and a tornado passed between the two trains, essentially, but they didn't actually provide any warning that same morning to a nearby town, that town didn't have a paid subscription to the tailored forecasts that the train company did. And that resulted in the death of 12 people. Right, and that that's one weather report. And the thing I kind of posit is, how might that play out over assessments of climate risk writ large, right, where you have haves and have nots, and you're just kind of reinforcing Layton inequities embedded in society and deepening them, right, where towns that are not paid subscribers are enduring losses and those that have the resources to pay for subscriptions, that can help them manage climate risks. Maybe they're better off.

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Doug Parsons 16:32

And I'm not expecting you to have a position on this. But I just kind of just imagine, as the climate data gets more accurate and modeling, I mean, that's a very specific kind of like, wow, we were able to avoid this damage to the railroad, but just the fact that the town got hit in the legal implications of it. And I just wonder what legal precedent for like someone is going to go do something dangerous, and you don't warn anybody about it as their legal precedent for that. These are things you probably need to start worrying about, as this climate information gets more accurate. And I'm not having you, implying that I'm just speculating myself on like these potential problems. And so I want to pivot a little bit here. And you'd mentioned like these firms that reach out to you like BlackRock, and they're asking you for your expertise. And you really make the point that you want this to be public information. I'm curious what that interaction was like, though, is this someone from BlackRock? Is it a policy person? Is it someone who has technical skills, when they talk to you want to use blackrod? Example, but just more generally, how did that unfold? Is it just like, yeah, go take a look at the website. I mean, how did you kind of really walk through that?

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Dr. Justin Mankin 17:35

Yeah, my science is funded by your tax dollars to UK right, and your listeners tax dollars, right, I receive funding from the National Science Foundation from the National Oceanic and Atmospheric Administration, from NASA from the Department of Energy. And I go on, I pursue my investigations, which are fundamentally about informing adaptation and risk management of climate change that science is paid for. And to the extent that science is linked back to people's tax dollars, I have an absolute imperative to communicate my science to whoever will listen. And I feel that really, really deeply, which is why I say yes to talking to things like a podcast, or anytime there's an immediate inquiry, I answer, yes. Or anytime I'm invited to give a public lecture, I say, Sure. And that's because I think there is a, a real moral imperative that I have given that people paid for that science, that it's theirs, and to share it. And that holds for when private companies reach out to me as well, like they deserve to understand what that science implies for them as a collective. And so I get emails, or sometimes people will call, call me. And they'll ask about the analyses or the assumptions, or if I have follow on analyses I'd be willing to share, or if there's code or data, and as part of the fact that our effort is funded by the public, we try to make those data accessible and reproducible. And that means that we work hard to publish our code and analyses and data, because that's also what's beneficial to the science. And I think it actually has some interactions with some of your questions about the liability attached to a lot of these private sector models that are that are being developed that are not subject to the same scrutiny or same kind of open calls I point them to where we archive the data and the analyses and to the extent that they have the technical alacrity to do so they can take it and add value to it for sure, and then repackage it and sell it to their clients if they want. I'm just not going to do that work for them. I also think that there's Yeah, I'd be lying If I didn't say like if they don't add value to it, and they're simply just casting my science for their clients, in order to generate a profit, that's a bummer, because their clients have already paid for that science. And they paid for it by paying taxes, which have supported the incredible work that's done by NSF. And NOAA, and DOD and NASA, NIH public agents is on this issue.

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Doug Parsons 20:25

And Ken, you've sort of answered this, but I'm going to ask it in this way, too. Of course, I think I generally know what you're gonna come from. But there seems to be a new climate tool presented at every conference, and it looks pretty good. And if it's a climate model, and if it's free, and this is usually the case, when there's government entities involved, wouldn't that just actually be a red flag for some people like a free climate model? Is it actually worth as much as something that costs something? And you're, I think your whole argument here is like, Yes, I hope you see what I'm getting at, though, is that something that's free and doesn't have that sort of premium of okay, we're going to really add all the bells and whistles, and that's going to cost you.

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Dr. Justin Mankin 21:07

I think, the climate models that have been built by national labs in the United States, those models, some of them are more community focused, like the ones that have the National Center for Atmospheric Research. Some of them are less public, but are, like less community focused, I guess, I would say, like the small from NASA guess in New York City, but are kind of

equally important in informing the IPCC, those models are technically out there, it just takes a tremendous amount of expertise and computational power in order to work with them, and to run them and conduct experiments with them that would provide some resolution on questions you have, I think the other thing is, is that they operate at a spatial scale that is not commensurate with decisions. What does it mean, to represent the amount of water volume metrically, stored in the top centimeter of soils in a 100? By 100 kilometer grid box? And like, what does that value even mean? It's such an abstraction does that help you characterize drought in a place, I would argue that it doesn't. And so the value added, is how we take those data, and bring them down to spacio, to poro, scales that are commensurate with like actual decisions being made by people, whether those are individuals or firms, or municipalities or states, or nations. The fact is that our experience, and therefore adaptation to climate risks is going to be local. And so there's a fundamental spatio temporal disconnect between what the scientific community provides when we're talking about climate models, at least in my discipline, and what we're talking about the needs of kind of the informational needs of adaptation. And so where the private sector I think, has found a foothold is in thinking about how to take these coarser, spatial temporal data, and bring them down to the spatial scales that are more relevant to decisions. The issue that I see there is that there's a huge amount of science and a huge number of scientific decisions that go into how it is that you take its course data at 100 by 100 kilometer grid box, and bring it down to say, the level of a township or the level of a farm, or the level of a watershed. Right, I think there are some really important scientific choices. And I think the question is, well, how much should that be up to a profit driven private sector, versus, which doesn't subject itself to the same scrutiny from the scientific community, versus being generated in NOAA, or in NASA, or in DOE, or wherever, or that's kind of the thing that

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Doug Parsons 24:09

I'm concerned of that you did cover like granite, and I still want to dig into that, because I think I've just even the you in the article, you've mentioned, you reference, you refer to these people to the even the climate modeling tools that you have at Dartmouth, and then these national labs. And I've been involved when I used to work with government, like when we're creating a tool or something like that. There's the sort of brainstorming sessions and most of the time people sit around who is our audience? Who is this tool for? And I think of especially these big models, and they get these grants to develop it, but maybe something's lost in that process that you need. You just described, you need high technical skills to maybe even understand it. But then you get to the point at the end of the day, why are we building this and who are we building it for? And for the tool that you have at Dartmouth? Did you go through that process or was it just very specific? This is really kind of insider stuff that like Climate scientists like me are going to be using and that's what it's there for. I mean, did you go through a process and who could potentially benefit from this?

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Dr. Justin Mankin 25:06

I think maybe it's helpful to kind of step back when I pursue a science question. I'm motivated by the science question, a scientist. And so I'm, I'm not necessarily thinking about an end user. I'm not that applied. I think there's actually I think there's a gigantic gap between the science I do and the decision relevance of it, I think we're trending towards maybe becoming more decision relevant and our science here at Dartmouth. But I think that there's still a pretty big

gap between science and decision making. But it's definitely like the case that I don't want one of the reasons that we make poor decisions in response to climate risks, to be a lack of science. And so that is certainly a motivation that I have personally that informs the questions that I ask and the analyses that we pursue. So I write proposals, I get them funded, sometimes if I'm lucky. And other times I don't vote in our my group, we're kind of motivated by different sets of questions, what a climate impacts mean, for people in particular places. And so we'll go and we'll do those analyses. And then we will go through the peer review process where we kind of take our results, and we distill them into something meaningful that we think makes a contribution to our understanding of the world, and then we try to publish it. And so we do that through the peer review process. And the peer review process, I think, is has its issues. But I think it's also tremendously beneficial and that it tends to clarify the results and improve their robustness. And they're oftentimes their relevance to particular stakeholders. And then out of that, we will think about, okay, how do we furnish these data and code in a way that's legible to somebody who wasn't involved in the research, but yeah, it's often to a technical community, like our community of peers. And so we will, alongside with our publication, publish our code and our data such that a researcher from somewhere else can go in download the those data and code and replicate the results. Ideally, it doesn't always work out that way is, that's that's a huge amount of work. But that's, that's very much a goal. We have. And I think, in general, as a postdoc here at Dartmouth, has documented in his own research, she has a preprint out there about the data transparency problem that climate has, and I was involved in a little bit of that work. And what Adam the Pollak, this postdoc here really does a great job of is documenting the extent to which minimal code openness and data standards are not being met by the climate science community, both private and public. And what that implies for our ability to move the science forward as rapidly as we have to, we need to get this stuff, right, because the stakes are real. And Adam lays out, I think, a really cogent set of data transparency, and reproducibility goals that individual research groups like mine can sign on to, and say, Okay, these are the standards we as scholars are holding ourselves to, in order to make our data public and publicly available. And that's kind of essential if you were to go on my website for some of our papers that are kind of where I'm the senior author. These are kind of papers produced by my postdocs led by my postdocs or graduate students. We publish the data and the code alongside of each of these projects. That said, I still think there's a huge gap between what I do and its relevance to any one decision anywhere.

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Doug Parsons 29:08

Another bit of a transition here, you have some recommendations in that column two, and you talk about having a national adaptation plan. Why do you see value in that?

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Dr. Justin Mankin 29:17

The national adaptation plan, there is a recent P cast report. So that's the President's Council of Advisors on Science and Technology. And maybe that sounds right. And they produced a really wonderful report last year that kind of lays out the necessity for anatomy national adaptation plan. And I think the question is, for me, it's who furnishes the minimal informational requirements for adaptation, right? Where does that come from? Is it something that you if you own a bakery, in some city somewhere, right, and you're interested in under or standing your flood risks? Or how temperature is going to change? Because I don't know that has some impact on how quickly your bread rises? Or how much climate control within your bakery you're

going to need to invest in? Or whatever, right? I'm not sure. But where does that information come from? Who provides that information? Do you have to pay for it? I think that there should be given the global warming as a collective tragedy, the information required to respond to it, whether you're an individual, so autonomous adaptations, or you're a municipality, that information should be a public good. And it should be protected as such. And that means that a national adaptation plan would establish minimal informational requirements and make those data to inform adaptation decisions available to people in a legible format. Right? I think, what does that look like? Practically, there's a lot of work going on in adaptation extension, at the local scale. And a lot of offices like the USGS, or I guess, state climate offices as well have been doing a lot of work doing the translation of kind, of course, model output, like the stuff that I work with, to what it might imply for local scale decisions and communities for you want to invest in a change in your storm drainage system at the municipal level, such that it's robust to flood risks for the next century? What's the diameter of the sets of pipes you put in place? Well, that's got to be informed by the sets of climate risks that we understand to be forthcoming, given our emissions of greenhouse gases, and there's a big disconnect there that you need a lot of data translation of bringing coarse projections down to the spatial and temporal scales, that a decision about Yeah, like a combined sewer overflow, pipe diameter might have to be if you're making that investment in a municipality. And so I think those folks have been trying to do that work. I think the question is, as we go forward, how much of the answers to those questions how what, how big should my pipe diameter be? To what extent do we outsource that to consultancies that do that translation, or how much of that is provided in house by the government. And so I think a national adaptation plan would clarify that. And it would have an adaptive management approach to a national adaptation plan, meaning that it would kind of take stock of evolving needs of the public as climate change, and its impacts continued to unfold in order to alter its strategy. But the national adaptation plan, the details of it are myriad and complex. I think at a minimum, it would mean that you have a website available, where you as an individual could just go to a website with a.gov domain, and assess the sets of hazards that you face locally, on various timescales, through transparent data in a legible form, right, you'd be able to evaluate the risk of your home or your business, or your family to heat waves or droughts or floods, or tropical cyclone events, sea level rise, and those data and those risk assessments are linked back to kind of transparent and assiduous peer reviewed science. Right. And that you could do that process tracing where I want to know where this risk estimate came from, or this range of risks that I face. Where does that come from? And you'd be able to go back and do that documentation, and that those risk estimates would be updated. As the science that provides those estimates improves, you'd be able to do that without inputting your credit card like that, to me is a minimal, a minimal requirement. I think a national adaptation plan could extend further to maybe include Okay, well, given your risk profile, right, and the sets of hazards that you face locally, what kind of adaptation strategies should you pursue? And what are the public resources available for you to pursue those adaptation strategies? I think that's another place where you can imagine a national adaptation plan being essential in both furnishing that information, right and directing people to the sets of resources such that they can take steps to manage their risks. And I think that should be a public good, in my opinion.

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Doug Parsons 34:56

Well, I did an episode where I had the author of The National Audit Titian plan in the Senate, he came on and just they actually created the legislation. And there was some optimism that it would have bipartisan support. And it did. But they haven't really been able to attach it to anything. And it wouldn't really have much of a budget. But it'd be a first step. And I'm not sure if you're aware, but we're the only country in the world. Now, I think with the last remaining

couple that we don't have a national adaptation plan. So there's demands for it. And it's a nice interface to actually communicate with other countries to I don't know if anything that the Biden administration released a national resilience framework last fall. It's kind of wonky, and totally for kind of insight or resilience, folks, but they have I think it's six or eight objectives. And one of them does talk about resources and information and climate data, acknowledging that there's all these resources available. And this needs to be available for local governments and such, again, that resilient framework isn't tied to any funding, but they're getting their thoughts together. And that for a lot of us resilience framework that even the messaging that the name is horrible framework, a national adaptation plan is just, I think, much more direct, and it's a better communication tool independent, what's inside it, but they're making the steps in that right direction, but it's still kind of insider stuff. So there's movement there until you start attaching money to all these things. And it makes it not as serious.

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Dr. Justin Mankin 36:15

Yeah, I mean, I guess I maybe the answer to this, Doug. But I wonder how much of that is tied to a lack of clarity about what a lead agency would look like, who would undertake the implementation of the national adaptation plan, who would own it, and therefore, who would be responsible for its success or failure? I wonder if there's that clarity there, I'm not sure. And how that choice of agency would inform were kind of the public sector provision of information. And and where that's picked up by the private sector, you can imagine a scenario where a national adaptation plan is pursued, and it's picked up maybe by an agency like NOAA, and they outsource the development of a lot of these tools to the private sector, based on inscrutable models, and inscrutable analyses that are not subjected to the same kind of scientific possibilities as open data. And so I just think that there's an alignment problem there, right, private sector interests are not the public interest, even when the public sector is kind of an essential client to the private sector. I think about the fact that climate scientists at at encara, the National Center for Atmospheric Research, they're charged with developing models and tools to protect the public interest and to promote knowledge that everybody can use. But a climate scientist at Exxon, right, they're charged with creating profit, even if it means that they have to bury their own science, about global warming for 30 years, all at the expense of the public, I just wonder who becomes the lead agency and where they determine private sector added value becomes the essential means to provide these data, how that shapes how that system of power and profit shapes the product that we as the public get. And I think that's another issue.

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Doug Parsons 38:08

Yeah, I started off my career in public sector, nonprofits, and a lot of people doing a lot of amazing work. But I can tell you what I'm, I'm being enticed by the dark side, I'm not a private sector entity, but I deal with them a lot more than I did in a previous life. And it just that motivation, even if it's profit motivation, like most people in the private sector, they want to get some joy out of their lives, that they're doing something positive and such. But the difference between the creativity, access to funding all these things that elevate the private sector, that the conservation sectors, that's where I worked for most of my career, it just, it's bare bones funding. And so I think there's a lot of delusions going on, and ultimately, what you can accomplish. And so that's why I'm intrigued by the private sector, bringing its resources to bear

in all these spaces. And again, there needs to be a lot of ethical conversation, like what you just what you talked about in your column, we need to have these conversations, but we also need to elevate our game big time.

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Dr. Justin Mankin 39:04

Yeah, I agree. I think there's an essential place for the private sector to be accelerating the lagging efforts in the public sector. Right. And that's something I think the urgency that everyone feels in the face of the climate crisis is totally justified. And to the extent that informs that decision to pursue things rapidly in the private sector. I think that's great. And I think that it's not as cut and dry as private sector, bad public sector. Good. I think it's more just how does incentivizing the development of climate risk information, the information we all need to adapt to climate change? How much does the commodification of that shape and reinforce the haves and have nots in our society? And what does that mean for the equity implications of global warming? That's something that that I think about a lot just as a climate scientist, and I think those are hard questions that we need to be interrogating. I think the acceleration of solutions around climate and the private sector that is clearly part and parcel with any kind of public sector efforts. And so I think of them as a constellation of approaches, and not an either or. And that's what I'm hoping for. You

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Doug Parsons 40:24

start this episode off talking a bit about your lab, but I like to ask professors, can you tell us a little bit about some of the work that your students are doing? I think you've mentioned one or two. But do you feel like your students? Are they just like they're they're these technical PhD students? Or do you feel any of them? Like they're getting into the adaptation space? Is that sort of the conversation or a sense that you're getting with your own students?

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Dr. Justin Mankin 40:45

Yeah, I mean, I guess I think about more about the, my students as Okay, are they technicians? Or are they scholars? And I think all of them are scholars, right. I think they're all fundamentally interested in improving our understanding of the world. And with respect to this question of climate change, and I think they're all deeply motivated by a sense of urgency around the climate crisis and wanting to inform good decisions to manage it. The work that we're undertaking right now, it's, there's a lot of it, or I have one graduate student who's nearing completion of his PhD, Alex Scalia, who is just a really wonderful thinker. And it's been really fun to collaborate with him on questions related to attributing things like snow loss with global warming, and what it implies for water availability in places like the American West and how that should inform adaptation. And in particular, we just actually had a paper come out in January, where we essentially show that the responsible locations, snow to global warming is a function of what your average wintertime temperature is, and that it's highly nonlinear, meaning that a place in the American West may only lose 5% of its snowpack to the first degree of global warming, but it's going to lose about 30 or 40%, to that second degree of warming. And that non linearity, I think, has important implications for informing adaptations, it implies that snow loss is not an emergency management kind of response, where you're talking about declaring disaster and getting a rapid injection of federal aid. Instead, it's that you have a

rapid acceleration. And once you kind of move into this snow loss regime, it's not about managing a disaster, it's about managing a permanent change to your water supply portfolio. And so that adaptation, versus Emergency Management kind of dichotomy. I think that's really clarified there. Are you really talking about the necessity for investing in water management adaptations that recognize that snow is not going to be a predictable part of your water supply portfolio, which has huge implications for a ton of places in the American West, I have other students thinking about more fundamental questions related to what the pattern of global warming implies, for ability. So far, this spatial pattern of global warming, so far implies about the projections of climate change that we get from our models, and how that should inform our interpretation of the range of answers that a climate model gives for any one location on Earth. And then one of the big initiatives that we have going on right now is around this question of data poverty. And I so I have another student thinking about this deeply with me, where we're interested in documenting how data poverty on the geophysical side. So I'm literally talking like weather station observations, how that data poverty shapes our ability to document climate impacts in the most vulnerable places on earth. And if you're just a look at a map of the spatial distribution of where we have weather observations, they are the province of the privileged right, like the ability to monitor your environment is itself a reflection of privilege. And data collection itself is a reflection of the values of the data collector that has implications for our ability to assess climate impacts in places like Sub Saharan Africa. And it turns out that these data biases generated by the fact that we're just lacking weather station observations in these places means that we're least able to assess climate impacts in those place and therefore to develop meaningful strategies to manage those climate risks. And then one last project I'll mention is on informing loss and damage and climate liability and so this is work that I lead by Christopher Callahan, who is a PhD student who's now a postdoc at Stanford, we're really interested in this question of can science inform loss and damage and climate liability conversations? And in particular, can we actually provide attributions emitter based attributions of climate damages? Meaning can we say how much say Multnomah County in Oregon has been impacted by the 2021 Heatwave, and how much that heat wave was generated by the emissions of a particular fossil fuel company. And we've developed a framework that I think become essential to informing these questions of in the climate accountability space and the data democratization space. So how do we provide these data so that people can evaluate both their liability burdens, or who they should be seeking to hold account for the, I guess, the consequences, the damages, and the harm that they've endured from these emissions as they've generated warming and that warming has generated hazards? And those hazards have generated socio economic impacts?

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Doug Parsons 46:10

Okay, final question. And I asked all my guest this and don't forget, this is a climate adaptation podcast, if you could recommend one person to come on the show, who would it be?

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Dr. Justin Mankin 46:20

Oh, gosh, such a good question. And I was woefully unprepared. You already had. I've learned about Madison Condon through you actually, and just sort of been, I went back and I listened to her episode, and just thought it was remarkable and just signaled to me how much farther

along so many people, including Madison, happen to be on these things that I think about. And so I'd encourage everybody to go and listen to that. And I actually think there'll be space for a second episode with her just given the amount she knows,

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Doug Parsons 46:54

I sort of love the idea that I've never had someone recommend a previous guest before that's kind of funny on its face. So I mean, that you could we could leave it there.

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Dr. Justin Mankin 47:01

No, I think a person I would suggest is well, I'd suggest to and they're both here at Dartmouth with me. And they've, they've both instigated a lot of deep thinking for me about adaptation, and how we pursue the energy transition in particular. And the first is Professor Aaron Mayfield, who is a professor in Thayer, which is the Engineering School here at Dartmouth. She's just a really sharp mind helping us think about how to pursue the energy transition, the modeling of it and the policies of it. And I think there are some important implications for the extent to which the overlap between what we think of as mitigation is energy transition, and how it shapes adaptation, because the energy transition itself is going to be pursued in a world in which there is the impacts of global warming, showing up and hurting our infrastructure. And to what extent is the energy transition itself kind of an adaptation exercise as well. And I think Aaron would be really good to kind of shed some insights there. The other person is Klaus Keller, who's also a professor at Fayer. Here, he is had a really amazing career in climate science. And Dartmouth has been fortunate to bring him in as a faculty here. And it's been great having him around. He's just a fun, brilliant mind. Just fun to have a conversation with. And he is really at the forefront of robust decision making under uncertainty. So how is it that we pursue adaptations that are beneficial under the broadest range of outcomes, and that strategy is hard to achieve and classes really wonderful because he's kind of got this background as a geoscientist and engineering kind of computational side, but he also deeply engages with stakeholder outreach and kind of actual decisions being taken by people and communities in response to climate risks and is really interested in kind of connecting really bridging that gap between science and decision making in a way that I can't imagine ever being equipped to do.

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Doug Parsons 49:14

Okay, fantastic recommendations. I don't normally cover energy but your point about her seeing the overlap with the transition with adaptation that could be an interesting discussion. So great recommendations and Madison I did say probably reach back out to her at some point because I'm going to keep covering this topic. I said I was gonna cover modeling and risk and all these things this in 2024. So it's a pattern I want to pursue. But Justin, this has been fantastic. I loved your column and I appreciate you coming on the podcast.

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Dr. Justin Mankin 49:41

Yeah, thanks for having me. It was fun to chat with you.

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Doug Parsons 49:51

Okay, Adapters, that is a wrap. I love these types of discussions. Thanks to Justin for joining the podcast. He has done us all a service by bringing attention to the future use of Climate data, most of which is generated by public tax dollars. As you heard from me, I think there's a huge role for the private sector and in improving the delivery of this information to end users like local governments. And yes, we need to be aware of climate equity, meaning those who typically have difficulty funding these costly options, my own experiences in government lead me thinking, there's a lot of work to be done to make publicly funding modeling tools more useful to adaptation end users, many are clunky or not designed to be used at the scale of your typical adaptation planner, there needs to be processes that take into account ultimate end users of these tools. And I hope the private sector steps up and establishes some baseline ethical standards when it comes to the models and the software they create. If they're not careful, governments will step in and establish the standards for them. I'm not saying I'm against that either. It's still early. As I said before, we're in the wild wild west of climate modeling. It's time to establish some standards in use and accessibility. Get on it, guys. And don't forget about the waterfront conference hosted by the waterfront Alliance. It's May 21 in New York City. All right, before you go, if you are interested in having me speak at a public or corporate event, please reach out I've been doing some keynote presentations. I was just in New Jersey giving the keynote address for their 2024 New Jersey coastal climate resilience conference. That was a lot of fun. The theme was adaptation. The greatest story never told us your stories from the podcast and my own experiences and adaptation. It's also a pep talk about what we're all doing here. These are sobering times, but also very exciting times in the adaptation field. It's such a new emerging areas that you can influence the field yourself. Let me help educate your audience on this emerging adaptation sector and how it differs from carbon mitigation and sustainability. Your companies and organizations and especially your leadership need to understand these differences in the years ahead, you can contact me at my website, [American apps.org](http://American apps.org) and imagine the potential of showcasing your achievements through a widely acclaimed podcast that boasts a large network of climate and adaptation professionals. Yes, I'm talking about America apps and how it offers your company or organization the perfect platform to tell your adaptation story and spread your message to a diverse and highly influential audience of climate professionals. by sponsoring a whole episode you not only have the chance to share your story with the world but also integrate a podcast episode into your organization's long term communication strategy. It's time to expand beyond the confines of webinars and white papers, which can be often dry and forgettable. Let's work together to identify the experts who best represents the remarkable work your organization is undertaking an adaptation. This will not only enable effective communication with your members, board members and funders, but also leave a lasting impact. The value of podcasts lies in their ability to continue promoting your story long after their initial release and sharing it remains a critical educational resource for years to come. I am humbled to have collaborated with prestigious partners such as Patel, the Department of Defense NRDC, University of Denzil Wharton World Wildlife Fund, UCLA, Harvard University, the trustees of reservations, and many more. So let's add your organization to this sustainless Yes, we can make a difference in the world of climate change adaptation, email me at [americaadapts@gmail.com](mailto:americaadapts@gmail.com) Okay, adapters Keep up the great work. I'll see you next time.