



Transcript of CleanLaw Episode 29: Hana Vizcarra and Jesse Keenan Discuss Climate Finance and Adaptation, November 13, 2019

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Robin Just: Welcome to this episode of Clean Law, from the Environmental and Energy Law Program at Harvard Law School. In this episode, our staff attorney, Hana Vizcarra, talks with Jesse Keenan, a social scientist and lecturer at the Harvard Graduate School of Design with a joint appointment at the Harvard Kennedy School in Science, Technology and Public Policy. They discuss climate-related data, financing community development to encourage adaptation, and recent work about what drives coastal adaptation decisions that communities make. We hope you enjoy this podcast.

Hana Vizcarra: Jesse, thank you for coming to the law school and talking to us today all the way across campus.

Jesse Keenan: Thank you for having me.

Hana: Absolutely. And it's kind of an honor to have you on Clean Law since you are one of Harvard's biggest researchers around climate adaptation, and you really approach that in an interdisciplinary way, it seems like. You have a background that includes both law and a PhD. You teach architecture students at the Graduate School, as well as policy students at the Kennedy School, and address areas including urban planning policy and the financial industry. Before we get into the details of some of your work, why don't you tell us a bit about how you came to focus on climate adaptation in this manner.

Jesse: When I went to law school, I studied environmental law, and at that point in time, the legacy in studying environmental law and the faculty and the principal texts and practice was toxics, it was clean air, it was clean water. I mean, it was the kind of fundamental principles of stationarity that were residual in the 1990s. And for me, that had a real limitation in practice because I was really coming in to environmental law at the transition from the Clinton to the Bush administration, and I saw a lot of people who had spent many decades advancing important, but maybe even marginal, contributions along the way and seeing it all kind of wiped out in a single fluff. And so, I started to interpret... I don't know. There was some texts, there were books, there was ideas that were floating around that, in fact, environmental contributions in the built environment could actually be an untapped opportunity in terms of law, policy, design, engineering and the like. And then, it wasn't just about cleaning up the



environment, but there was opportunities to think about it from a more positivist orientation.

Jesse: So, I got into law, real estate, housing, infrastructure with very strong land use environmental aspects to it. Eventually, got into post-disaster reconstruction, in a field known as disaster risk reduction. And from disaster risk reduction, I more formally got into, in parallel, a certain education and research track in finance, and eventually ended up into a kind of body of work around environmental policy, environmental finance, all within the social science and applied science lens of climate adaptation. So, it was a somewhat emergent, like a lot of people in climate adaptation came into it via disaster risk reduction, and then started to understand that, in fact, global change, as well as environmental degradation, was responsible for defining much of the vulnerability that was at the origins of post-disaster and, eventually, pre-disaster hazard mitigation.

Hana: A lot of your recent work, and it sounds like this builds out of your past history, centers on the way the financial community is addressing climate concerns. And this is interesting from my perspective because a lot of what I've done in the last year has focused on the increasing desire to see more expansive disclosures from public companies around climate-related information, both risks and opportunities. And the availability of climate-related data is a rapidly evolving, and with new techniques allowing for more precise assessments of risks, tailored to the needs of specific entities. And this evolution, though, also brings with it some difficulties in quality and consistency of the data, and they're not always necessarily supportive of the new desires and needs of investors or other entities.

Hana: Now, I'm introducing this topic in the terms of investors in public companies, largely because that's what I've been focused on, but this relationship goes much further than that. And the climate-related data applies to everything from municipalities to our federal government and banks and everything else. It's not just a firm level relationship. You recently wrote a piece for the journal Science about the changing data environment. Can you walk us through some of the challenges presented by the emergence of the climate services technology industry that you addressed in that piece?

Jesse: Like you, I share this deep interest in the idea, and maybe it has some ideological or philosophical origins, in the idea that market economies absent many market failures, of course, but many aspects of market economy have the opportunity to appropriately price and discount climate risks and, arguably, opportunities as well. A number of years ago, I wrote an article on, and spent many years studying, how Goldman Sachs made money from climate change as a kind of internalized development of adaptive capacity, and in that article, I'd synthesized the business scholarship and the climate scholarship on adaptation.



And I realized that a very fundamental truth, or axiom, of market performance is that, either adapt or you go out of business. It's that simple, right?

Jesse: And so, we would hope that through the proliferation of systems of intelligence, and that's reinforced by accounting rules, it's reinforced by valuation standards. It's reinforced by licensure, it's reinforced by a variety of different institutions both in public and private terms, that provide the necessary intelligence. And you can think of that in terms of price discovery, with derivatives. You can think about it in terms of disclosure for consumers and the mortgage markets and the implications that may have for broader capital market investment. So, full spectrum of activities.

Jesse: And what we see with the emergence of the task force for climate related financial disclosure, from the financial stability board, is a broader top down initiative, kind of nomothetic influences that are driving a desire to have some measure of transparency in the underlying scenarios or, in probabilistic terms, more finite understanding of risk and uncertainty, deep uncertainty and ignorance within markets, within product services and the like. And there is a whole crop of service providers. We would know this within the realm of climate service providers, and now there's a sub nature of that, the climate services technology companies, that are utilizing that technology and emergent technologies, and very often experimental technologies, to synthesize various models that are driving vulnerability, exposure, and sensitivity analysis.

Jesse: It's one thing to have, for instance, just to back up a second, if you think about a publicly traded company and you think about their supply chain, or you think about their capital assets, well, you can actually measure... And there's companies out there that have databases on this. You can measure where their facilities are, you can simulate how supply chains may be disrupted from various types of shocks and stresses. All of that can play into their capacity to make money at the end of the day, of course, and revenue and the like.

Jesse: So, with this, we have these climate services technology providers, and this is all fine and well if you're talking about the private sector, because they will offer and develop products and services with machine learning and artificial intelligence and all these bells and whistles. There's always some irreducible uncertainty with these types of analyses and the measurement science behind it, and we have to also think that, now, we live in a world of internet of things and highly distributed networks of data from which these tools and modes of analysis actually do have some concrete value. But do they have concrete value, of course, within the context of financial decision making, which operates under different degrees of certainty and uncertainty? And we could talk about that if you like.



- Jesse: But that's all fine and good. The market will kind of bear that. If it's a good product, they'll buy it. But I think one of the considerations I had raised in that piece was that, from the public sector, and we're now making very large public capital investments in infrastructure, in many things, both programmatic and in terms of capital assets, as material assets. There's some significant problems here that we're running into. One, this stuff's pretty experimental, and if you are... And this is a legal podcast, we'll just focus in on a second for the legal implications. If you think about the associated intellectual property of who owns the data that these things are interacting with, so there's a lot of public data and what we've seen in some of these contracts, for instance, is that they're uptaking that public data, processing it in ways that we are not privy to the underlying methodology. It's a black box, if you will. And when they do that, they're now taking ownership over data, and that itself is a first order of potentially problematic.
- Hana: Bringing it back to the private sector a little bit, and certainly the public companies and the transparency issue, that specific issue definitely runs counter to the concept of financial disclosure and what investors are hoping to get out of increased disclosure. But then, investors are also some of the same people who are encouraging this development because they're utilizing these services. And I've just seen, I think, five or six different individual investment firms or companies in the last few years that I'm aware of that have partnered with these tech companies to develop services for them for their own analysis, internal analysis, so that you have different ways that they're looking at this data. Potentially different data now, right?
- Jesse: Yeah. Yeah.
- Hana: That's not just what you see coming out of the companies .
- Jesse: And in Europe, we looked at the idea of blockchaining data for purposes of external validation so that we don't lose track of where this data is. So, if there was a transactional component to the data, we could truly blockchain it and authenticate it externally. So, that is critical, and I'll come back to that in a second. But the other component of this is that there's trade offs. You want to support the development of this technology. And the other component, I'll just back up for a second and say is that, when you look at the warranties and representations and the standard of care associated with the delivery of this stuff, they waive everything.
- Jesse: This stuff, and what I worry about is, that the products are one thing, the financial outputs are one of the things, is the negligent delivery of the associated services. Because I do see, in practice, that they're issuing products that companies don't necessarily understand, but when it's the surface side of



interpreting and applying that product, there's degrees of negligence from which culpability and contract, particularly from fairly unsophisticated public purchasers and consumers of this, I think becomes very problematic. I think there's some of the things that we can do to get behind the black box to have transparency in quality control and quality assurance.

Hana: You mentioned a few things on your paper. Recommendations for public institutions in particular, right? And this is sort of... the city is when they're contracting with these data providers what they can do to provide additional protection.

Jesse: That's right. City, state, and federal government. We do this with pharmaceuticals. I mean, there's mechanisms from which we can have oversight and public oversight over a proprietary intellectual property. So, that feels dangerous in a way, but at the same time, we want to promote these technologies. Because if, let's say, taking the network for greening with financial system, which is a global order of central banks that are really pushing, I would argue, the most consequential global body of governance in the world relating to climate change, because they can steer the flow of capital. And they're going to steer it in a way that is ordered to the greening and browning of asset classes.

Jesse: So, you need technology to be able to help set those benchmarks of what is green and what is brown. I mean, you need the technology to be able to develop the measurement science advances to have transparency in the first place. Right? So, it's going to be tricky. It will inevitably be messy, and it'll be subsequent generations of these firms that will probably be the most productive or profitable. And I think, at its core, and this is where I end off in this Science paper, is that we really have to think about what is the public nature of this data? At what point in time do we continue to engage that data and have oversight over and ownership of it in the advancement of disclosure. So, I don't think it's so clear that everything has to be open and disclosed.

Jesse: And I tell this to people a lot, and they don't quite always understand it, but one of the things I want to do in life is to understand how people make money from climate change. Because once you understand that, then you can understand the value chain from which we could extract taxation and other mechanisms from which we stabilize and promote a more sustainable global order. Maybe that's too ambitious. So, it's not easy to say.

Hana: Not a small thing, by any means.

Jesse: It's not. But I mean, what else are we going to do? So, I want to see these firms grow. I want to see them grow in the right ways, but I think we need some measure of oversight to make sure that, in terms of quality assurance and



quality control, that we're not utilizing bad science in the advancement of poor financial stewardship.

Hana: Well, in fact, you actually talk about some of the specific problems that could come out of this, maladaptive decisions that a lack of understanding of the underlying data could result in from public entities, and provide a few specific ways that they could avoid that. And I don't know if you want to kind of just run through a little bit about what those are and your advice, basically, to the public entities about how to avoid these problems.

Jesse: At its origins, it's procurement, and it's a lack of sophistication associated with how to draft these contracts and how to have oversight over the intellectual property, but also the underlying proprietary processing behind the technology. And I don't think that cities or municipalities, local government, states, whoever it may be, they're not particularly well-informed about what this technology actually is, and therefore, they don't know how to set up contracting appropriately. But more specifically to your question, we rely on an awful lot of data to reduce uncertainties, to have a formal probabilistic risk from which we can make investments. And if we have some probability, best case scenario, then we can think about expected value. We can think about average annual reductions and losses. We can think about the extent to which we have a positive return on our investments.

Jesse: And if we have bad information, and we have negligent services behind that, we may be making investments that are really quite maladaptive. And the problem with this is, one off investments here and there, and they may be bad and that's just kind of the nature of things. But a lot of the particularly infrastructural scale investments have a lot of path dependencies, to the extent that you make an investment in something, you're now locked in for operations and maintenance and capex, opex, operating expenses, capital expenses, for sometimes generations. So, the degree to which you have reliance on these technologies in from the get-go is really critically important.

Hana: And that honestly goes both to the public sector, who are often involved in making decisions around large infrastructure projects, but also the increasing interest from the private investors around where they want to put their money that are relying on these same ideas and technology firms and underlying data. Let's turn to the recent suite of papers that you edited for the San Francisco Federal Reserve. I think there were 18 papers in total in that study. It was quite a suite. And can you tell us a little bit about that project, how you got involved, and what you're hoping that will come of that?

Jesse: I can't speak on behalf of the Federal Reserve in this case, I can speak in terms of my individual capacity. This is a project, and its origins were I previously



worked for the Governor's Office in the State of California doing climate adaptation work and research. And in that, I had the opportunity to work with a lot of different stakeholders including the Federal Reserve Bank of San Francisco, which covers the entire Western region, Alaska, and Hawaii. I think we shared, particularly within the community development department, a certain ambition to think about the opportunity to engage community development, finance, institutions, to engage banks, to engage a variety of financial industry stakeholders, in the emergent discourse behind climate change.

Jesse: I think what we all had observed, there were a lot of banks that wanted to be engaged, there were a lot of stakeholders in the financial industry that want to be engaged, they just weren't quite sure how and under what circumstance. There's a lot of rhetoric and climate change, but there's also a fairly substantive, empirical, and analytical methodologies which are directly applicable to financial services. But they really just didn't have the subject matter expertise, and I think the launch of this body of work specific to climate adaptation... We also had a paper that came out this year on applications of the Community Reinvestment Act for banks to incentivize climate adaptation resilience investments. That body of work was really to promote literacy and use it as a means to a scope full spectrum from which the financial services and the financial industry writ large could be engaged. So, it was a really a first order initiative to define that scope and to bring a diverse set of voices in community development and mortgages and insurance and a full spectrum of activities into a common platform to begin that conversation.

Hana: There is quite a variety of topics covered and voices, as you mentioned. So, how did you decide what was going to be covered by the suite? I mean, it had quite an impact, I think, nationally. There's a lot of coverage of the existence of these papers and that the Federal Reserve is taking this on in some form. What went through deciding what type of topics you were going to try to cover in this round?

Jesse: So, I serve in the capacity at the SF Fed as a visiting scholar. We have a team of researchers that I work with very closely. Actually, throughout the term of several years I've been working with them, we've worked very closely throughout the federal reserve system with other researchers. We had an open solicitation for contributions. We also had our own networks during the Obama administration. I co-lead something called the US Climate Community Resilience Task Force or something. I forget.

Hana: Close enough.



Jesse: But I had a fairly robust network of people engaged in this world and panel... I'm sorry, US Climate Community Resilience Panel. So, we had a pretty robust network between all of us and across our constituent partners. And so, it was a little bit of these are the people that we know are taking leadership and then, of course, opening it up to have an open call for submissions and going from there. So, it was a great opportunity. For me, this was a real exercise in setting forth a kind of common literacy and a common set of language and concepts that we could all push forward that are consistent with the IPCC, the National Climate Assessment, et cetera, et cetera. So, internalizing this body of science and social science into this language in a very, I would argue, fairly insular world of community development and financial services. So, it's really about synthesizing the language as much as anything, but I think we've been successful in bridging these multiple stakeholders.

Hana: Do you know if the Fed has any sort of further plans for how to build from this group of work beyond just the very important work of sort of getting people to understand the topics involved, understand the language and the educational aspect of it? Is the Fed planning anything beyond that that you're aware of?

Jesse: It wouldn't be appropriate for me to say or speak on their behalf, but I think the one thing we can recognize is this is a critically important issue, and this is in my own lay judgment, this is a critically important issue that impacts the financial stability of the United State's full employment and a stable economy. So, I hope that we will see more work in the future.

Hana: It's interesting, actually, right after the set of papers came out, that the Dallas Fed addressed in one of their magazine, or whatever that they put out regularly, a couple of climate issues, and so it seems to be kind of percolating throughout and starting to build and be recognized as a part of the financial discussion in a different way than we've seen in the past.

Jesse: I think each of the regional banks have, at one point or time, published various pieces that were climate related, so this is the nature of economic research, community development research. And with all measures of integrity, I think they have followed the true phenomenon as a market phenomenon.

Hana: I want to end with a little bit of discussion of your most recent piece that you've been working on with, or that I think is about to be published, with another Harvard researcher AR Siders, about the variables that shape coastal adaptation decisions. Tell us a little bit about that work and what you try to tackle in this piece.

Jesse: Siders, who's now formerly of Harvard, now at the University of Delaware, so if people know me at all in the United States it's generally for my work and sort of



pioneering the study of climate change in real estate and the built environment. And so, I've been very interested in market pricing, the sort of discounting, buying between buyers and sellers, research on mortgages and how particular signals in mortgage markets, and trying to understand the implications for public finance, muni bonds, credit ratings. I mean, all the way down. This is the work that I've led, I think has been most important to me in past more than decade, I suppose.

Jesse: One of the things we wanted to look at in a place like North Carolina, which has a very well-developed coastal management regime, land use regime, environmental regulation with California and other states, one of the most sophisticated states, we wanted to look at various types of adaptations in terms of beach renourishment, coastal armoring, and managed retreat. We wanted to see what those relationships were in terms of, are we just protecting wealthy homeowners? Are we protecting a tax base? Are these activities well-aligned with the actual risks in observational terms? How do they relate to each other? So, how is armoring and increasing beach renourishment, are they coincidental? More fundamentally, are critical facilities being protected? And how all of this plays out in terms of public administration, and a broader capacity of resources, to execute and pay for these interventions that are done in the name of resilience and adaptation.

Jesse: And I think it's an important piece just came out in the Journal of Ocean and Coastal Management. I think it has wide implications in terms of land use and environmental law and coastal management, I think, in California... in North Carolina, rather. We found a number of different findings. One, just starting where I ended off, in terms of critical facilities, we found, really, a lack of coordination but a lack of correlation, I should say, with these interventions and critical facilities. So, you're talking hospitals, police stations, ambulance service stations, pumping stations... things that are fundamental to our critical infrastructure.

Hana: You might think that the entities, whether the state coastal management plan might address first or that cities themselves when they're trying to allocate dollars for funding for protection might be looking at this infrastructure first.

Jesse: That's right. You would think-

Hana: But maybe not?

Jesse: You would think even at a county level there would be some measure of prioritization, and certainly, if you look at the policy behind post-disaster reconstruction and public assistance associated with that, you would think that these... Those types of facilities usually are early stage beneficiaries in terms of



reconstruction. So, we're not finding any coordination or more formally, again, correlation there.

Jesse: We also found that it is wealthier jurisdictions, or geographies I should say, and that's wealth defined by median income and household evaluation of several socioeconomic variables, that are highly correlated with beach renourishment and shoreline armoring. And what we found is that shoreline armoring and beach renourishing were happening together, which is a very interesting finding. So, we see that they're not only making a kind of singular investment, they're really doubling down on the infrastructure it takes to do this. Now, we don't know if the shoreline armoring and the beach renourishment was increasing property values or if it was because the property values were there in the first place and that value was there to drive it. We don't know which way that's going. It could go both ways.

Jesse: We also found that those that were the beneficiaries or participated in buyouts were of a lower income, generally nonwhite households, and that, again, we don't know first who was offered and who accepted, but we know at least among those who are accepted, that it is skewing in a certain demographic. This could be bad or good. We don't know if these people were wanting this. We know that certainly in some communities have asked for buyouts and had wanted them. Some communities are sort of following along with a broader policy, and that may certainly have implications in terms of environmental justice. So, this really opens the door for future research. One thing we did really understand is the relationship between these multiple adaptation interventions and how they relate to each other. And I think one of the more interesting findings, at least from my point of view is that, and you're thinking about this in terms of household wealth and who's the true beneficiary of these interventions and strategies. Well, it turns out it's the counties with the greatest amount of population density that's driving this, right?

Jesse: So, again, it goes back to institutional capacity, and more rural counties are not benefiting from this. And I think this is pretty clear from my own experience and that of others. There's a lot of overhead, there's a lot of subject matter expertise that you need to make investments in the human infrastructure to even apply for some of these federal grants or state grants. I mean, it takes true expertise and investment and an administrative class to get this stuff done, and what we see in North Carolina is that these rural areas are not undertaking adaptation interventions that were available in higher density and higher populated geographies.

Hana: I think people have a common understanding of how the complexity of accessing these types of programs can impact an individual's decision, but I think they may not have the full appreciation of how that translates just as



much to the government level, whether it's a city or a state or a county making decisions about how they're going to allocate their resources and support the needs of their community. These are complex systems, regulatory structures, that require sophistication, as you've seen.

Jesse: And a particular, perverse phenomenon here in terms of land use is that it's the rural areas, or the less populated areas, where you see the most amount of growth, because this is the lower land prices and there's lower infrastructural overhead. You don't have to put in as much. You don't have the impact fees... Or actually, I don't even know North Carolina has impact fees, but whatever it may be by extension, it's just cheaper land. And that's where the growth is, and so those new residents, now, are going to be disproportionately bearing the burden to protect themselves going forward. This is going back to the necessity, as was recently advanced in Texas for instance, about consumer disclosure. Right?

Jesse: So, if I'm moving to a area, relatively rural area, but cheaper area of North Carolina on the coast, and again, this isn't just the barrier islands, this is well up various river systems, riverine systems and the like. It's a much broader geography than you realize. Yeah. This is just consumer disclosure 101. This is maybe where we come full circle for task force for climate related financial disclosure. At the end of the day, disclosure among consumers is just as critical as it is disclosure among mortgage providers and capital market participants.

Hana: Absolutely. I don't know to what extent you were able to assess sort of the impact of the particular laws at play, because I know that North Carolina actually does have some limits on hardening, at least for private property. And my understanding is that they're generally not... don't allow seawalls on private property, but there's other ways to get around that with sandbagging that create dunes and other things that have sort of essentially created hardening structures without seawalls. How does your research fit into the larger discussion of, at least what you found in this particular piece, fit into this larger discussion of legal systems around coastal management planning, what we have to look at to adjust private property rights versus public rights? This may be taking us too far field and outside the scope of what you did, but I'm wondering if you have some thoughts on that.

Jesse: No, I think it's really interesting. I do and I don't. I think what it raises is, first of all, and I think your intuition and maybe your own experience here is absolutely correct in the sense that there's all kinds of workarounds, right? So, people game the system. But it's not just individual property owners, it's also jurisdictions themselves that have varying degrees of constraint from state and federal authorities. I mean, a lot of people always ask me like the Netherlands or Japan or somewhere, how do they get all these hazard mitigation and climate



adaptation infrastructure investments? I say, what they don't realize is they waived a lot of environmental regulations to do that stuff, and there was trade offs along the way. And they made decisions about what those trade offs are. Now, as we approach the 50th anniversary of NEPA, it raised a really interesting question like, "Okay, well what's NEPA reform going to look like in the face of some pretty draconian interventions that are probably necessary in places like New York City or Jacksonville?" Or wherever it may be, right?

Jesse: So, anyway, it really, I think, raises really interesting set of questions around the counties and the local government jurisdictions themselves and the extent to which they feel political pressure to do one thing, but they have certain constraints and delegated authorities to go in the other direction and they're caught in the middle. And so, is it overlooking enforcement? It's the soft side of things that I think is quite telling. But it's also the legacy infrastructure itself, too, right? So, there's all kinds of infrastructure out there that may not be permissible under today's regulatory regime, but you can't just... you could, but it's politically or economically or even ecologically undesirable to deconstruct and advance, let's say, a biological conservation agenda or whatever that may be. So, how do you deal with that? You raise some really great points about not just the division between public and private, or I should say about private property rights, but really the diversity of actors and the trade offs and tensions that they're caught between.

Hana: This is actually an area that we are hoping to build up some body of work on, and I'm unleashing our army of RAs to start investigating the areas that they're interested in. But this dichotomy between the need to plan and the need to sort of think more holistically about how to approach these issues, but then the limitations both of the regulatory structure, private property rights, and constitutional takings issues, and all of the rest of the suite of issues that come into this. So, Jesse, I want to thank you. If you have any final words about climate adaptation or-

Jesse: I do, actually.

Hana: ... or other areas that people should look into to add to this work that you're doing?

Jesse: So, my field is climate adaptation, or adaptation science, and it's an interdisciplinary field of study. And it makes me think, as you all advance your research mission and your external engagement and you're really having influence on the world, it makes me think about we're, what, 20, 25 years now into law review articles on adaptive management and adaptive environmental management and the limitations of stationarity as a set of principles in



environmental law? And so, what adaptation science represents is an orientation around the dynamic nature of human environment interactions.

Jesse: And I wonder what it's going to substantively take, whether it's in constitutional terms or otherwise, to really challenge those principles of stationarity. And even in the context of stability seeking or toxic remediation or whatever, I mean, even in the core areas, what's it going to take to internalize a different regime that is aligned and supported by consensus based science, but has a slightly different orientation as to the speed and change and the fundamental notion of stability in ecological terms? I think that people have talked about this for a long time, and maybe it's litigation, maybe it's a different mechanisms that will drive the advancement of law here, not necessarily in legislative terms. But I think that fundamental tension is one in law that will define the practice, I would argue, of environmental law going forward.

Hana: Well, thank you very much. Those are great words to end on. Thank you for joining us today.

Jesse: Thank you for having me.

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