

Getting Curious with Jonathan Van Ness & Heather Randell

JVN [00:00:00] Welcome to Getting Curious. I'm Jonathan Van Ness and every week I sit down for a gorgeous conversation with a brilliant expert to learn all about something that makes me curious. On today's episode, I'm joined by Heather Randell, where I ask her: Are dams cute or not so cute? Welcome to Getting Curious, this is Jonathan Van Ness. I'm so excited for this episode, honey, because I got questions. Welcome to the show, Heather Randall, who is a sociologist and demographer at Penn State University. And she specializes in dam-induced displacement. Welcome, Heather.

HEATHER RANDELL [00:00:38] Thank you. I am so excited to be here and to talk dams today.

JVN [00:00:43] Me, too. And, you know, here's the thing. I am, like, I, I love myself, obviously, but I also realize that, like, I'm a little basic sometimes. And I was raised in the 90s. And when you were raised in the 90s, in America, what I'm realizing in my 30s is, is that most things that we thought were, like, really cool and fun when we were growing up are deeply problematic. So Olympics, you name it, my dreams keep getting crushed. So here I was on this road trip on my twenty-first birthday, I was driving to Las Vegas, drove by the Hoover Dam, the night before had been intense and I was just trying to make it to Vegas in one piece, which we loved. But I saw the Hoover Dam and it was like, "What is that?" So ever since I've been curious about dams, which leads me to my first question. What is a dam?

HEATHER RANDELL [00:01:28] What is a dam? So a dam, it's really simple, essentially a structure that blocks a river or a stream to keep water above it. And we call that area above the dam, the reservoir. So when we think about, "Oh, there's a reservoir here, there's a reservoir there," it's a reservoir because there's a dam.

JVN [00:01:48] First of all, yes, reservoir. You who knew. Obviously, you did because you're a literal scientist, but like, yes, it's that reservoir is up there. And then I would imagine the dams are really difficult because, like, water erodes stuff. It's also, you know, real powerful, real strong, that water. So it's, like, why are they built? Why do we want a reservoir? Why do we want to dam up the water?

HEATHER RANDELL [00:02:12] Yeah. So there's a handful of reasons why most dams are built. One of the most relevant ones, especially for new dams being built today, is for hydropower. So generating electricity.

JVN [00:02:26] Holy shit! Wait, I have a follow-up question about that. I thought, I really honestly didn't see it coming. I guess somewhere I knew that there was hydropower. How much does that really make, though? Is it enough to run the whole city, do you think? Or is that just like another question for another podcast?

HEATHER RANDELL [00:02:38] It could. It depends on kind of how big the dam is and how many dams and things like that. So the US is-, gets about seven percent of our electricity from hydropower.

JVN [00:02:52] That's a lot.

HEATHER RANDELL [00:02:54] It's a lot. It's you know, it's a lot it's not a lot compared to some other places like Brazil, which is where I study dams, gets about three quarters or more of its electricity from hydropower. So it can actually power a lot.

JVN [00:03:09] That's major. What are the other reasons?

HEATHER RANDELL [00:03:12] OK, so flood control, so dams are kind of like living creatures. So in, you know, wet season, the river will be higher and flow more. The dry season it'll be smaller and flow less. And then you can have extreme rainfall events and have floods. So floods have taken major tolls on, on people in various times in history and there have been some catastrophic floods. So another reason to build dams is to prevent these catastrophic floods for communities living downstream. So that's another reason.

JVN [00:03:48] Are there other reasons?

HEATHER RANDELL [00:04:51] There are, a few more. So for water supply. So drinking water, for example. So if you think about the desert southwest, like Las Vegas, like Phoenix, dams like the Hoover Dam and the Glen Canyon Dam have actually enabled the growth of those cities by providing water for both drinking as well as for agriculture, so for irrigating farmland. And so that's, those are some big reasons why we want to contain a whole bunch of water in a reservoir. There's also a whole lot of small dams and some of those are used for recreation. So like, "Oh, cool, now we have a lake to go boating and go fishing and this and that." And then lastly, which is less common but still exists and still can have major implications for people and the environment is dams can be built to hold waste, like, for example, mine waste. So it's essentially, like, holding back a whole bunch of toxic sludge from a mine. So that's another reason.

JVN [00:04:56] And but that, that happens, like, it's rare. But those things, they do happen.

HEATHER RANDELL [00:05:00] They do happen. And actually, in Brazil in the past five or so years, there have been two, two of those mine waste dams have broken and had catastrophic implications because all this sludge essentially went down the river in a toxic kind of wall of mud, essentially.

JVN [00:05:19] I think that happened in the Colorado River or something recently. We're like a big portion, like the Colorado River turned this, like, crazy color. And it was, like, it had, like, some, like, element in it. I have another little teeny tiny follow up question for flood control dams. Are levees a type of dam?

HEATHER RANDELL [00:05:35] Levees are not technically a dam. So, if I am correct, a levee is kind of building up the banks of a river. Yeah. So that wouldn't be the same as a dam because it's not, it's not stopping the flow of the river. It's just kind of building up the river bank. So when the river rises. Yeah.

JVN [00:05:54] Got it, got it, got it, got it. Okay, I'm obsessed. So how are they built? Like blow up like a rock face or something.

HEATHER RANDELL [00:06:00] Essentially for smaller dams, which the vast majority of dams in the world are on the smaller side, you're either building it generally from Earth, so from soil and, you know, whatever is in the ground or from rocks or from a combination. And I think you would kind of divert the stream or river so that you have a dry area and then you kind of just start piling things up. The bigger dams would be kind of a bit more complicated. So if you have a really wide river, you might, like, block off part of it so you can build it, and then block off another part. And so you're just kind of doing all that fancy engineering.

JVN [00:06:42] Do we know, like, when dams first started?

HEATHER RANDELL [00:06:45] So people have been damming rivers to, to have a water supply for thousands of years. And these were, you know, these were hand-made dams, made of Earth, the era of mega dams, like, when you're talking about the Hoover Dam or the one of the biggest dams in the world, the Three Gorges Dam in China, for example, that didn't start until the early nineteen hundreds. So kind of the era of big dams is relatively recent.

JVN [00:07:17] So some of the intended benefits are water supply, flood control, hydropower or, like, recreational. If we were doing a pros and cons list, like on dating dams, those are the pros. What are the cons? Like, what's not amazing about them?

HEATHER RANDELL [00:07:39] Yeah, so there's a whole bunch of cons. So dams, not surprisingly, change the ecology of the river and that has, those ecological changes have important implications for both the natural world as well as for humans. So firstly, they affect fish populations and populations of other aquatic animals and plants. One way they do that is by blocking fish migration. So, you know, most fish can't go over a dam. Some dams have fish ladders that are supposed to kind of help fish get up river. I don't know how well they work. And that's been a big issue, particularly for some dams in the western US, where Native, Native communities have throughout history been relying on salmon and salmon need to go up river to breed. And so dams have taken a toll on salmon populations and affected that fishery and livelihoods.

Dams, like I mentioned, there's often seasonal changes in the flow of the river. And so dams kind of take away all of that seasonality. And in, in a lot of the world, people the the area the land right next to rivers is really fertile and rich because of seasonal flooding, kind of brings nutrients to the soil. So it's really important for agriculture. So essentially, the dam is stopping that, that pattern of bringing nutrients into the soil and it affects floodplain agriculture. Dams change water quality. So if you're kind of slowing down the river, the temperature of the water changes, the oxygen level changes, the chemicals in the chemical composition changes, and that affects all the life that lives in the river in addition to the reservoir. So it's kind of like a lake. And so different species are going to thrive in a lake versus a fast flowing river.

And so invasive species, like certain types of algae or fish, can kind of negatively affect the rivers, native fish and other aquatic species. So those are kind of the ecological effects and those have important implications for people. So like I mentioned, you know, many people throughout the world, their livelihoods depend on, on the river for, for fishing, for agriculture, for drinking, for all of these things. And so that's affected many Indigenous peoples, whether in the US or throughout the world, have important historical and cultural connections to a river or a waterfall or particular places, kind of sacred places or places that have important cultural meaning or meaning for their livelihoods. And when that place is now under a big reservoir, it can have implications for cultural traditions as well as wellbeing.

JVN [00:10:51] So let's just frame that up for a little bit, because I think this is one area of, like, dams writ large that I really never understood. So it sounds like there's a lot of dams in Brazil. Sounds like there's a lot in the US. I know there's like some in the Mississippi because there's some where I'm from, plus some in, like, the western US. Where else are there a lot of dams?

HEATHER RANDELL [00:11:12] There's, there's a lot of dams like everywhere that there are rivers essentially. So, you know, all over the world, you know, everywhere that you can

dam a river. Not everywhere, but many places, there are dams. So, for example, China has about ninety eight thousand dams. The US, we have over ninety thousand dams that are at least six feet tall. A lot of those are on the smaller side, but there's about forty six hundred large dams. So when we think about dams that are flooding a big area, dams that are tall, made of concrete, almost 5000 of them in the US. So there's lots and lots and lots of dams ranging from just a few feet to three hundred feet tall.

JVN [00:11:57] So when you have traditions that are passed down like this for such a long time and then whether it's from like a colonizing force or like a governmental force, even if it's like from within your own government or from somewhere else, this is like really huge cultural, like, generational trauma, differences, invasion, like, it just I just wouldn't have ever thought that dams would have created so much, like, hurt and pain for different communities that were like living there for such a long time, like that they would be such a life interrupter.

HEATHER RANDELL [00:12:30] Aside from the fact of people whose ancestors have lived for thousands of years in a place, even if you grow up in a place, you have to think about memories you have from where you lived when you were a kid. People have really important attachment to, to land and place and space and home. And so, relatedly, you know, one of, one of the main things I study related to dams is displacement. And so that is literally when people are in the way of a dam and they are removed from their homes. So there is the loss, not necessarily the displacement of people, but the loss of, of places that have important cultural, personal meaning to peoples, to communities. And then there is the actual displacement of people themselves.

JVN [00:13:25] So because a lot of dams were built in the early nineteen hundreds or, like, throughout the nineteen hundreds, we obviously didn't have the same understanding of climate change when a lot of these dams were first constructed. And so that makes me think of: how does climate change interact with some of these mega dams? And, like, and, like, what about, like, a dam failure?

HEATHER RANDELL [00:13:49] Yeah, so in two, two kind of broadly important ways, so firstly, you know, dams, especially more recent dams and dams that are built for hydropower, are kind of framed as, "This is an important source of renewable energy. Climate change is, is a big issue and we need more energy. And so if we dam rivers, we can generate energy without relying on fossil fuels." So it's kind of framed as a way to get more energy in a renewable or more sustainable way. But in fact, dams actually can contribute to climate change in a few different ways. So, first of all, you know, oftentimes if you're going to build a new dam, you have to cut down lots of trees to get to the area, to build roads, to do this and that. And we know that deforestation, you're removing-, trees contain carbon and they

are a sink for carbon dioxide. And so when you're cutting down trees, you have fewer of them to kind of take in the CO₂.

Also, reservoirs actually can release carbon dioxide and methane, which is a much stronger greenhouse gas. So, like, when you, when you dam up a river, any sort of decaying, like, plant matter or biological matter in the water as it decays, releases gases like CO₂ or methane. So that's contributing greenhouse gases into the atmosphere. And actually, about 10 percent of the world's hydropower dams have greenhouse gas emissions per unit of energy they generate. That's as high as fossil fuel power plants. And some of them are even higher. So not all dams, but in certain environments, dams can actually release a lot of greenhouse gases. So that's one end of the spectrum. So dams themselves, despite being framed as a wonderful renewable source of energy, not dependent on fossil fuels, can actually contribute to climate change.

On the other end of the spectrum is: "OK, how does climate change affect dams? And what is, what does that mean for people and for the ecosystem?" So for the purposes of hydropower generation and for water storage and for drinking water irrigation, you need water in the reservoir to go through the turbines or to just be there to, like, go provide water to cities. And so we know with climate change that we're having more severe droughts in certain parts of the country, in certain parts of the world.

And so if you have less water in those reservoirs, that affects the ability for the dams to do what they were built to do. So, for example, you mentioned the Hoover Dam. So the Hoover Dam created Lake Mead, which supplies water to Arizona, Nevada, California, and northern Mexico. So that's drinking water. It provides irrigation water for about a million acres of farmland and it provides hydropower. That power is about half a million homes. OK, so that's really helped enable the growth of those areas and the economies of those areas. And so the last time that Lake Mead was full was in 1983. That's the year I was born. I'm thirty eight, like, that was a long time ago. So that was the last time the was actually full. And so we're currently the whole southwestern US is currently in a mega drought. So it's been about 20 years of a drought. And so that's massively diminished the the water levels in, in Lake Mead, also in Lake Powell. So that's in, on the Colorado River as well. And in August 2021, the US government declared a water shortage on the Colorado River.

And so that declaration is instituted, cuts to water usage and kind of the first group affected by those cuts are going to be farmers in Arizona that, that rely on the water from Lake Mead to irrigate their crops. And then kind of more cuts are coming. And if Lake Mead is—currently, as of today, the water level is at one thousand and sixty eight feet—if it drops below one thousand fifty feet. It won't generate energy anymore, like, there is not enough water to go through those turbines. So this is one clear implication of climate change. So

we're seeing, you know, and we know that particularly the Southwest as well as other areas in the world, are going to be experiencing more severe droughts. And so if there's not water in the reservoirs, you can't do as much to fulfill their purpose.

JVN [00:18:43] In your research has-, is there any other mega dam that has such a precarious point? And it's functioning as Hoover Dam and like Lake Mead, like, is there anywhere else it's in that neighborhood?

HEATHER RANDELL [00:18:56] I think Lake Powell is also in pretty, I mean, they're in the same general vicinity, but-

JVN [00:19:03] But it's two different dams that control them?

HEATHER RANDELL [00:19:05] Yeah, yeah. So the Glen Canyon Dam is what fills, or is in front of, or behind Lake Powell and Hoover Dam, Lake Mead. And so they're both in the desert southwest. So they're in very low levels.

JVN [00:19:22] Are we seeing this in, like, China, like, Brazil, anywhere else?

HEATHER RANDELL [00:19:28] Yes. Brazil also, currently, right now, is in a major drought, and a number of their reservoirs have also fallen to their lowest levels in all the 91 years of record keeping that Brazil has been monitoring these reservoirs. And so the federal government is actually asking Brazilians to cut their energy usage and it's raising energy prices. So, you know, if you think about the cost of electricity going up, who's most impacted by that? Poorer people that the, that a greater proportion of their income, they're spending on basic needs like food and electricity and things like that. So, so Brazil as well is in a major drought that's affecting their ability to generate hydropower. And like I mentioned, Brazil gets the vast majority of their electricity from hydropower. So that's a big deal for them. Despite that, Brazil has, like, nine new hydropower dams that it's planning to construct this decade, in the 2020s. So, again, there's this idea of, you know, we know that climate change is affecting precipitation patterns, but we're kind of charging on with, with building, quote unquote, "renewable energy" as if it's still going to be functioning the way it used to.

JVN [00:20:50] I was just going to ask, I'm sure that there is a lot of people who have made a lot of money from building dams and there's probably, like, generational wealth in those means of building dams and, like, a whole industry that is wanting to build them because that's their livelihoods and everything. What's the story with them trying to be more green or environmentally responsible, or is there, like, a push within the dam industry to try to make them more, like, desirable or, like, deal with these issues?

HEATHER RANDELL [00:21:17] I don't know the answer to that. And, you know, I, I don't know that there is a good answer. I don't know that, you know, building a mega dam is ever "green." But I know that there's-, in the US, we have a whole bunch of kind of smaller dams that were built, like, during that era of mills, like you think of New England in those old industries from the eighteen, early nineteen hundreds. And so we have a whole bunch of dams that are sitting there not being used. And there is a push among some to to kind of start using them to generate smaller amounts of hydropower. And I don't know enough about that kind of discussion to know what people feel about it. But yeah, I don't, I don't know that there is a way to build a gigantic dam in a way that doesn't have these effects.

JVN [00:22:11] So would Vegas and, like, Henderson, could they have ever grown to what they are now in absence of those dams?

HEATHER RANDELL [00:22:20] My guess is not I mean, you know, water is such a basic need and, you know, it's a desert. So, you know, having that water supply certainly helped the cities grow, and they're continuing to grow. You know, I was in Vegas earlier this summer because my father-in-law lives there. And you just see kind of new housing development after new housing development. But they're going to be affected by these water restrictions as well. So it's, I don't know what's going to happen with that.

JVN [00:22:49] You know, I was reading this thing about California water rights and how, like, their water rights were, like, made in the eighteen hundreds in nineteen hundreds and how essentially it's, like, a first come, first serve things like the farmers that were there first like they have like these farms are, like, fifth and sixth generation. They won't really be affected, but all the people that were there later will be, and in a lot of times that's people that are like low income, like more marginalized groups anyway. And so it does seem like these water shortages are going to have very, like, political, like, social, political, financial issues. And so it's, like, that is so scary. So what do people in Vegas do? I mean, do you see a world where this, like, becomes, like, untenable and, like, there just isn't water there? And they eventually do become displaced and have to find a different place to live?

HEATHER RANDELL [00:23:38] I don't know. That's a good question. And I think we're still a ways out from that. But I mean, I think about that all the time in terms of what we know, what is already happening with climate change between droughts and floods and fires and things like that. And, you know, it's affecting different know, just focusing on the US, it's affecting different parts of the country differently. And so, I mean, it's a good question. I don't know, you know, I don't know, like, humans are pretty resilient. Humans are pretty good at figuring out ways to adapt. But, you know, there's gonna be people who, who certainly lose out. And, you know, like you mentioned, the effects are never felt equally. So it's

going to be, you know, in many cases, you know, lower income or people from marginalized populations that are most adversely affected first.

JVN [00:24:27] It seems like there is the people who are displaced by the building of the dam itself in the first place. Has there ever been like a postapocalyptic, like, Vegas of sorts, like somewhere in the world where, like, the dam just dried up and they had to leave anyway, and then they displaced, like, two gigantic sets of people?

HEATHER RANDELL [00:24:45] I haven't heard of that happening yet, luckily, yeah, so but, you know, it could be in the cards for decades in the future. I don't know, it's a good question, but the people who are displaced by dams are literally anyone who is living where the reservoir is going to be, where that transmission line is going to be, where anything related to the infrastructure of the dam or where it's flooding is going to be. And, you know, around the world in the 20th century, it's estimated that between 40 to 80 million people have been displaced by dams. So it's affected a lot of people.

JVN [00:25:27] What?! 40 to 80 million people, I didn't see it coming.

HEATHER RANDELL [00:25:33] In the 20th century. Yeah. So just kind of the, the big, the biggest dam in terms of displacement, and the biggest dam in terms of hydropower generation is the Three Gorges Dam in China. So that dam displaced one point two million people, just that one dam.

JVN [00:25:50] How?

HEATHER RANDELL [00:25:52] By flooding a whole bunch of area. Yeah. So, I mean, that's kind of, you know, orders of magnitude bigger than what a lot of other dams do in terms of displacement. But it adds up when you have so many dams, you know, you're affecting a lot of people. And so, you know, it's anyone who's living in those areas. And oftentimes it's rural populations. It's people with less political power, people from more marginalized groups that are forced to leave because the dam is going to flood their home, their farmland, their livelihood, their historical, the place where their families may have lived for generations.

JVN [00:26:35] Where do people go when they've been displaced?

HEATHER RANDELL [00:26:37] So it ranges based on kind of the, you know, the whoever's building the dam, like, what are they going to do? And I think, you know, it's changed historically in terms of what dam builders do and what they have to do. And so, so in the more recent era where you can't just not do it, you can't just displace people and not do

anything for them. Like, that's not cool. You can either build new homes for people, like, you build, you know, build a new village, resettle people in a city, provide new homes for them. So that's one option. And or you can give them money so you can pay them for their losses or losses of their home and their land and et cetera, and enable them to go buy a new house or land somewhere else. So those are the main, the main ways that people are relocated.

JVN [00:27:40] And then, I mean, and obviously, what are the effects, and what are the effects of displaced people's health and well-being from being displaced? I mean, I would imagine it takes generations to recover from this. Or it can.

HEATHER RANDELL [00:27:56] Yeah. So in most studies of damage due to space that you might as you might expect, things are generally negative. So people, you know, people lose their land, they lose their livelihoods, they lose their social connections. You think about your close friends or family or neighbors, and especially if you're living in a rural area somewhere that you rely on day-to-day, losing their housing, all of these things, losing the schools that they, their kids went to. So, so there's a lot of kind of an array of potential negative impacts on people who are displaced by falling into poverty, losing jobs, losing homes, losing health care, losing those really important social ties, things like that.

It doesn't always have to be like that. So there are cases where, where, you know, people have done OK. And actually the data that I studied in Brazil, I kind of went into it thinking that it would be bad for the rural farmers that I that I worked with. And a lot of them actually in a year or two after being displaced were, were doing pretty OK. And it really surprised me. And and I think partly that had to do with the fact that because Brazil built so many dams, and because they have historically been very bad for the people that have been affected. Brazil, you know, kind of the dam-building company was kind of forced to invest a lot of money in their, in their displacement and resettlement program. So, so the the money that people were paid to move ended up being enough for a lot of people to, like, buy an OK farm, you know, in another area and maybe even buy a form of transportation or things like that. So it doesn't necessarily have to lead to all these terrible negative outcomes, but in many cases it does.

JVN [00:30:17] So earlier you were mentioning that there are certain dams in certain climates that can actually make equal emissions of greenhouse gases as, like, their fossil fuel counterparts. Do you have any statistics or info on, like, what that percentage is, like, of the functioning dams in the US or Brazil, like, like, 80 of them are less greenhouse emission creating, but 20 of them are actually the same? Or is it worse, or do you know that?

HEATHER RANDELL [00:30:42] Yeah. So there's a paper on it that would probably have all that information. I just remember from the paper that it's about 10 percent of dams, hydropower dams in the world, you know, are kind of releasing as much greenhouse gases.

JVN [00:30:59] And ninety percent are doing less?

HEATHER RANDELL [00:31:01] Yeah, so, so that's good news. But it really varies also in terms of, kind of what kind of environment the dam is in. So, like, in more, like, tropical lowland areas, that's more likely to generate higher amounts of greenhouse gases, for example.

JVN [00:31:19] So but in your opinion as, you're a literal scientist, is like there's probably not a way to do them safely, but then there's this big economy of dam builders who are, like, "We can still sell a story that makes it seem like it's greener and better."

HEATHER RANDELL [00:31:36] Totally. And, and that's how it's framed generally. And I think a lot of people buy that framing because, you know, if you have to say, "Well, should we do hydropower, or should we do fossil fuels?" You know, it's hard to argue for fossil fuels, but of course, those are not our only two choices. We can do much better.

JVN [00:31:58] Yeah, that's what I was thinking. So for you, is it like what about wind or, like, or solar?

HEATHER RANDELL [00:32:02] Yeah, I mean, that's the answer. And there's no perfect way to generate energy. Yeah, there's no, there's no form of energy generation that has no negative ecological impacts, like solar, you know, you need to mine the things that go in the solar panel and and wind can-

JVN [00:32:19] But it's, like, what's the least harmful, because it's all about a harm reduction model.

HEATHER RANDELL [00:32:23] Right. So, like, I think it's hard to argue that, that hydropower is better than wind or solar or tidal power, things like that. So there's certainly alternatives.

JVN [00:32:34] Because you're just affecting less resources, less people, less plants. And it's just like a less butterfly effect on, like, the resources than, like, damming an entire moving body of, like, literal huge, gigantic water that has so many forces of like. Sediment and erosion and, like, gravity and, like, all these other things, I probably don't even know about how they interact with, like, moving bodies of water.

HEATHER RANDELL [00:32:54] Exactly. I mean, it's like a river is such a, such a complex ecosystem and you're just literally, like, stopping it in its tracks.

JVN [00:33:05] Isn't providing water as a resource for the people around the dam, couldn't that have, like, downstream potential, like, limiting water access for other people that would have had access to water, but now they don't because you dammed up something?

HEATHER RANDELL [00:33:17] Oh, yeah, that's a big issue. And for example, there is a dam that's maybe it's almost done, in Ethiopia called the Grand Ethiopian Renaissance Dam. And so it's damming the Blue Nile River, which runs and connects with the White Nile, informs the Nile. And so it runs from Ethiopia to Sudan to Egypt. And it has been a major kind of cross country conflict over the potential loss of water for the downstream countries, Sudan and Egypt, when Ethiopia dams up that river and keeps a massive amount of the water behind that dam. And so it's, it's a big issue. So the, you know, the provision of water to whoever is building that dam, in this case, Ethiopia, is leading to the loss of water for whoever lives downstream. And in this case, it's two other countries that also need that water.

JVN [00:34:17] So what's going to happen?

HEATHER RANDELL [00:34:19] I think it's just it's going forward. I yeah, I haven't paid super close attention lately, but it's been a years long battle. But I think it's I mean, it's like almost done if not done.

JVN [00:34:29] How do you protect people from flooding and limited water access? Is it just, like, not building dams anymore?

HEATHER RANDELL [00:34:35] I mean, I think most dams that are built now are for hydropower. So they're not generally being built for flood control or water supply as much. So the question is less about I mean, yeah, it's less about that. Like we're not, you know, "Oh, there's more flooding because of climate change. Let's build a dam." That's not, I don't think, happening as much. It's more like, you know, "OK, climate change is happening and there's this boom in dam building because so many countries are developing economically and see it as a way to generate more energy renewably." Well, you know, there's got to be a better way to do that because, you know, there's so many of these implications that we've been talking about for both the ecosystem and for humans, you know, related to dam building.

JVN [00:35:28] And how are we going to protect people from dam-induced displacement? Is there anyone leading efforts to help those people?

HEATHER RANDELL [00:35:35] Yeah, so there's, I'm, I mostly know the Brazilian context because Brazil is where I study, but also Brazil has done, I mean, they've been building dams for a long time and lots of people have been displaced. And so there's you know, for decades there's been kind of an anti-dam movement, social movement organizations in Brazil. So one of them is called the Movimento dos Atingidos por Barragens, so, like, it's called MAB, and it's grown into a national org is an organization that helps people affected by dams and they have partnerships internationally. There is, there is, there's not much dam building in the US anymore. So essentially almost all of the dam building is happening elsewhere in the world, primarily in low- and middle-income countries. But there's organizations like International Rivers, an NGO that, that works, you know, much beyond dam building, but related to rivers and protecting people who depend on rivers for their lives and livelihoods.

JVN [00:36:43] Well, if there's anyone listening to this episode that's really into that, we'll make sure to include the link to that Brazilian organization that you're just talking about and International Rivers that people want to do more research on it. I have one more question about back to I think was Lake Mead. So you said it was like at a thousand sixty eight and if it gets to a thousand fifty, it won't be at a place to generate like water anymore. I wonder what, like, the level of water loss, like, is that projected. Like, if it keeps going like it's. But is that like in six months or does it take like three years to lose a foot of water?

HEATHER RANDELL [00:37:17] That's a good question. Yeah. I don't know. It's a good question, but I know that kind of the lower it gets. So if you think of a canyon like this, the lower it gets, the quicker it goes down because it's like a V, almost like a right, a wineglass or something or a champagne flute. Right. So yeah. So the lower it gets the quicker it gets continuously lower.

JVN [00:37:34] That's fascinating. And then I one talk about you a little bit. So what drew you to this field and what's your career journey? Like, is this, do you see studying this forever? Like, what drew you to this? What's next for you? Tell me everything.

HEATHER RANDELL [00:37:49] Yeah. So, so I discovered dams my senior year of college. I took this class. It was like this small class where we worked with the professor to write a paper to like an academic paper to publish, like, everyone in the class. And the topic which he picked each year was on kind of ecological change and human diseases. And so I got assigned a disease that I was going to, you know, contribute to the paper. And it was schistosomiasis, which probably you haven't heard of. Maybe you have. Yeah. So it's actually, it's

a parasitic disease that affects low and mostly tropical countries. The biggest effects are in sub-Saharan Africa. And it's this, like, fluke worm parasite thing that completes part of its life cycle in a snail that lives in the water. So an aquatic snail. And then it goes out of the snail and swims around the water. Then when people go in the water, it burrows in your skin. And that's how it gets into people. And it is, it mostly doesn't kill people, but it can lead to, to morbidity, illness. And it's a major source of illness in places where schistosomiasis is endemic.

And so I found in researching this tropical disease that when you build a dam, it can actually lead to much higher levels of schistosomiasis in the people living around the dam because it changes the water flow, it changes the ecosystem. So, like, the snails can proliferate more. And they're like these prawns that feed on them can't live in the area where the snails are. That's, you know, one example. And so I was like, "Whoa, that's crazy. Dams can have major health effects for the people living around them." Then I, like, tabled that idea for a few years, and went and got a masters. And then when I was starting my PhD in sociology, I decided that I wanted to kind of come back to, to dams and the social and health effects of dams. And my advisor was like, "Oh, well, they're building this giant dam, like, right where I've done research for fifteen years in Brazil. So, like, why don't you go check that out." And that kind of started my journey of studying the Belo Monte Dam, which is was built in in the Brazilian Amazon.

And so so I. A few years studying the displacement of rural farmers, so I interviewed and surveyed them before they were displaced. And then I tracked them and found them after they were displaced or most of them, and reinterviewed and surveyed them to see how they're doing and where they moved and how they made decisions on where to move and all of those things. So that's what I did for my PhD. And then I pivoted more to climate change work for, and I've mostly been focusing on looking at the health and social impacts of climate change in, in mostly in East Africa and other countries in the tropics. But I have some new work on dams. I'm kind of coming full circle back to dams. So I am planning a new project that hopefully will, will get funded. So the Belo Monte Dam, which I study, it's the fourth largest dam in the world, a hydropower dam in the world, I should say, in the amount of energy that it has the capacity to generate, not that it does generate, which is an important side note, because, you know, you, you justify the cost of this tens of billions of dollars down by saying, "It's going to generate so much energy for Brazil, it's going to power so many households and so much industry." And then it turns out that usually it doesn't actually generate that much energy, because if the water flow, if there's not enough water flow, it can't generate the full amount of energy. And so that's, that's a side note. But Belo Monte displaced, it's estimated 20 to 40 thousand people there. And so quite a few and most of them were actually in a city upstream called Altamira. And so I'm

hoping to interview women, moms who were displaced in the city to kind of see how it affected them and their kids and, and their kind of health and well-being.

JVN [00:42:26] Has there been a lot of, like, do you see, like, modern displacement of Indigenous peoples in Brazil from these dams, too?

HEATHER RANDELL [00:42:35] Yeah, so, so it is an issue. And there is a lot of protest in Brazil by Indigenous groups and for Indigenous groups related to dam-induced displacement. So the Belo Monte development, the dam was originally proposed in nineteen seventy five. They were like, "This is an awesome part of the river for a dam." It's like, like, literally a dam engineer said, "God made this part of the river for a dam. It's, like, perfect." And so this was originally a set of multiple dams that would flood thousands of acres of including Indigenous land. And there was so much protest over it that it kind of got tabled for multiple decades. And there was a lot of press and a lot of Indigenous groups protested. And so then they kind of redesigned the dam. Now it's only kind of one dam complex. But still, there was major protest and a lot of it centered around indigenous people. So it wasn't, it no longer has displaced any Indigenous people, but it has affected both directly and indirectly the livelihoods and wellbeing of Indigenous groups.

So there's and so the river is shaped kind of, like, this, like, a bend in the river. It's like a big "U." So say it flows like from one end of the year to the other. And so they dammed, it's a kind of two dam. So they dammed here one part of the "U" to divert water into, like, a newly created reservoir to power the major dam that's generating most of the energy. So there's a whole swath of the, the bottom of the "U" kind of in between those two dams that is getting less water. And so there's actually two Indigenous groups that live near that bottom of the "U" and the water levels. In order to generate enough electricity, they've had to cut off so much water from the bottom of "U" that, like, fish have been dying en masse. It's hard if you navigate the river on a boat to get places. It's hard to get around. So there's like so many other ways in addition to displacement, that's when Indigenous people are affected by a dam building in Brazil. And that's just one example.

JVN [00:44:49] And I would also imagine that, like, who's to say that, like, there are people from those groups that don't leave and don't become displaced and they may be just like, don't ever talk to a scientist about it until, like, really their story. Even so, that's fascinating. Your work is fascinating. And then if someone is also obsessed with this and, like, your scholarship, what would you tell them to, like, major in, in college?

HEATHER RANDELL [00:45:14] I think, you know, there could never be enough people majoring in environmental studies. I mean, I'm a little biased towards the environmental social scientists. I think we need more people who are thinking kind of sociologically about,

about environmental change, its causes, its consequences, how power dynamics lead to these effects and who is affected, how kind of historical legacies of colonialism in general, inequality have kind of got us to where we are today. And what can we do about it?

JVN [00:45:54] Ah, yes! I mean, well, no, but yes, you know, I'm saying? Is there anything else you'd just be remiss if you didn't share? The floor is yours. Like, did we miss anything about Dam 101 that you're like, "How did he not ask me about this or something?"

HEATHER RANDELL [00:46:09] I yeah, I have like one more thing related to climate change that I think is relevant that I forgot to talk about. And so I mostly talked about droughts, but I think you mentioned, like, "Oh, has there ever been a dam that broke and, you know, because of rain?" And, and in the US. So one example, not necessarily of breaking, but in California there is the Oroville Dam. And in 2017, there was they were worried after heavy rainfall that it was going to literally break. And so they evacuated one hundred and eighty thousand people living downstream for fear that it would, like, a wall of water was going to come wash them out. Luckily it didn't end up breaking that time. But, you know, as far as we know, things are happening like that in China, like heavy rainfall is really kind of challenging the current dams that were not built to withstand heavy rainfall like that, so-

JVN [00:47:07] Have they reinforced that Oroville one since? I remember that.

HEATHER RANDELL [00:47:10] I remember that, yeah, I hope so. I haven't, I haven't followed up on it. But I would, I would hope that they have made whatever repairs need to be made. But, you know, but I think so we're in terms of extremes. I mean, that's kind of the name of the game with climate is extremes. And so we're seeing extremes of drought and extremes of heavy rainfall. And dams were not filled with those in mind, especially a lot of the dams in the US that were built in the early nineteen hundreds, the period of most and building was the nineteen sixties. Like, we weren't talking about climate change then.

JVN [00:47:44] I mean we were still telling pregnant ladies to smoke.

HEATHER RANDELL [00:47:47] Yeah, right.

JVN [00:47:49] There was a lot of not cool stuff in the 60s. Not to mention that it occurs to me that the larger area that you're damming, I mean, like, the larger the, the, like, the higher you go up, the farther you have to fall, like the more energy that you're trying to harness or manipulate or whatever, the more can go wrong, because you're impacting more people. And we've had such huge ones built all over the place. So. Wow.

HEATHER RANDELL [00:48:13] Yeah. And I just thought of something really important because I think we're just talking about the bad stuff. So in the US, like I mentioned, so there's this, like, dam building boom globally. But in the US, we're, like, not really building much these days in terms of dams. But what we are doing is removing dams. And there's a whole lot of dams that are just kind of sitting there and that are either in poor states of infrastructure, like, they're, they have damage that would be expensive to repair. They're not doing the job that they were built for, like, like, you know, powering these old mills in New England, all of these things. So, so, dams are being taken down. And there have been some dam removals, particularly in the Pacific Northwest of dams that really decimated salmon populations and the Elwha River dams in Washington. And there's a set of dams on the Klamath River in northern California that are going to be removed in the next coming year, a couple of years that are really important for a few tribes, the Yurok, the Karuk in Northern California and dam removal has been really effective in restoring ecosystems and bringing the salmon back in, kind of revitalizing what used to be kind of this system.

JVN [00:49:41] It's almost like the end of Moana!

HEATHER RANDELL [00:49:43] Yeah. Yeah. So there's it's like while much of the world, unfortunately, is just putting up new dams, like, there are dams being removed in the US and an organization that does a lot of work with dam removal and does fantastic work as American Rivers, an NGO. I have, I shared in one of my links, I have a video of theirs about the Klamath River dams. It's a fantastic short film. And so there is reason to hope, you know, like it's possible dams don't have to be forever.

JVN [00:50:18] Tulaaaa! Yes! Have you seen Moana?!

HEATHER RANDELL [00:50:22] No, but I have a three-year-old, I really probably should.

JVN [00:50:26] All my friends are so obsessed with that. I got obsessed with the soundtrack, but then I never actually watched all of it until I was just on the plane on the way home from the UK, and it is so amazing. I cried so hard because it is finally, like, Disney made a story where, like, the, like, it's a female hero and she doesn't need love. There's no love interest. It's like she was the first because I think that this is like pre-Frozen. Yeah, and it's just so cool because, like, she is just like she is a bad ass water fucking navigator. So you'd love her! I feel like you'd be obsessed with her.

HEATHER RANDELL [00:51:08] I will sit down with my three-year-old and watch it, for sure.

JVN [00:51:11] And then when you see the part, when they're, like, "Tula!" you'll be like, "Oh, that's what he was, cool, I get it now!"

HEATHER RANDELL [00:51:17] I'm going home to my Disney Plus.

JVN [00:51:19] Yes. I had so much fun in this episode. I hope you did. It was just, like, such a pleasure to meet you. Everyone, give it up for Heather Randell. Thank you so much for coming on the show.

HEATHER RANDELL [00:51:29] Thank you so much for having me. This is so awesome. And I'm really glad to be able to talk about all this stuff.

JVN [00:51:36] You've been listening to Getting Curious with me, Jonathan Van Ness. My guest this week was Heather Randell.

You'll find links to her work in the episode description of whatever you're listening to the show on.

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