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[00:00:00] **Zach Weiss:** I've seen estimates that by 2030, half of the world's population is gonna be living in areas of extreme severe water stress. We have also seen examples where bringing water back to areas has actually caused the reverse migration. Where people have returned to their homelands that they don't want to leave, they're being forced to leave because they don't have a viable future.

[00:00:22] When you create a viable future in those areas, people return and you can reverse this migration. You know, it takes a little bit of steady effort by people, but it is very much possible.

[00:00:39] **Nate Hagens:** Greetings on this reality round table. I'm joined by three experts to discuss a long overdue topic for this platform, which is the subject of water and hydrology. Joining me to share their unique expertise are Heather Cooley, Zachary Weiss, and Mike Joy. Heather Cooley is the director of the Pacific Institute's Water Program, where she conducts an overseas research on an array of water issues, such as the connections between water and energy, sustainable water use, and management, and the hydrologic impacts of climate change.

[00:01:14] Zachary Weiss is the founder of Elemental Ecosystems, an ecological development company specializing in watershed restoration and ecosystem regeneration. Where they work in over 25 countries across six continents after 10 years. Zach also founded water stories as a way to train others in the same work through his watershed restoration expertise.

[00:01:40] Mike Joy, a longtime follower of this show and my previous work, is a leading freshwater ecologist and a powerful advocate for the conservation of our

waterways. He has been working for two decades at the interface of science and policy with a goal of addressing agriculture's polluting impacts on New Zealand's waterways.

[00:02:01] Every year, we see an increasing number of droughts and floods all over the world, and even entire cities that face critically low levels of available drinking water. In this round table conversation, we cover how everything from climate to agriculture to land use change has contributed to these issues and what the possibilities are for us to recover the integrity of the planet's water systems.

[00:02:25] While this is a massive topic that would take many hours to cover fully, this episode serves as an excellent primer on hydrology and how water shapes the world. With that, please welcome Heather Cooley, Zachary Weiss, and Mike Joy. Welcome to another version of Reality Round Table. Today we're going to talk about water, and one can argue that after all the oil is gone, water will be pretty important for the rest of, human existence on this planet.

[00:02:57] with me today are Heather Cooley, Zach Weiss and Mike Joy World, experts on the issue of water. maybe each of you could just briefly introduce yourself, where you work, where you live, and what's your particular interest in water is, Heather, start with you.

[00:03:13] **Heather Cooley:** Yeah. Thank you Nate. I'm Heather Cooley.

[00:03:16] I'm Chief Research and Programs Officer at the Pacific Institute. I'm calling in today from, Oakland, California. but our work at the Pacific Institute is global in nature. the Pacific Institute's a nonprofit research organization, working to solve the world's most pressing water challenges.

[00:03:35] So we take a real interdisciplinary approach to the work, given how water is connected to so many things. And we take a really collaborative approach working with diverse stakeholders from governments and corporations to grassroots organizations.

[00:03:49] **Zach Weiss:** My name is Zach Weiss, working around the world with water stories and elemental ecosystems, and I practice what's called water cycle restoration.

[00:03:59] So how do we get the water cycle working in a healthy way that's cycling as much as possible to bring water and life to landscapes in desperate need of it all around the world. And today you're joining us from Greece. Yep. From an island in Greece called Raki.

[00:04:17] **Mike Joy:** Excellent.

[00:04:17] **Zach Weiss:** Mike

[00:04:17] **Mike Joy:** Joy. Mike Joy, I'm a senior researcher at Victoria, university of Wellington, New Zealand.

[00:04:23] I'm talking to you from, which is a little village on the coast, north of Wellington. I've researched water for 30 years odd now, as a, as an academic mostly. also been a, farmer and, an amazing array of jobs in New Zealand. So I come from a really diverse background and now just really a freshwater campaigner.

[00:04:45] I, I guess,

[00:04:47] **Nate Hagens:** and following your social media accounts, I know you watch our podcast. Yes, I have. let's start with this, I have not had a water expert

on the show. maybe each of you could just take a stab at this question. What is the most important water issue, in today's world, from your perspective, Heather?

[00:05:11] **Heather Cooley:** Yeah, great. Great question.

[00:05:13] **Nate Hagens:** Probably could be 10, but just, pick one for starters.

[00:05:17] **Heather Cooley:** Let me, pick three. If you, we could build on it. I mean, I often with water, it's too much, too little, or too polluted. I think those kind of three areas, I think encapsulate, a lot of what we see within water.

[00:05:32] I think through my work, I'm, very focused in on water scarcity, too, little water, whether that be sort of ongoing challenges, with, in mismatches between water supply and water demand, or ones that occur really during drought. When I think about kind of the challenges we are facing, of course climate change is a, major component of that.

[00:05:56] It's putting tremendous pressure on water systems, that in many cases are already strained. and it's really, exacerbating a lot of our challenges in creating new ones.

[00:06:08] **Zach Weiss:** From my perspective, the biggest challenge we face with water is the disturbance of the water cycle. The healthy cycling of water through the land, through our land use changes through destruction of forests, wetlands, channelizing of waterways.

[00:06:23] We've created this system where water funnels downhill very quickly leading to floods. And then because we have the floods, we're immediately followed by drought. And so we see all around the world, places are getting bigger storms with longer time periods in between, and that's leading to this cycle of flood and drought, which are really two sides of the same coin.

[00:06:46] **Nate Hagens:** You said, because we have the floods, then we have drought. Is that, necessarily true?

[00:06:52] **Zach Weiss:** Yeah. You know, you think as that rain would've been received by the landscape, instead of rejected all of that rain that would've gone into the ground and slowly moved through that system is now being forced very quickly downstream.

[00:07:07] So if you look at a hydrograph of flow of water over time, we're making these very high peaks, followed by these very low troughs. So we're creating the flood and the drought all at the same time through our disturbance of the water cycle.

[00:07:22] **Mike Joy:** Thank you, Mike. Well, I think, it's the number one issue here in, probably in many other places is, eutrofication.

[00:07:30] So too much nutrient eating up and water and that, I mean, it links to everything with the, main source, the main problem being nitrogen in the water and that coming from fossil fuels through that harbor Bosch process. So, you know, you've talked about it often, but that massive increase in reactive nitrogen, you know, that we now humans now make more reactive nitrogen than all the natural systems put together.

[00:07:53] And so the eutrofication of water that then goes on to pollute offshore, so you get those big dead zones offshore, like you end up off the Mississippi and other big rivers and, within the rivers and lake systems. The hypoxia that it causes for the life and the rivers. And then we've got this huge issue and it's, blooming in New Zealand, where drinking water is contaminated with nitrate as well.

[00:08:19] And there's a whole bunch of human health issues associated with that. So, you know, in, in my world it's, nutrient pollution. That's the biggie.

[00:08:28] **Nate Hagens:** And how much on the radar screen, of governments and policy people is eutrofication and, excess nitrogen in the water supply, either in New Zealand or globally?

[00:08:40] 'cause I don't hear about it much.

[00:08:42] **Mike Joy:** No. Well, the industry do a really good job of trying to cover it up here. I mean, they've got all the money in the, and, you know, to spend on, on, on PR and, buying science to kind of make the problem go away. you know, we are seeing it show up here. we have the highest, level of colorectal cancer, of any in, humans, of any country in the world.

[00:09:05] And, We had the highest levels of nitrate in our rivers of most of the countries in the world. I think we've got higher. A bunch of our rivers are the higher flux of nitrogen than the Mississippi River. and so we are seeing that show up. There's, papers. Lots of research now from Europe and from the states that it's a really big issue actually in the US is nitrate and water and the cancers that are associated with it.

[00:09:31] **Nate Hagens:** Where I live, we have excess nitrates off the charts in our water supply. We've had our well checked.

[00:09:37] **Mike Joy:** Yeah, Being really careful with that 'cause there's so many things associated with it. Yeah.

[00:09:41] **Nate Hagens:** Let me ask a follow up to that, 'cause I have no idea the answer to this, but I'm asking you because you follow the podcast and I know you're ecologist and a nature buff.

[00:09:50] Does the unification, well I know the answer to this, but does the eutrofication have deleterious effects on the, natural flora and fauna in addition to human impacts?

[00:10:00] **Mike Joy:** Yeah, No, I mean, I was only highlighting the human one. 'cause that's a more recent one that I, kind of imagined that, people sort of thought, oh, it's only, fish, you know, it's only the life that lives in this dream, who cares?

[00:10:11] But now cancer, you know, things will change, but, really didn't it, which shocked me. But no, what happens in, in rivers and lakes, particularly in rivers where. You have algal blooms, and in the case of rivers, they bloom on the bed, the ben thick algae on the river. So you see this huge mats of slime on the bed of rivers, which is bad in itself.

[00:10:32] But what happens is that through photosynthesis, those plants, you know, are drawing down the oxygen. So early hours of the morning we're getting, down to 30% dissolved oxygen and peaking super, you know, atrophic in the, sorry, levels of, oxygen up around 160% in the afternoon. So in a healthy natural river, it's just a flat line.

[00:10:55] You know, it's dissolved oxygen's around a hundred percent all the time, but the more polluted they get, the more those swings happen. So you get. Just not enough oxygen for the fish to live in.

[00:11:05] **Nate Hagens:** So, not to go too far down this tangent, but what happens with the organisms in the water then? When there's not enough oxygen, they swim towards an area that has more oxygen if there is such a place?

[00:11:16] **Mike Joy:** Yeah. Well, so the, if you see, I mean, I'm sure people have seen with goldfish in a bowl how they'll go to the surface and they'll gulp oxygen

off the surface. You know, fish like goldfish that have evolved in eutrophic systems, then they have that ability. But here in New Zealand where we had no, you know, no sources of high levels of.

[00:11:36] Pollution like that. We had very forested, you know, so the life here has evolved without having to deal with low oxygen. So they have no ability to do that, so they just die when there's not enough oxygen.

[00:11:47] **Nate Hagens:** So we have between an hour and a half to talk about how important water is to our lives and our futures.

[00:11:54] So like, we couldn't cover this topic in 10 hours. so let's get to something, in, the news, Heather. could you outline the relationship between hydrology and, water systems play in the climate system and, What I'm most curious about is we have all these models in the world, but the standard deviation of rainfall and drought, as Zach mentioned, has been increasing.

[00:12:25] So what's the inner relationship between the climate system and hydrology?

[00:12:30] **Heather Cooley:** Yeah, that's a fantastic question. And you know, the, we all learn about sort of the water cycle when, we're kids, right? the movement of water is really the primary way energy's distributed around the world.

[00:12:44] and as we're seeing rising temperatures we're in effect, accelerating that water cycle. And, Zach talked a little bit about how our disturbance of land, also accelerates that as we're paving areas. so with climate change, you know, these impacts are not. Off in the distant future. we're seeing them now, and they're getting worse.

[00:13:06] So some areas are getting wetter. Others are getting drier, right? That's part of that intensification. We're seeing more sort of transpiration, more evaporation happening. and then that water goes into the atmosphere and comes down in other areas. And so we're seeing really big shifts, in that movement of water.

[00:13:26] we're seeing areas experiencing more extreme weather. again, more extreme droughts, more extreme floods, more frequent occurrences. we're seeing with warmer temperatures, in places that rely on snowpack. More of that precipitation is falling as rain rather than snow. and the snow that they're getting is melting earlier in the spring.

[00:13:52] And so that has really big implications then for the amount of water and the timing of that water. that's available for agriculture or for ecosystems or for, you know, downstream communities for drinking water. We also see in coastal areas rising seas, right? Pushing that salty water from our oceans is pushing further up into rivers and streams.

[00:14:18] It's pushing into coastal aquifers. And again, these are waterways that people are using for drinking water or for agriculture. they're using, they're of course supporting ecosystem health. another. Big issue is water quality. So with warmer temperatures, of course, warmer air temperatures, we're seeing water temperatures get warmer.

[00:14:42] that of course has impacts on ecosystems, but it also can affect our energy systems, because a lot of energy. power plants are using water as cooling water, so when it's warmer, they're less able to do that, less effective. In some cases, we see where they have to shut down because they just aren't able to cool appropriately.

[00:15:03] we're seeing algal blooms, concentration of pollutants in waterways during droughts. So there's lots of sort of knock on effects, with climate change. another Im important piece, and one I think is too often ignored, is the effect of rising temperatures on water demand. So when it's hotter, plants need more water.

[00:15:27] that means demands at a ti especially at a time when there's less water available. We're seeing demands get pushed up. Demands for agriculture, for example, demands for, you know, people irrigating their, yards in, those places that do that. So those are, I think, some of the direct effects.

[00:15:45] I'll also say though, that there are indirect effects of climate change on water. We can look at wildfires as an example. when we have wildfires, we see water systems that are destroyed. we see sedimentation, right? That happens after the fire that, effects the quality of water. we see impacts on energy systems that then affect water systems.

[00:16:07] So, you know, climate change is having, already having tremendous impacts on water both directly and indirectly. And, those are going to continue.

[00:16:16] **Nate Hagens:** Thank you, Zach. Do you have something to add to that?

[00:16:20] **Zach Weiss:** Yeah, I think in addition to everything that Heather said, which is right on point, there's also, as Dr.

[00:16:26] Milan describes it, the second leg of climate change, which is land use, changes and disturbance of our water cycling. And as we know, water is a absolutely the main driver of heat regulation on our climate. And if we look and estimate at how much water we're draining out of the landscape every year, that would actually absorb and dissipate up into the upper atmosphere, 250,000 terawatt hours of heat energy.

[00:16:55] So that's actually more heat energy than we're producing as a civilization each year. That would be. Moved through evaporation or transpiration. And then if that water vapor condenses in the upper atmosphere forming clouds, it would actually dissipate that heat up into the upper atmosphere. So I think it's really important to look at the two legs of climate change.

[00:17:18] There's the emissions based, but also the water cycle disturbances. As we tify landscapes, we get high pressure, heat domes that actually prevent the inflow of more moisture, more humidity, more cool conditions, and then as areas heat up their ability to store and reradiate heat increases to the power of four.

[00:17:40] So you can quickly see how these two effects together really start to lead to some disastrous outcomes. Sounds like

[00:17:47] **Nate Hagens:** we live as part of a system or something.

[00:17:51] **Zach Weiss:** Exactly.

[00:17:53] **Nate Hagens:** but that second leg, what, when does that happen and what are the implications for humans in our current institutional arrangements?

[00:18:02] **Zach Weiss:** You know, I think this is the harder part to solve because we have to really look at our land use. How that's affecting how water is received or rejected by a landscape. You look at all the cities that we build, all the agricultural fields, we've lost 87% of the world's wetlands globally. And so we're destroying the actual retention structures of the landscape, the ability to store that water that then dissipates and moves heat around and actually creates more precipitation as well through the small water cycle.

[00:18:36] And our land use changes are not so easy to address. You know, people don't want to move outta the city. People don't want to stop doing farming. and

so I think we have tend to have a myopic view towards carbon when water is also a main driving cause of the issues, especially when we look at flood, drought, and fire.

[00:18:57] Real

[00:18:57] **Nate Hagens:** briefly, you mentioned wetlands. I often hear how important wetlands are. Could you just give me the cut and dry explanation of why restoring or maintaining wetlands is important for us?

[00:19:10] **Zach Weiss:** Oh, there's this huge shock absorber in our system. So if you imagine a. Big series of sponges all throughout our system.

[00:19:18] Now, when the rains come, when the floods come, if we can actually store that water in the landscape, it's not just getting trapped in that wetland, it's slowly dissipating through that landscape so we can use the same water again and again. And when we look at a healthy ecosystem, like the Amazon for example, the same raindrop cycles through that ecosystem seven times, transpiring, condensing, falling as rain, transpiring, condensing, falling seven times through that whole cycle before it moves downstream in the river.

[00:19:53] And so wetlands are a great way to store that water on the land so that land can benefit from that water. And as we lose them, we're losing that shock absorbing of the moisture that used to be in place.

[00:20:06] **Nate Hagens:** Mike, you're a water ecologist expert. What, do you have to add to what Zach

[00:20:11] **Mike Joy:** just said? Yeah, totally.

[00:20:12] I mean, I come from a country where we've, we've. lost 90% of our wetlands, and it's even worse than that because what replaces the wetlands, or, I

mean, they're still there, they're just being drained, is, intensive farming, which happens in those spaces, which has a whole lot of negatives to go with it as if it wasn't bad enough losing the wetlands.

[00:20:31] There is you a kind of, if you look at, and I've done some work on this, the, biodiversity within those wetlands is incredible. And so it's not just, you know, the, physical, you know, the great job that they do as, ecosystem services to protect us. But the life that was in there, you know, for the First Nations people, the Maori people of New Zealand, they were the food basket, they were the, pharmacy.

[00:20:56] Everything was in those wetlands. And so that it's, far more than, you know, there's just so many components to, wetlands that make them important.

[00:21:03] **Nate Hagens:** So how has our water demand tracked, GDP and population and our economy? Does it track kind of the same as other inputs and, what's going on with water demand globally right now?

[00:21:19] And I think there is a positive feedback aspect. Heather, that you mentioned is as temperatures warm, that creates more demand for various reasons, not only for plants, but for human systems. But is demand for water going up globally?

[00:21:33] **Heather Cooley:** Globally it is going up. however, there are many places that have decoupled water use and both population and economic growth.

[00:21:44] And so I think that's an important sort of. Silver lining. and an important cha shift that we're seeing in many areas. Again, on a global level, we do see, population growth, economic growth. we also see shifting in lifestyle, shifting in towards meat diets, for example, higher levels of consumption.

[00:22:08] All of those things put an upward pressure on water demand. but again, there are many areas that are starting to see a, real, a big change in that in the United States, for example, water use peaked in and around 1980, since then we've seen water use decline, whereas population, the economy have grown.

[00:22:30] Is

[00:22:30] **Nate Hagens:** that because of technology we're delivering it, using less resources or is it because we've actually demanded less?

[00:22:38] **Heather Cooley:** It's that we've demanded less. But there's a couple reasons for that. One is that, we're seeing more uptake of efficient, devices. So homes are equipped with toilets, with shower heads, close washers, all of those things that use less water.

[00:22:55] We're also seeing in some areas denser developments. And so when you have denser developments. These areas typically have less outdoor area that they're irrigating. we also are seeing a shift in the economy, so shifting away from manufacturing, which tends to be water intensive towards more service oriented types of economy, which, use less water.

[00:23:18] So there's a number of reasons. and, even in agriculture shifting from flood irrigation, for example, towards more drip, and micro sprinkler. So we absolutely have a long way to go there, but I think there are many places, many large urban areas states, even, again at the US level where we're seeing that shift already.

[00:23:41] **Nate Hagens:** So on the issues that each of you care about the most, two part question. How do you find the people in charge of making changes and decisions on water, in your work? how receptive are they to your information and, scholarship and, policy recommendations today versus five or 10 years ago?

[00:24:06] **Heather Cooley:** I mean, I think it's under the radar in terms of, You know, the importance of water and how connected it is to so many things in our life. It's connected to energy, it's connected to food security, it's connected to gender equality. I mean, there, there's just so many things. So it's undervalued, underappreciated from that level.

[00:24:28] That being said, I am seeing a, shift towards that. I'm seeing a lot greater recognition of the role water plays. I see that from government. I see that from corporations. I see that from the general public as well. Again, it's not where we need to be to make the changes that, that we all know are needed.

[00:24:47] but I'm seeing a lot more re realization of the importance of water. I'd be curious if, if Zach and Mike are seeing the same thing where they are.

[00:24:57] **Zach Weiss:** You know, I'm pretty fortunate to be working in the private sector mostly, and I've seen a huge shift because the reality is most farmers, most people are having issues with water scarcity, and they're very receptive to do things that they.

[00:25:13] Do what they can on the land that they're managing to improve that scenario. So we're seeing just huge rapid uptake of these techniques all around the world. You know, more than 200 different countries are now implementing these types of things on the ground, grassroots efforts for the land managers, because they see they're participating in these landscapes every day.

[00:25:35] They see the changes that are happening and they see that some changes are needed for their farms, for their landscapes to be viable for future generations. So I'm seeing a huge rapid uptake of these kinds of approaches, and people are very receptive to it.

[00:25:50] **Mike Joy:** Yeah. I kind of wanna respond to something that Heather said because, there's this issue of virtual water.

[00:25:58] you know, it might look like you are not using it there, but you're just importing it, just like. You know, the, emissions, if you start shifting your manufacturing offshore, so for example, work that I published recently shows that to make a of milk in New Zealand in, one of the worst parts than Canterbury, which is.

[00:26:16] 11,000 liters of water to make one liter of milk. That water isn't destroyed or polluted, it's just cycled back into the system. No, that's polluted. So about there's green, blue, and gray water. so the green and blue, which is the irrigation and the rain water make up about, so there're about 300 liters each.

[00:26:39] And then the other, you know, 10,000 liters is gray water. So that's the water that's polluted by the process. And where does that water go? Well, so it goes down into the groundwater and that's what the pollution is. That's in the drinking water and it's polluting the lake. And that's how get

[00:26:55] **Nate Hagens:** nitrates and such.

[00:26:56] **Mike Joy:** Yes, So, I mean, it's just a way of thinking of it is to think that, well, to solve that problem in Canterbury, if you increase the rainfall 20 fold, if you had 20 times more rain, then you could dilute that nitrogen back to a safe level. So that's where that measurement comes from.

[00:27:12] **Nate Hagens:** Wait a minute.

[00:27:12] 10, 10,000 liters.

[00:27:15] **Mike Joy:** Yeah.

[00:27:15] **Nate Hagens:** Of water to make one

[00:27:16] **Mike Joy:** liter of milk. Yes. That's how much water is polluted.

[00:27:20] **Nate Hagens:** What about a, kilogram of lamb or

[00:27:22] **Mike Joy:** beef? Is it that magnitude or no? No, it's not. It's nowhere near that bad. But I was just thinking about most of that milk, so that liter of milk won't get drunk as milk.

[00:27:32] most of it will be dried with coal. In our case, we are the biggest exporter of milk powder in the world. And Mars, the Mars Corporation. So you guys will eat that water as Mars Bars, you know, I mean, that's what I'm talking about, that virtual water. That's where our, that's where our milk powder ends up in candy bars.

[00:27:51] That's where it ends up. Yeah. so Danone, Nestle and Mars are the big buyers of our milk. it's a cheap protein. Right. And they can, whatever your sort of junk food is you are making, then milk powder is an ideal thing to put in it. And it comes from a place like New Zealand where we are the biggest exporter.

[00:28:11] Not that many other countries, they sort of supply their own drinking milk, but this is the industrial side of it. And, so that's the, claim is made by the industry that we're feeding the world. And, but the reality is it's milk powder for junk food and infant formula to be sold to poor people

[00:28:31] **Nate Hagens:** and, increasing the nitrates dramatically in our own country.

[00:28:35] Yeah. yeah. How, much does the average New Zealand, citizen understand what you just

[00:28:43] **Mike Joy:** said? Oh, very, few. I mean, when I'm campaigning around fresh water, people contact me and say, oh, but you know, we, we love our milk and cheese. You know, and I try to explain that, you know, maybe 2% of the product ends up consumed in, in New Zealand.

[00:28:59] 15% overall might end up as some kind of milk product you would recognize, you know, as cheese or butter. And the rest is powder to end up in Mars bars and Oreos and all of those kind of things. You know,

[00:29:11] **Nate Hagens:** it's really amazing once you start pulling on a thread of the tapestry that is modern civilization.

[00:29:18] There's so many things that were unseen before that are, just mind boggling. I mean, I didn't know that Mike, I didn't know that about milk in New Zealand. so, What if, I mean this is going to skip around a lot of places, this conversation, but what do you think is baked in? because either of our institutional inertia or because of climate and what's even in the base case of the models, what can we expect in coming decades as kind of the base case, with respect to water in our current, living styles and expectations?

[00:30:04] can each of you hazard a guess? Zach, start with you.

[00:30:09] **Zach Weiss:** For me, this is where we have a tremendous amount of agency because from what I've seen and experienced, we have a huge amount ability to change the outcomes that we're experiencing in terms of water. Some of these projects, when you set up a landscape to receive that water, they're able to grow three, four crops a year.

[00:30:29] When they were just able to grow, one, they're able to have water abundance recharge their aquifers, recharge their wells. So to me, there's a very hopeful message here in that we don't have to accept this doom and gloom

narrative that things are going to get worse, that things are going to get more extreme.

[00:30:48] We can very easily, if we put our minds to it, really severely reduce the flooding that we're experiencing, reverse the drought that we're experiencing, recharge the aquifers that we're using. How can we reduce the flooding? By decentralized water retention. So you imagine so much of the flood mitigation.

[00:31:06] So we

[00:31:07] **Nate Hagens:** all, we don't change the rainfall, we just change what happens to the rainfall once it comes. Exactly.

[00:31:12] **Zach Weiss:** You imagine all these hardened surfaces are all pushing that water downstream, rejecting that rainfall, and then usually our flood mitigation strategies are to dredge and levy the waterways, which then just force that water at an even stronger forest downstream, creating these horrific flooding events.

[00:31:29] So if instead we have decentralized water retention, we're storing that water throughout the landscape in all of these small ponds and water bodies and wetlands, we can really reduce that flood peak. But then also because of that retention and infiltration, we've now reversed the drought that landscape is experiencing.

[00:31:49] All with the same methods.

[00:31:51] **Nate Hagens:** So it's, education and we're not gonna alter, well, maybe we could, but we're unlikely to alter the drought and flood that is kind of baked in with the higher standard deviation of a warmer atmosphere holds more water. But we can alter the human response and maybe in an ecological net positive for the

planet stewardship sort of way change, how locally, regionally, globally, we respond to what's coming.

[00:32:18] **Zach Weiss:** Yes to the ladder, but we can also even fix the former to a certain degree. So for example, ecosystems produce these hydroscopic microorganisms that nucleate rainfall in the atmosphere. And when you store enough water in the landscape, when you create enough vegetation, when you grow enough of these hydroscopic microorganisms, you can actually increase the rainfall in a place.

[00:32:42] As you reduce the temperatures, you can start to re-trigger the biotic pump and bring more moisture into those areas. And so we've seen increases of 15%, up to 50% recovering the rainfall that has been lost in some of these places.

[00:32:57] **Nate Hagens:** Getting back to my broader question, coming decades, Heather and then Mike.

[00:33:02] **Heather Cooley:** Well, you know, I agree with Zach in that y there are absolutely a lot of challenges. we've talked a lot about those, thus far there are a lot of opportunities, to be doing things better. And we have the technologies, we have the practices, right? Yes, there's room for innovation, but really what is needed is scaling the, technologies and practices and strategies that we know work.

[00:33:29] So that is really what gives me hope, is that I'm, we're starting to see, evidence of positive change. and it's, really about how, do we expand, you know, just in terms of, as Zach was mentioning, the, idea of sponge cities, right? We're seeing more and more cities. Tear out pavement or not put it in when they're first being developed, and instead put in trees, start greening those areas so that they are able to absorb, that water such that when there are, intense rainfall events, there's less flooding.

[00:34:04] there's of course biodiversity benefits there. and then when there is a drought, you have some of that storage, some of that water held in the soils. That's an important shift that I think, again, we're starting to see. we can and must do a lot more similarly in agricultural areas, looking at soil health.

[00:34:27] so, storing carbon in soil, storing water, all of that is so that we are able to withstand these, extremes. in addition to those types of things, I'm seeing much greater adoption of water efficiency, recycling and reusing water. You know, so many of our systems were built use water once.

[00:34:48] Once get rid of it. more and more we're seeing people close that loop, looking at ways of recycling and reusing at a building scale, at a district scale, and even at a much more, a larger centralized scale. so there's lots of, I think, positive, signs of hope, and things that we can really build on.

[00:35:08] **Nate Hagens:** So counter to in, in contrast to some issues that we face in the world where we really don't know what to do. This situation is we kind of know the problem and we have a lot of solutions. They're just not widely known or scaled or implemented. Yeah. Mike, to you on coming decades, what's the base case, regarding water and water, risks?

[00:35:32] **Mike Joy:** Yeah. Well, I mean we, the thing is, as the other, as Zach and Heather have pointed out, we know the answers. We know the things that we can do to fix the problem. It's, and, that, you know, as usual, they have all of these other positive effects as well. But we, are seeing the reverse here. So, we've got a very, right-wing government at the moment that is just tearing apart all of our legislation and throwing it out.

[00:35:56] I mean, it would be seen, it would be seen as very extreme here, but you are out doing us in the states, and so it doesn't seem so bad because you know the way you are throwing science out. Let me double click on that.

[00:36:09] **Nate Hagens:** Republicans, conservatives, the origin of the word is conservation. So does the fact that someone is right wing necessarily say that they're anticon conserving our water and our wetlands and our ecosystems and the health of water for the future.

[00:36:29] **Mike Joy:** Now, what we're seeing here is the, right wing that, that I'm talking about is they see property rights as being the most important thing. So according to them, we don't need legislation because, if you are my neighbor and you are harming me, then I can take you to court. I can sue you. That's the kind of their ideology is around that kind of.

[00:36:49] Worldview, which might work in some cases, but doesn't work in river systems where everything accumulates down a river and there is no one person you can point the finger at. It's the whole catchment land use thing that's happening. So the, other part of it is linking those gains to other things.

[00:37:08] So our, biggest greenhouse gas emissions here, are methane from agriculture. You know, that's our biggest footprint. More than half of our emissions come from those very cows that are doing all of the harm. Well, the way that we farm them, the all of the harm. Is also a huge greenhouse gas emissions problem.

[00:37:28] The, human health side of it that, you know, so I think we do a bad job or, you know, linking these things together that you can, what we do for, water, we also do for, climate atmosphere human health. You know, we, tend to silo these things. I mean, our government departments silo water.

[00:37:49] There's a water kind of. People, and there's the greenhouse gas people and there's the energy, you know, departments, everything's separate, but, not seeing the connections, you know? Yeah.

[00:37:59] **Nate Hagens:** I have a follow up there, but, Heather, you wanted to chime in?

[00:38:03] **Heather Cooley:** Yeah, I wanted to talk a little bit, I mean, what some of the things that we have seen with.

[00:38:07] With polling, and again, this is polling based in the United States, is that water is really at the top of concerns of people even before the economy, even before many other, you know, inflation things that we hear more about in the news, you know, on the day-to-day basis. it polls in both party Republican and Democrat identify water as one of their biggest issues and concerns.

[00:38:32] they support investments in water systems and water infrastructure. And so I think there we are absolutely living in very divisive times. This is an opportunity though, for water to be a connector and a bridge builder. and you know, I think there's a lot of momentum and interest in solving water problems, whether it's water quantity or what water quality.

[00:38:58] and you know, I think we need to really build on that and, that can serve as a model where we can find com common ground on other issues as well.

[00:39:05] **Nate Hagens:** So I'm gonna, I'm gonna return to governance and watersheds and, what we can do, but I don't, I wanna ask this question because I don't know the answer and I don't know which one of you to call on.

[00:39:18] but how much of our water usage either in the United States or, in the world, is from fossil aquifers that don't, replenish on human timescales. Can any of you educate me briefly on, on the situation with fossil water aquifers?

[00:39:39] **Heather Cooley:** Yeah, I mean, I don't, have the numbers globally, but there are many parts of the world where you see, continuous declines in groundwater levels, in effect, we are mining that, that water.

[00:39:51] Right? and, with that, you of course, in some cases start getting subsidence, which is where the groundwater aquifer starts to compact. now in some places you can add water and there, and it acts like a sponge. But once you start getting that subsidence and compaction, it becomes a permanent loss of that groundwater storage capacity.

[00:40:13] And so, you know, we see that in, parts of California in the Central Valley. You talked about the Ogallala aquifer parts of China, India, the, Middle East, and North Africa. Oh, there, there are many. Parts of the world, unfortunately, where we're seeing that mining of groundwater.

[00:40:31] **Nate Hagens:** Well, just because the word fossil is involved, it's the same sort of dynamic as, hydrocarbons where we're treating it as if it, were a paycheck, but it's really a trust fund that we're drawing down.

[00:40:44] And I think there's a lot of people live in areas that are dependent on fossil aquifers. So Zach, do you have any, follow up there and is some of the sponge technology for wetlands, can that replenish fossil aquifers as well?

[00:40:59] **Zach Weiss:** Well, so we have confined aquifers that are not gonna replenish. Not only within our lifetimes, but thousands and thousands of years, tens, maybe hundreds of thousands of years.

[00:41:12] So we're drawing down these aquifers. We also have Unconfined aquifers, which we do really have the ability to recharge, and I always like to draw a really simple analogy, I think. Overall, this is a failure in governance in that we've

highly regulated surface water and we haven't really regulated groundwater so much, and so we've incentivized people to pull out groundwater.

[00:41:36] But groundwater and surface water are actually very interlinked and most water systems in the dry season in a river, half of the flow of that river might be groundwater. So as you draw down the groundwater in that area, you're losing the surface water in that area. And the analogy that I like to draw is a bank account.

[00:41:55] If we're always taking out more of a bank account than we're putting in, we all know what happens with that. It gets really bad really quickly. If we're always putting a little bit more into that bank account than we need to use, then we always have a healthy surplus for the times that we do need it. So I think it's really important that it's not to say we shouldn't be using groundwater, but respectful use and not overuse.

[00:42:18] And how do we make sure we're. Recharging even more than we're using from those groundwater aquifers.

[00:42:25] **Nate Hagens:** So let me ask you this. there is, some, quite a few of my previous guests on this show have talked about the mismatch between grid-based division of governance, where we have cities and counties and, such.

[00:42:42] I'm talking about the United States, but I, think this probably rhymes globally. And the reality of the boundaries of a watershed where water comes from the sky and goes with the topography of the land and flows a certain way. And that, governor John Kitzhaber, among others has recommended that we divide our governance and community, leadership decisions structures by watershed instead of these ad hoc, boundaries.

[00:43:14] is, this playing out in the world at all? Or what do you each think about that, concept?

[00:43:19] **Mike Joy:** Yeah, I mean, we do amazingly in New Zealand, we have our regions that are the administrators, are based on catchment boundaries. So we Oh, that is totally what you say is, the way it's done here. So we don't have any is that's always been

[00:43:33] **Nate Hagens:** the way

[00:43:34] **Mike Joy:** No, since, the Resource Management Act in 1990, which split the country up.

[00:43:39] And this was the, way that the, thing is run at the moment. And so we don't have any waterways that cross boundaries at all.

[00:43:46] **Nate Hagens:** and yet you still have, 10,000 liters. yeah. Yeah.

[00:43:50] **Mike Joy:** that's,

[00:43:50] the problem that even when you do that, so that w that sounds fantastic, but what we ended up with is, those regions are then told to, they have to, you know, they have four pillars and two of the pillars are environment and economy.

[00:44:06] And so of course, economy is the winner. And you can imagine when you're, when you are stuck with that situation as an administrator, and then below that level. As an example, so the, at the regional level, which is the catchment boundaries. Then within that there are smaller units, which are the district councils.

[00:44:26] The district councils and city councils are responsible, for example, for wastewater management. And so they have to get a consent from the regional council to be allowed to discharge into waterways. Half of the waterway, half of the, wastewater treatment plants discharge to rivers in New Zealand and.

[00:44:45] And so you get the situation where the, police, effectively, the environmental police, which is the regional council, would have to enforce something on their own rate payers. And so there's a tendency to do nothing. So, for example, my favorite wastewater treatment plant that has been, that has not complied with any of the conditions in, a couple of decades, the penalty for not complying is a sad face stamp.

[00:45:14] You know, somebody at the regional council then bangs the stamp down on a piece of paper and you get that sad face. And so of course nothing changes. you just get ongoing. Degradation

[00:45:26] **Nate Hagens:** in my small, circle of online systems, ecologist friends. our response to the story you just said is what a species, Zach and, Heather, do you have any comments on governance and watershed, and such?

[00:45:45] **Zach Weiss:** I think generally as governance gets more centralized, you get a lot of issues in terms of decision making because the decision makers are not actually connected with that landscape. So a lot of the best examples we've seen go to hyperlocal governance of those areas. So they develop their own water councils, their own water congresses to start looking at how do we manage water within this watershed?

[00:46:13] And I think for one, it's. A much better way to look at boundaries and governance by watershed, but it's not just by the catchment areas, but actually by the aerial flows of water that are very important. So we not just have the rain falling and where it falls, but where is that rain coming from? And a number of

colleagues and friends, climate scientists say, you know, it'd be so easy to recover the rains in the desert Southwest, except for one little problem, California.

[00:46:42] And because California is breaking that moisture conveyance into the desert Southwest, you really, if you're just looking within watershed basins in those areas and not looking at where that water is coming from, how it gets there, how that precipitation is nucleated and seeded by biological systems, you're only looking at part of the equation.

[00:47:04] **Nate Hagens:** How much, let's just leave energy depletion and, climate change aside for the moment, which, or not climate change, but, economic turmoil, which is difficult to, leave that aside, but how much like population migration are we gonna see in the next few decades due to water issues? Either too hot and not enough water or too much of a higher standard deviation of, flooding and just people are gonna have to move, have, any of you looked at that?

[00:47:38] **Heather Cooley:** I would just say, you know, in, in fact we, already are seeing that, right? And, but I think one of the challenges in tracking it is we don't often identify water as sort of the core issue or the core driver. It's people are responding to famine, they're responding to job loss. some of which is dependent, you know, on the fact that water was not available when and where it was needed, or it was too polluted.

[00:48:02] so we're already seeing that. And I think there is a, a, you know, a really important. conceptual understanding of that relationship between water and security. it's, been a topic that people, some people have recognized, but I, but we're not talking about it broadly. but, it is a, really big issue and I think as we look at climate change and the other pressures that we're seeing on water, it's one that we need to really be mindful of, aware of, but also proactive in trying to kind of address and solve these issues.

[00:48:36] It really underscores one of the important reasons why we need to really focus on solving our water challenges.

[00:48:43] **Zach Weiss:** Building on that, everything that Heather said, 100%, we're seeing it so much already, and I've seen estimates that by 2030 half of the world's population is gonna be living in areas of extreme severe water stress.

[00:48:58] 2030. That's five years from now. It's right around the corner. and we have also seen examples where bringing water back to areas has actually caused the reverse migration. Where people have returned to their homelands that they don't want to leave, they're being forced to leave because they don't have a viable future.

[00:49:17] When you create a viable future in those areas, people return and you can reverse this migration. You know, it takes a little bit of steady effort by people, but it is very much possible.

[00:49:29] **Nate Hagens:** Okay, so let's do this. the three of you each know far more about water than myself or my guests. Clearly we have lots of systemic issues in the world.

[00:49:40] climate change, economics, energy depletion, polarization, but also water. and you've outlined some of the problems that we have. So what I'd like to do now is ask each of you, if you were given a very brief audience with a, let's start with a, world leader or a national leader. And they said, what should I be concerned about and how should we think about it and what should we do?

[00:50:05] in 90 seconds, seconds, what would you, what would be the high points of what you would tell this, international, global leader.

[00:50:14] **Zach Weiss:** For one, I think it's very important to actually tailor the messaging to the audience. And so I would need to know what country are they from? Pick a challenges are they facing, let's say the United States 'cause I'm very familiar with there.

[00:50:28] The big thing I'd say is empower local governance around water. Now we have a lot of laws that actually inhibit people from storing rainwater on their own land. 'cause that rainwater is owned by the state to be distributed by the water rights system of that state. We have a very broken water right system, so we need an overhaul change of our water rights system to allow the raindrop to service the land where it falls as much as possible to slow the flow of water through that landscape.

[00:50:59] And so empowering local governance to be able to accomplish that slowing of the flow where water runs. Help it walk where water walks help it crawl, where water crawls help it go into the ground.

[00:51:11] **Nate Hagens:** And e empowering local governance isn't a local decision. I, take it. It's gotta be at a, level higher, like federal or state or something.

[00:51:23] **Zach Weiss:** Well, it can be a local decision if people have the civil courage to do it. and we've seen this in some of the best examples, like in India where people just, you know, as the land managers, they take the power into their own hands. The federal government be damned.

[00:51:37] **Nate Hagens:** So maybe my question is not the correct one then maybe on this issue.

[00:51:42] The ans all the, real answers are at the local, and regional level, not at the federal and global level. Is that fair to say?

[00:51:50] **Zach Weiss:** I think there are a lot of roadblocks from the federal level that need to have some. Some loosening of them in order to empower that local level. 'cause to ask local people to break the law, to do the right thing is a very difficult challenge that only some people are gonna do.

[00:52:10] **Heather Cooley:** Yeah, I mean, I think in terms of, the importance of water, if, you know, speaking to, a national leader or intern, I, I would really sort of e emphasize the role of water in, security, in economic development and, public health. I think, it's really integral connected to all of those things.

[00:52:34] and so I think that's an importance of sort of why water, and when I would point to what I think the solutions are, and again, I think these solutions would apply across scale. It's, about rethinking water demand, rethinking water supply, and rethinking water management. I think those are the three areas in which we need to see.

[00:52:55] Real, real changes, rethinking our economic priorities and choices, how that, and how that affects demand. looking at alternatives, you know, for far too long it's been about extracting water from rivers and aquifers, in effect, mining it. we need to be looking at alternatives, capturing urban runoff, looking at recycling and reusing, that water.

[00:53:20] And then I, would, focus in on with respect to management, it's about, and, I think this gets on, Zach's point. It's about sort of open, transparent, and inclusive decision making. and, making sure that. People are involved, in that, and it's about data and information, making sure we actually have the data and information to make informed decisions.

[00:53:45] I think those are some of the key points. I would, kind of highlight as helping to a underscore the importance of water, but also identify some of the key, solutions.

[00:53:56] **Mike Joy:** The important thing to think about is that we have to manage catchments. what is a catchment? Mike? sorry, a watershed is, your term for it, I guess.

[00:54:04] Sorry. Yeah. we, call it a catchment, but a watershed. So, so you have to, you can't fix the bottom. You have to start at the top. and so for the management side of it, I think that, it's what we've seen in New Zealand and I'm sure that it's happening, you know, everywhere is the pressure that goes on to.

[00:54:27] Grow to intensify to get more off the land all of the time. In our case, capital gains from just increasing how much the land value goes up because you intensify the farming. So there's a real economic pressure there. What we've seen, and I think this is really important, mostly what I'm involved in now is legal cases.

[00:54:50] So the legislation up until recently anyway has been there, but it just hasn't been applied. So I spend most of my time writing evidence for court cases. The most recent one, one of the, indigenous tribes here in Na Tahu, which covers more than you know, area-wise. Half of New Zealand has taken the government, the crown to court to take over freshwater management.

[00:55:15] Basically the saying, you the government of New Zealand have failed to protect freshwater. It was an agreement that we had under a treaty and you haven't done it. And so I've been. Cross examined in high court in the last couple of months, presenting that evidence and the, gains that we're having is in court.

[00:55:35] So, so the legislation's there, you know, coming back to your question, to me it has to be at the highest level to then empower the lower levels to be able to go back to that legislation and say, you said here that this is what you were gonna do. And, we force it to happen that way. So we have a lot

[00:55:53] **Nate Hagens:** of viewers of this program around the world, who are systems thinkers and care about how all the issues interconnect.

[00:56:03] What sort of advice would you give to someone, who's understanding the risks that, the water, and climate pose to coming decades? What can they do, either in their own lives, in their communities, or to play a larger role in, our, collective future with respect to water issues?

[00:56:25] **Zach Weiss:** My favorite thing to advise people to do, it's super simple.

[00:56:28] Go outside in the rain, put on a nice rain jacket, get your umbrella, go outside in the rain and learn from that landscape. The water in the land is gonna show you everything that's unfolding, and you're gonna very quickly understand what areas are rejecting the rain, what areas are receiving the rain, the areas rejecting, that's creating the flood downstream, and the drought later on.

[00:56:50] And so simply by just spending some time get nice and bundled up outside in the rain, you can learn everything you need to know about water management on land. Okay,

[00:57:00] **Mike Joy:** Mike? Oh, I think it from individual point of view, Getting meat out of your diet is, gonna be a big one. I mean, animal agriculture without a doubt in, this part of the world is the biggest issue for, water quality and for the state of our rivers and the catchments and the flooding and all of the impacts that have happened because we've deforested.

[00:57:22] **Nate Hagens:** Can you just spend one minute on, the logic of why that statement is true?

[00:57:30] **Mike Joy:** All of that nitrate that ends up in our waterways is put there to grow grass for these animals to, to eat. And, that it is from that, I mean, we

have 10 million cows in New Zealand, and if you look at that, you know, like we, you know, you talk about the human equivalence with, energy, slaves, or if we look at human equivalents for those cattle, then we're looking at equivalent.

[00:57:53] So we've got 5 million population, 10 million cows, but that 10 million cows is equivalent to, you know, 150 million people in the amount of nitrogen and, pathogens that come out of them. So, and, I'm sure that big parts of the states, it's very similar. It's the, animals, the crops that are grown for the animals and the animals themselves that are a big part, but

[00:58:17] **Nate Hagens:** wouldn't,

[00:58:18] the grass or something grow.

[00:58:21] Even if we didn't have cows or you wouldn't have to water it, you wouldn't have to continually water it if it, you would follow natural cycles.

[00:58:28] **Mike Joy:** Yeah, I mean that's the thing. It's not, the cows. If you go back to the 1990s here, we had about one cow per hectare. We've now got about four cows per hectare, and the only way you have four cows per hectare is pouring on nitrogen fertilizer.

[00:58:41] In our case, we import huge amounts. We're the biggest importer of palm kernel, so we feed them with palm kernel, nitrogen fertilizer. And so that's how you get that high intensity of, animals and all the harm that comes from if you were back, if you were farming cows in a natural way. The way we did, you know, in the past the nitrogen is fixed by clover in the pasture, so we didn't have to add nitrogen fertilizer.

[00:59:07] We fixed it naturally. So if you got back to those levels and so that's what I'm, why I'm pushing that, not. Stopping animal agriculture, but massively

reducing it to, a natural level. And that would have so many beneficial effects for, freshwater, for greenhouse gas emissions and, all of those things, just linking them together.

[00:59:27] Thank you. Heather.

[00:59:29] **Heather Cooley:** Yeah, Bo both great points. I, would add to that, in terms of your, home. So starting, where you live is to look at ways in which you can be capturing more of that rainwater on site, slowing it down right into the landscape and reducing waste inside and outside the home.

[00:59:50] I think those are critically important. But then going out beyond that, looking where we at where we work, what are the opportunities there for the workplace to be a better water store for the company, to be a better water store or the government where wherever your nonprofit, wherever you're working, and then looking even beyond that to the community, what are the ways in which the community can be implementing some of these solutions?

[01:00:14] And I think, you know. While we've talked about a lot of these global issues and we absolutely face global challenges in many places, water is managed locally, right? There are locally elected boards, water utility districts, et cetera. And so there is a real opportunity for people to engage, even just starting by showing up at those meetings hardly anyone does.

[01:00:39] and so, you know, getting engaged, thinking about when you're voting what, the candidate thinks about water, really pressing that issue, I think can help to elevate it, but then get involved in local organizations and local government, to find ways to, help solve some of these complex challenges, that we face.

[01:00:59] **Nate Hagens:** Thank you. Yeah. I, have so many questions on this, but, I would like to ask each of you, just as human beings who are aware of climate and

water and biodiversity loss and all the things, do you have recommendations, or ideas for the people watching this show just generally on how to, engage with the issues of the, of our time?

[01:01:26] Heather, start with you.

[01:01:27] **Heather Cooley:** Yeah, it's, a really important issue. I mean, we are faced, with lots of crises, on a daily basis. and so I do think it's about balancing care for the environment and society with, self-care and just making sure, you know, you are taking the time to go out and enjoy those things that you love.

[01:01:50] you know, personally I, going for a walk, just getting out, really helps me. I, would also, the other thing I would add is just, we can focus in on all of the disasters and the bad things, but we can also make a shift and a choice to look for signs of hope, identify ways to really amplify and build on, those areas.

[01:02:12] I think it's critically important for people working in this space, but in order to ensure longevity. But it's also important for people just in their, everyday lives.

[01:02:22] **Nate Hagens:** Well, that's why I kind of asked, because the three of you have chosen, on the economy, environment side of the ledger.

[01:02:31] You're, working on the environment side. and, it, it can't be easy, always this path. Zach, what are your thoughts?

[01:02:41] **Zach Weiss:** The biggest thing for me is educate yourself about all of the incredible stories that are out there. The success stories of people restoring their landscapes, rehydrating their landscapes.

[01:02:52] This is why we created water stories. 'cause there's amazing examples from all around the world of people implementing all of these things, but they're

just. So little known, and it's so easy to get wrapped up in environmental despair. But in fact, you have all of these clear examples and clear solutions from every continent, from every type of people.

[01:03:16] And I've been amazed hearing from some of our students how it's actually cured their depression. 'cause now instead of focusing on all the problems, they can put all of their time and energy into the positive solutions that exist, work every day towards creating more positive outcomes. And then you just have all this positive energy within you as a result of that

[01:03:38] **Nate Hagens:** is one of the positive, examples or possibilities, getting rid of, green lawns in front of people's houses.

[01:03:47] It certainly could be. what are your views on that?

[01:03:50] **Zach Weiss:** Oh, I mean, you look back to the source of lawns and lawns were from feudal times in England where they would take crop fields and grow a lawn on it to show that they were so wealthy they didn't need to use this productive land for agriculture.

[01:04:04] Yes, it's a, vain good,

[01:04:07] **Nate Hagens:** a,

[01:04:07] conspicuous consumption signal.

[01:04:09] **Zach Weiss:** So it's something we could really do away with, you know, can we create living biodiverse habitats in those areas? Can we, can heavily reduce our water usage in those areas, and create really good biodiversity and ecosystem outcomes in those areas that are otherwise just, you know, kind of an ecological desert.

[01:04:30] **Mike Joy:** I mean, I, don't know the, whether Heather and Zach get the same kind of flack that, that I get. I'm a freshwater campaigner here, but I come up against this huge industry and, they turn very nasty, you know, litigious and threatening and people have wanted me to be, or called for me and public to be hung, drawn and courted and,

[01:04:51] **Nate Hagens:** oh,

[01:04:52] **Mike Joy:** it's, it, is, pretty nasty here when you, question this big system.

[01:04:56] So I've seen, you know, friends burn out and fall by the wayside, and so I, I totally agree with the other two about that, you know, making those connections and getting into, freshwater, into nature and connecting with it and how important it is. It's very limited in what you can do. And I kind of, I feel more and about all of the issues that you talk about, Nate.

[01:05:19] It's, a crisis of imagination. It's our inability it. To imagine a world that isn't like this, because this is all we've ever known. and in my case, all I've ever known is that, as a kid, our rivers were clean and I could swim in them. And now that's changed. When I started studying as an older student, nine, 20% of our native fish were listed as threatened with extinction.

[01:05:47] Now it's 74%. So just in three decades, you know, we've gone that, that far in the wrong direction and we've, done so much work. 10 years ago, polls showed that fresh water was the number one environmental issue for New Zealanders, and now it's just fallen right off the chart. So we've peaked and we're, slipping away now and we're in, the process of seeing all of our fresh water protections being thrown out with this, system at the moment.

[01:06:18] So it's very hard not to, feel. Negative about what's happening here. we just, I guess we hope for a coup and that it will turn around. Well, thank

[01:06:30] **Nate Hagens:** you for, I, I mean, I've known you for a long time, so thank you for continuing your Sisyphean task. I don't usually ask this on round tables, but I will.

[01:06:41] If you had a magic wand, that there was no risk to you personally and no recourse, what is one thing you would do to improve human and planetary, or even water futures? Heather, start with you.

[01:06:56] **Heather Cooley:** Yeah, so, I, think with, respect to that, I think one of the key things that we need is to, really understand and respect the value of water.

[01:07:08] so I guess if I had a wand, IWI would wave it such that everyone did understand and respect that value.

[01:07:15] **Nate Hagens:** and is that what you're doing at, the Pacific Institute is trying to educate people on these things?

[01:07:20] **Heather Cooley:** It is certainly a re a really big component of, what we do is not only looking at success stories, strategies and approaches that are working, but really sharing that, we do a lot of work with the media.

[01:07:32] We do a lot of sort of other forms of outreach, to, really get people to, to understand that. So absolutely. it's not only understanding it, but then, how do we solve it?

[01:07:44] **Mike Joy:** Mike magic wand would make a, law that, No money is to be involved in political parties. There isn't just completely take the money out of the whole democratic process because it's just so obvious here that our politicians

have been bought out by industry and they don't even embarrassed about it anymore.

[01:08:05] They're quite open about the fact that they've received money from, and then I immediately, you, you see them, we've got this thing called, they're calling fast track legislation, so we don't have, we only have one layer of parliament here. And so they've, fast tracking and they're not going through any of the due process and just throwing out laws.

[01:08:25] And it's, and you can see exactly that, the funders who paid for their campaigns are the ones that are being given the special treatment. So if we could somehow take that out because New Zealanders, you know, I'd say all the people of the world understand. the, problems and, they, there's just a tiny proportion of the population who profit from all this harm, and most of us pay the price.

[01:08:53] and that's so un somehow undoing that little. Process would be the thing

[01:08:58] **Nate Hagens:** you're not the first, guest to, suggest that as a magic wand.

[01:09:03] **Zach Weiss:** Zach, since Heather already used her magic wand to get everyone to respect water, I can go in a new direction with mine. and I would say it would be to really get everyone to understand the intimate, interconnected details of the water cycle and the approach of water cycle restoration because it's so simple when we understand these things.

[01:09:25] There's so much agency that we actually have, and it's confusing, but I always tell people I wanna have the biggest environmental footprint possible. They're thinking, what on earth are you thinking? Because we can have a positive environmental footprint and we're, if we're only ever focused on having a less

negative footprint, we're always gonna be going negative, just maybe more slowly.

[01:09:48] So how do we really start to build that positive footprint?

[01:09:50] **Nate Hagens:** I totally agree with that. in my. Lectures to young students. I talk about maximizing your impact, not minimizing it. so let me close with this. What is one thing that each of you are working on or seeing that you're particularly excited about?

[01:10:08] probably to deal with water, but it could be anything in, your life. Zach, start with you. Springs coming back to life

[01:10:15] **Zach Weiss:** Springs that when weed. Springs Spring Water, the highest quality water, drinking water, true drinking water for humans and for animals being revived as a function of our work. And this has happened in our own projects.

[01:10:29] This has happened in our student projects. We're creating enough retention and infiltration is actually reviving the flow of springs. Sometimes creating new springs, sometimes making springs flow five, 10 times or more what they previously flowed. And this is all just happening in a couple of years.

[01:10:47] **Nate Hagens:** And is that, is the technology to do that, universally, applicable?

[01:10:54] Like could I find a how to guide on how to do that where I live?

[01:10:58] **Zach Weiss:** Yes, there's gonna be geological conditions that need to exist. So it's not that you can just create a spring on any landscape, but it is using Earth to hold water and get it going into the ground. That water that goes into the

ground ends up coming back out as fresh, clean, filtered water in waterways, in rivers, creating those springs and creating those flows and the life that results.

[01:11:23] **Heather Cooley:** Such a great question and so hard to choose. I think one of the, some of the work that we're doing that I'm, really excited about is looking at, ways to reimagine revision, sort of our urban landscapes. looking at ways of making them less dependent on, you know, applying.

[01:11:45] Irrigation water essentially, and letting them use kind of water that's, coming naturally. and looking at ways of putting in native plants, low water use plants, to really kind of make those areas greener, make 'em more resilient to climate change, supporting biodiversity. So, I, think it's exciting work.

[01:12:08] We're also looking at ways that low income households, can benefit from those as well. And I just think it's gonna have a real knock on effect. as, folks realize the, many, benefits of these, transformations,

[01:12:24] **Mike Joy:** what's making what's. Spinning my wheels at the moment is, working with the indigenous people here, the Maori people in New Zealand.

[01:12:32] And mostly it's involving the court cases, but it's getting that management back with the people who have, values other than economic values, you know, so they're much more connected. And so I find it so, invigorating working with these people and teaching in that space as well. So, so that's where my, that's where my effort is going now.

[01:12:56] **Nate Hagens:** I hope it brings you a little joy. Thanks. thank you all for your time and your continued work on this issue. This was just a, the, a tiny scratching the surface of the importance of water, in our current world and the changing landscape with climate and pollution and everything else. thank you all and, Be well, thank

[01:13:20] **Heather Cooley:** you. Thank you.

[01:13:21] **Nate Hagens:** If you enjoyed or learned from this episode of The Great Simplification, please follow us on your favorite podcast platform. You can also visit The Great Simplification dot com for references and show notes from today's conversation. And to connect with fellow listeners of this podcast, check out our Discord channel.

[01:13:43] This show is hosted by me, Nate Hagens, edited by No Troublemakers Media, and produced by Misty Stinnett, Leslie Balu, Brady Hayan, and Lizzie Siri.