

Intro music plays

John Fleck: Certainly, climate change is also our fault. But the bottom line is we're using too much water. Humans have to use less of it, and that's a challenge.

Heather Himmelberger: This is water's moment. We finally have a lot of attention in a lot of different places on water, and we need to really take advantage of it.

Carly Bowling: Do you remember learning about the water cycle in elementary school? Today, I'm going to take you back to that day. You first learned about water to refresh your memory, because if you've read the news recently or if you live in the western United States, you may know that water is kind of a big deal. So, while I do not have a diorama for you nor a giant water drop mascot for you to high five, sorry, I hope you will listen as we explore this enormous topic that is water, where it comes from, how it arrives to us in our homes, how population booms have impacted our use.

And finally, where does climate change come into play with this situation? I'm Carly Bowling and you're listening to *It's (Probably) Not Rocket Science*. So regardless of how much you remember about water, here's a quick refresher for you on just a couple of things. You'll hear a lot of talk about groundwater and surface water in this episode. So just as a reminder, groundwater is precipitation or snowmelt that has made its way deep into the ground below the water table and it sits in the porous space between rocks. Rivers, lakes, and reservoirs are, you guessed it, examples of surface water, which is the primary water resource for some parts of the country. According to the United States Geological Survey, about 65% of drinking water in the U.S. is surface water, with 35% of drinking water coming from groundwater. Now, you won't find a lot of surface water in deserts. Obviously. So, a few of the primary other options for providing water are pumping groundwater, if it's even available, hauling water in, which is extremely expensive and logistically challenging, or essentially fueling rivers or canals with water from a larger source. In much of the west, the source providing that water boost is the Colorado River and its reservoirs and even the Rio Grande receives some of its water from the Colorado River.

John Fleck: So, the Colorado River is the largest river in the southwestern United States and southwestern North America. It flows into Mexico as well. It starts in the high country of Colorado and Utah and to a lesser extent in New Mexico and Wyoming and flows down through mountainous regions of the upper Colorado River basin. And then it narrows down, and it flows down through the canyon country, through the Grand Canyon, and emerges into the deserts of the southwest to Arizona and California, Nevada. It is the most important water supply for something around 30 to 40 million people in the United States, in Mexico.

Carly Bowling: That's John Fleck, a longtime science journalist turned professor of practice and water policy and governance and the writer in residence for the center at UNM. He served as director for UM's Water Resources program from 2016 to 2021. John is an expert on the management and governance of the Colorado River.

He's written two books on the subject. *Water is for Fighting Over (and Other Myths About Water in the West)* and *Science Be Dammed: How Ignoring Inconvenient Science Drained the Colorado River*.

John Fleck: It is a critical water supply to us here in New Mexico, to Albuquerque. And we're outside the Colorado River Basin. But like many of the places I've lived in my life, we get water from the Colorado River basin. We run it through dams and canals and pipes to cities that are outside the basin. And this is true across the front range of Colorado, in places like Denver, here in Albuquerque and Santa Fe, Los Angeles, and San Diego. All well outside the basin and yet dependent on that river for its water. It is also the chief water supply for many millions, probably three or four or five million acres of irrigated farmland. And really importantly, these rural communities that depend on that agricultural water for sort of their well-being. So, it grows food for us. That's important, but its real importance is the cultural value to all these rural communities across the Western United States. And then really importantly, there are 30 tribal sovereigns, Native American communities that have been on this landscape from time immemorial, who get their water from the Colorado River, who have deep cultural, spiritual, and religious attachments to it, who use that water for their farming and their municipal water supplies as well. And then it's a magnificent environmental amenity as well, right? That canyon country is magnificent. The fish, the birds, the riparian vegetation, the trees, it is a river doing a lot of work in a whole lot of different dimensions.

Carly Bowling: Wow, yeah, I'm glad you touched on the cultural element of water, especially in the Southwest. Why do you think the water issues are so intertwined?

John Fleck: So, when you are in a desert, water is central in a way that... water is central everywhere. But if you live in a place that has a lot of it. It's like not a big deal. It's just like there, it's all around you. If you're in the northeastern United States, if you're in the far Midwest, the upper Midwest, places that have a lot of water, it's just always there.

It falls from the sky. You can grow a wheat field or have a city without having to think too much about the volume. And sometimes you have to worry about having too much, right? There's going to be flooding. When you're in the desert, it's different. And there's this this wonderful book called *The Desert* by a guy named John Van Dike, where he describes traveling across the desert and it's dry and it's barren and then you come across the lip of a hill and you see a river valley and there is this ribbon. There are these ribbons of green along those river valleys and as people from time immemorial, from the indigenous communities that were here before colonization, the Spanish, the American colonizers, we all gravitated to the water and we built our cities around it and we built our farms around it, and we then extended it out to serve these communities. So, we're all deeply tied culturally, economically. As a practical means of existence to these rivers that are in our midst, you know, and, and here in Albuquerque, the Rio Grande is that river for us. And throughout much of the west, the Colorado River is that river for many, many people.

Carly Bowling: Yeah. And so how do these states and tribal nations work together to share the Colorado River?

John Fleck: The glib answer right now is we're not working all that well together at all, but we can talk about that. From the early 20th century, folks realized that developing the kind of society we were trying to develop with the arrival of United States with Americanism would require collective action on a scale that we'd never had before. Used to be. You live near a river; you take some water out of it. You never took out enough to harm anyone downstream because the rivers were big. When you're trying to do something at the scale of millions of people or millions of acres of irrigated land, suddenly the actions you take harm your neighbors, the folks downstream or are affected by the folks upstream. And so, in the 1920s, the seven states that make up the Colorado River Basin, one of which is New Mexico, came together and negotiated a water sharing agreement called the Colorado River Compact. And the idea was to sort of divide it up in a way that felt fair and equitable to the negotiators at the time to allow everybody to have their farms and their cities signed the agreement, actually in 1922, a century ago, actually, in Santa Fe, New Mexico, at the palace of the governors, and divided the river essentially in half the folks in the lower basin. So Arizona and California and Nevada would get half the river. The upper basin states, which is us here in New Mexico, along with Colorado and Wyoming and in Utah, would get the other half. But I'm putting scare quotes. You can't see me doing this because we're audio but scarecrows around half because they didn't really know how much water the river really had. And so, they made a mistake. Yikes. And, you know, this is what science be damned. The book, the draconian of wrote is about they mis estimated the volume of water available. They pretended there was more water available than there was, and it made it easier to do a political deal. Everybody says, yeah, there's going to be plenty of water, so we'll get ours. They've allocated this water in absolute amounts rather than saying like in percentage, you get half, and you get half. There were specific numbers attached to that, and it turns out that the Colorado River even then was a lot smaller as a river than they thought. And really importantly, they did this by ignoring science that was available at the time.

Carly Bowling: Wow.

John Fleck: The best available science suggested that they should be cautious, but caution was not going to help them get a deal right. And they knew that the deal was important and that the problems would take a long time to manifest themselves. Until across the 20th century, it became increasingly difficult to meet the demands on the river that the agreements that we signed in 1922 placed on the river and we finally have reached the breaking point in the 21st century. We would be at that breaking point even before climate change had reduced the flow of the river, but climate change then has made it even worse. And so, the 21st century, as a result, poses real challenges for figuring out how to share this river that we all depend on.

Carly Bowling: That's really kind of frightening. What's the primary cause of the river's depleting levels? Is it this original sin of overallocation, direct human action or human-caused climate change?

John Fleck: Yeah, and it's all of the above and so even if we hand over I mean, even if we didn't have climate change, the overallocation of the river allocated a lot more water than the river really has and it took us most of a century to build the cities and the farms and the dams and the canals to start using all that water. But when we finally did, by the late 20th century, it was absolutely clear that we were using more water than the river had to offer and in the 21st century, it has become clear that climate change is reducing the amount of water further. So, it's always our fault for taking too much, right? If there's less water in this river, we have to take less of it. It's our fault. Certainly, climate change is also our fault. But the bottom line is we're using too much water. Humans have to use less of it, and that's a challenge.

Carly Bowling: How does human water use today in the West compare to like ten or even 20 years ago?

John Fleck: So, this is really interesting because I think there is a myth or a misunderstanding that population growth is what's causing this problem and in fact, if you look at the major urban areas that depend on Colorado River water, they're all using less water than they were ten or 20 or 25 or 30 years ago, even though population has increased. So urban water conservation is, in fact, succeeding. There's a remarkable thing going on this year. Right now, Las Vegas, Nevada, which is dependent on the Colorado River. They're using the same amount of water this year that they used in the mid-1980s, and their population has tripled. Right. Tremendous water conservation success, you know, here in Albuquerque. Our per capita water use right now in 2023 is half of what it was in the mid-1990s before we began major water conservation efforts. So, cities are doing a lot, but the majority of the water in the southwestern states is used in irrigated agriculture and those are communities that are economically dependent on that. Those are communities that have been there for a long time and under the legal structures around how we allocate water, they have a higher priority right to the water and they're loath to give it up.

Carly Bowling: Right.

John Fleck: And you kind of can't blame them. It's their livelihood.

Carly Bowling: Sure.

John Fleck: But by the same token, the only way out of this mess is for cities to continue the conservation path that they're on and still do more. But we're going to have to irrigate less land in the deserts of the southwest. There's just no way around that. The water simply isn't there to do anything other than that.

Carly Bowling: Between the upper basin and lower basin states. How do the rates and water use differ? And which states rely most on the river?

John Fleck: Oh, this is a great question. So, the Upper Basin states in theory. So, this would again be Wyoming and Colorado and in Utah and New Mexico in theory get half the river. But they

developed much more slowly. They have much less irritable farmland that can be reached for the river from the river. So, they're using actually right now a lot less water than the compact said that that they were entitled to. This is a bad thing if you think we're entitled to all this water and we're not getting it. This is a good thing if you point to the fact that there's never that that water is actually not in the river. This has helped forestall this problem for a while. You have major urban areas that are extremely dependent on the Colorado River. So, you have places like Denver in the Front Range in Colorado, which have some water on their side of the Rocky Mountains and move a lot of water from the Colorado River basin, through the mountains, through tunnels and ditches, very heavily dependent on Colorado River water. Albuquerque is in some sense entirely dependent on Colorado River water. That's a little bit misleading because we have the ability to fall back on groundwater and pump groundwater from our aquifer. But that's not a long-term sustainable approach. So, we use Colorado River water as our primary supply and as Colorado River water shrinks or as we face risk because of the problems in the basin as a whole, potentially causing some curtailment of the water available to us. We're at great risk. The community that is absolutely the most at risk is Las Vegas, Nevada, a fascinating place because I mentioned earlier, they're sort of best in breed at water conservation. They're really good at it. They have to be because they're almost entirely dependent on Colorado River water. They have no other source of water. So, they have a real incentive to conserve. And they also have a real incentive to act as leaders to try to solve the basin-wide problems so that the whole system doesn't just blow up and they become collateral damage to litigation and political problems.

Carly Bowling: So, as John outlined, irrigated land plays a huge part in managing Colorado River water use. The states in the upper and lower basins have been trying to reach some sort of agreement about how to conserve the water for a long time. But it's been hard to reach a consensus. In May, a few of the states released a letter that pointed to some sort of agreement. But there are some questions as to how that might come into fruition. So, John will explain that in just a second.

John Fleck: The governance of the Colorado River is in a bit of a chaotic state right now. You know, when I wrote the book *Water for Fighting Over*, which, you know, I finished the manuscript in 2015, so more than seven years ago, things were going well. There was a lot of work on conservation, and it was succeeding and there was a lot of work on collaborative governance. When the book came out, I was a bit of a, it was an, it's an optimistic book about our ability to solve these problems and this was a bit of a surprising thing. People usually write about the Colorado River as kind of Debbie Downers and I was this guy who'd written an optimistic book and people would invite me to come speak at their conferences and like, there's this guy who's an optimist, let's hear what he has to say. And I would give my optimistic pitch and I would talk about water conservation and collaboration around water. And then the climate change scientists would come up and they would talk about the risks that we face and there's always this uncertainty about climate change science. We know it's going to be less water, could be a little bit less water, it could be a lot less water.

And I would look at their graphs and their charts and I would think, you know, if we're on a lot less water, you know, the stuff that I'm talking about won't be enough. And if you look at what has happened in the last two or three years on the for years on the Colorado River, we had a series of very bad years where we had big snowpacks, but it just didn't translate into water in the river. Right? That's climate change, warm temperatures, less water in the river for a given amount of snow and the dropping reservoirs accelerated beyond the ability of these collaborative governance systems to solve their problems. And we were at risk of a catastrophic collapse. We started talking for the first time about what we call dead pool when the river reservoirs, the big ones on the Colorado River, get so empty the water can't get out and that caused a real struggle, especially among communities that depend on Colorado River water for their economic livelihood, these agricultural communities and we just had this explosion in the early spring that was a risk of significant litigation that would have tangled up river management in a way that was just unacceptable to everyone. So, three states that matter most for trying to figure out how to solve the problem, which are Nevada and Arizona and California, came together with what has been called an agreement. It's a little thin on the written details to conserve substantially more water over the next several years and the big incentive here is that farmers who are going to fallow land or not irrigate or use more efficient irrigation systems will be paid substantial amounts of money. So, we have billions of dollars, federal money to pay people essentially to not use water and this may get us through the next couple of years, but there's problems with this agreement. First of all, it's not really an agreement. We don't have signed deals for many of these parties. Everybody's just said we promise, and we have to trust that they will do this, but we know in the long run that there is not enough money to keep paying people to not irrigate and so the kinds of problems that raise the threat of litigation in the early part of this year are not going to go away and there's a second really important problem. And, you know, I talked about the 30 tribal sovereigns, Native American communities have legal but also moral entitlements to water that they often don't have because a history of a century of colonial racism. We paid for irrigation infrastructure for non-Indian communities and not for Indian communities. So, they got a legal right to water that they don't have any way to use because they didn't get the subsidy that these farmers got.

Carly Bowling: Sure.

John Fleck: So now we're paying farmers to use water that they only have because it's because the Indians didn't get it. We're paying the wrong people here and there's a really important ethical issue that we're going to have to confront as a society in terms of our legal and moral obligation to those Native American, those indigenous communities. And I think that's, you know, that's the great original sin of the Colorado River Basin, and it hasn't gone away.

Carly Bowling: Wow. Yeah, it definitely sounds like it. So, can you talk to me a little bit more about the federal money, where that money would come from and how much of it is available?

John Fleck: Yeah, so federal infrastructure legislation and the Inflation Reduction Act legislation allocated billions of dollars to the Bureau of Reclamation with a B, I think it's around \$4 billion of money that can be used to do a variety of water conservation efforts and the most likely path

is simply paying farmers not to irrigate. We don't have the agreements in place that would allow that to happen and that's a nontrivial problem, but that's essentially what we will do is pay people to not use water.

Carly Bowling: Okay. So, while we're on the topic, I know that you mentioned that there haven't been a lot of like a written agreement. What agreements would be necessary to make something like that happen?

John Fleck: So, there are a couple of things that need to happen. One is the water agencies involved have to sign formal agreements with the federal government that have to be acted on by their boards of directors. The federal government has to have contracting mechanisms in place with water agencies to move that money, to have the formal commitments and we've seen that process tangled up right now. We've had the Imperial Irrigation District in California, which is the largest water user on the Colorado River, has been ready since late last year to conserve a bunch of water as soon as the contracting mechanisms are in place. They're not. And I don't understand the reason why.

Carly Bowling: Hmm. That's not great to hear. When you think about removing water from agriculture, I think some people get nervous because it's like, well, where's our food going to come from? So, to what level is the agriculture in the southwest important to the nation?

John Fleck: So, it's important in some ways and there are other ways in which it's not. And so, for example, if you're eating lettuce in the winter anywhere in North America, you're eating lettuce grown with Colorado River water, mostly in Yuma, also in California and some in northern Mexico. It's coming out of fields through packing houses up on the mesa above the Colorado River in Yuma and it's in your salad bowl here in Albuquerque three days later. And that's essentially all of North America's lettuce supply but it's only a subset of the land and it's the most lucrative crop. But if farmers have more land and more water, they'll grow other crops and so you'll see, you know, and there are a number of crops that are like this also high value, important to our food supply, carrots and onions, for example, broccoli. I've got a friend who grows it, just a huge quantity of broccoli down there in the desert. You know, melons. Those crops are really lucrative and so farmers will grow them. Even if the water supply shrinks, they'll still grow the most lucrative crops. And we have seen this and in fact, this is some research that I'm working on with the University of New Mexico. Economics colleagues, colleagues Eugene Wang and Benjamin Jones, were studying how Imperial uses water under shortage scenarios. The crop that's taken out of production when water gets short, and we've seen this over and over again, its alfalfa, it's very drought tolerant crop. It's great to grow in the desert if you've got land and water, but you don't make as much money off of it as you do with lettuce. So, they'll always grow all this lettuce. As water supply shrinks, we see alfalfa, alfalfa acreage going down. We grow alfalfa everywhere in this country. Alfalfa is an incredibly durable crop, can be grown under a variety of circumstances. So if you look at Yuma and Imperial, they grow maybe 2% of the nation's alfalfa. So, it would be a hardship for the people who make their living growing alfalfa. I don't want to minimize that, but it will not affect our nation's food supply. Our nation's

food supply is secure. What's important is the cultural value of the life of these rural communities. That's what we need to focus on.

Carly Bowling: Yeah, it definitely sounds like it. I guess. And thinking about how these things can be applied to just average people who don't farm, maybe they live in cities or rural areas. How can those people help conserve water?

John Fleck: So, it's really important that folks in communities that are listening to this do two things. The first thing is use less water. And as I said, we're all pretty good at that already, but think about the choice you're making. If you plant or don't have a lawn, be conscious of the value of the trees in your yard. Don't let your trees die. They provide enormous value of the shade, the urban heat island, cooling benefits, the air quality benefits of trees. So don't get rid of all outdoor landscaping, but really focus on the outdoor landscaping that provides the most value to us. You know, trees, pretty greenery, but lawns, eh. Indoor water fixtures are less important because generally speaking, in a place like Albuquerque, we're cleaning that water and putting it back in the Rio Grande, where it can be used by the ecosystem or folks downstream. But that's important, too, right? And, you know, low flush toilets are a no-brainer now they use a lot less water, showerheads, water fixtures, but the more important thing is to interact through the democratic processes, to think about the expectations you place on your local government. And the biggest challenge I have seen, and this was really clear when I wrote *Water is for Fighting Over* seven years ago and even has become even more clear now that local governments are incredibly important to this process, local governments need to be willing to recognize that we face a future with less water and we can't just say, well, the Colorado River promised us Acre feet of water. Why can't we get it? Why are we just letting it go downstream to Las Vegas or Phenix or L.A. to recognize that we're all going to have to contribute and that if we at the local level lawyer up and fight for our piece of the Colorado River, that's what leads us to catastrophe, as if everybody fights for their share and doesn't recognize that everybody's share has to get smaller and I think that's the really the most important lesson of the ten years that I've spent studying the Colorado River is that it's really important because water is always used at the local level, one farm field and one showerhead at a time that we all think about how in our own personal use and in our interactions with the broader water sharing system, we collaborate and use that as an approach rather than just fighting. One of the really important messages, and this is really the heart of my book, *Water for Fighting Over*, is that what we have seen is that communities are always afraid if their water supply shrinks, "Oh my gosh, we can't possibly do that," and then their water supply shrinks and they're fine, right? When people have less water, they use less water and if people can get over that limbic fear of the risk of the impact of climate change on our water supply, that leads us to sort of fight for our piece, that's the key to solving our water problems.

Carly Bowling: All right. So, I hope this conversation with John Fleck opens your eyes to just how collaborative water management needs to be. I want you to picture a map of the country and Mexico and the millions of people who rely on this water in one way or another. Now, I want you to zoom in past the state lines all the way into your kitchen sink because water issues can feel very nebulous when you don't understand where and how water gets to you. Up next, we

have a conversation about water systems, how water arrives to our homes and how it's taken away. Because if you've never thought about it before, you might be surprised to learn just how intricate, expensive, and vital these services are.

Heather Himmelberger: I think most people, that is the way they feel. If I turn on the water is, you know, turn on the tap, the water is going to come out. I don't have to think twice about it. And that's actually a pretty good thing. For the most part, we're really happy about that because that means we're doing our jobs as water professionals if you can just forget about it. Hi, I'm Heather Himmelberger. I'm the director of the Southwest Environmental Finance Center, and we're located within the Center for Water and the Environment at the School of Engineering, and this is a job I've had for the last almost 30 years and really love what I do, and that's why I'm still here.

Carly Bowling: The Southwest Environmental Finance Center is one of several centers around the country established by the EPA to help communities manage the costs of environmental programs. Heather's center works primarily with small water and wastewater systems in region six, which includes New Mexico, Arkansas, Louisiana, Oklahoma, and Texas, as well as 68 federally recognized tribal nations in that region. The support is important because while larger systems can be run by professionals in the water utility field, smaller systems are often run by groups of homeowners or volunteer board members who may not have backgrounds with water. Can you imagine how challenging that would be?

Heather Himmelberger: Primarily, we work with small water and wastewater systems. We help them improve their compliance and improve their infrastructure to better manage what they have to do better, serve their customers, help with financing those water systems. So bringing in outside dollars or helping them set a rate that brings in the dollars from their customers. So, kind of anything related to how to provide the basic water and wastewater services to communities is what we do most of the time.

Carly Bowling: Yeah. So, the center was recently awarded a \$4 million grant from the EPA. What are you going to use that for?

Heather Himmelberger: So that money was associated with the official name is the Infrastructure Investment and Jobs Act. So, IIJA, but we all call it the bill, the bipartisan infrastructure law. So, most people call it that. The bill law and the bill law has lots of infrastructure funding. But the part we've been concerned about is \$50 billion extra for water and wastewater so it's a lot of money over the course of five years. So over five years we have \$50 billion we can spend. It's not so simple to just say we have \$50 billion, have at it. We really need to figure out how to get the money to the people who need it and in particular, they were really interested in getting money to people who haven't been as well-served by some of the funding programs because maybe they just didn't know about it or they didn't have the ability to fill out the forms or just we were talking about the fact that they're volunteer boards and they're really overworked already just doing the day-to-day things they have to do, plus their own life and their own jobs.

Carly Bowling: Sure.

Heather Himmelberger: So, trying to make sure that those people knew about the money and got the help they needed to access it. So that's a big part of that \$4 million we got is really to get out and help the traditionally underserved communities and give them, you know, a helping hand. So if they need a helping hand to fill out the application or to help create the documents you need as part of the process or even think about what kind of project they need to do. So sometimes you might know you need to do something, but you don't know what you need to do because again, it might not be water professionals running the system, so just helping them vision what they need to do and then helping them the whole way through the process of getting the money and then maybe building some of their local capacity. And just to understand the maintenance that needs to be done and helping them get a map or inventory of assets or things like that. So, it's really to help them in any way we can with the hope that we can get the money well spent, the 50 billion really well spent across the country.

Carly Bowling: I want to talk with you a little bit about what a water system is made up of. I think for most people, it's something they don't have to think about. You know, you turn on the tap and the water disappears in most places in the U.S. And so, I would love to hear kind of what makes up a water system, what makes these systems so grand and expensive and challenging?

Heather Himmelberger: So, it has to start at the source. We have to have water to begin with and in New Mexico, that's particularly challenging. We're in a time where we're having climate change impacts. We're in a drought, it's very dry, it's hot and dry. So just having water at all is the first step. So where is that water going to come from? And so primarily it comes from groundwater. So, we have to drill a well into the ground and bring the water up. Sometimes it does come from a river. So, for example, Albuquerque takes some of its water out of the Rio Grande, but primarily groundwater is used most in New Mexico.

Carly Bowling: As I mentioned at the top of this episode, the Rio Grande, which is surface water, gets some of its water from the Colorado River, but whether the water comes from groundwater or surface water, if it's coming from a system, it has to be treated before it's served to people who are receiving the water.

Heather Himmelberger: And the next step is we have to treat it to make sure it's safe. So sometimes we just have to disinfect it to make sure there's no viruses or bacteria or anything else in the water that's going to make us sick. But other times there might be something in the water that will have to be treated. So like arsenic, for example, we have systems in New Mexico that have naturally occurring arsenic, which means they have to treat for that because we don't want to serve that kind of water to people, and I'd say most systems just have to disinfect and then after that we have to get it to the customers. So here we are with our water that's been treated, you know, how are we going to get it out into the distribution system to the customers? So, we have to put it under pressure and usually that involves both pumps and storage tanks. So, if you've ever been driving around and you see a big giant metal ball sitting high up or you see a big tank that's coming out of the ground, that's probably a storage tank for drinking water

and we put the drinking water high because pressure relates to the high end of the water. So, if the water is 100 feet in the air, it's going to have a much higher pressure than if it's ten feet near and then it can go from the tank through the pipes into your home. So there has to be a series of pipes that are out there. There has to be a series of pumps and storage tanks. So, it takes a lot to get water from start to finish. And there are people behind the scenes that have to manage all of that, have to make sure the treatment is working. They have to take samples to test the water. They have to make sure all the equipment is functioning and that there aren't any breaks in the pipelines or anything like that. So it is a pretty complicated thing and there can be a lot of pipe in the ground like here in Albuquerque. There's about 2,500 miles of pipe.

Carly Bowling: Wow.

Heather Himmelberger: Right within the city of Albuquerque, just trying to deliver water to customers. So obviously, our city is not 2,500 miles, but the pipes go up and down the streets and they loop. So, there's an awful lot of pipe that comes in just to provide water. So, it is a pretty big deal.

Carly Bowling: What is the importance of being able to have and maintain these systems and just generally having access to water in this way?

Heather Himmelberger: Yeah, I mean, I always tell people that water is sort of the foundation of your community and if you don't have water, you don't have anything. So, if the water is not there, your community is not going to be in good shape and if we think about all the ways that you have to have it there for any business you want to have, you have to have water for any schools or hospitals or public health clinics or anything like that. Water is super important. So, you know, not only for the homeowner, but the entire community has to have water. And so even though it's like the foundation, we don't always think about putting money into it. So, what happens a lot of times is there'll be money coming in to build something, and it could be from the state or the federal government or somewhere else, private sector or something. So, they'll build a water system, but it isn't going to last forever. It has to be maintained. And if it's not maintained well, it won't last as long. So, what could happen is you get a system you don't take care of and it starts to fall apart. And right away you have to do another one. And its way, way, way more expensive to put it in new than to take care of what you have. So we really, really, really want to keep our systems running smoothly and well supported and lots of operation maintenance. And it's hard because people don't like to maintain things. We think of our own lives like how often do you skip a maintenance task of your home or in your car? It's the same thing with a water system. If we don't keep them up or a wastewater system either one. If we don't keep it up, it will not last. It will not work as long we'll have breaks in our pipe, or maybe it will have a public health concern happen. So, we really, really, really want to make sure we maintain those systems to keep the quality of life up and make sure that the customers get good, safe drinking water at their homes.

Carly Bowling: Yeah, and it sounds like they save a lot more money taking preventive actions.

Heather Himmelberger: Yes!

Carly Bowling: Yeah, I think that's an important point. And how does, you know, climate change, the effects of things like wildfires and obviously decreasing water levels, especially in the southwest, how do those things impact the resiliency of water systems?

Heather Himmelberger: Yeah, that's a really, really big topic now is resiliency and so resiliency to all kinds of things. So, one big thing in New Mexico is the fire danger. So, fire can cause all kinds of problems. It can cause source problems if you happen to use surface water, you know, Albuquerque does, and a few other systems do. If you get a lot of ash in the river, that's going to cause a lot of problems in the treatment plant. And generally, they'll shut down the surface water plant if the river gets too full of ash or, you know, some other contaminant like that, because it'll just mess up their whole treatment units and they don't want to do that. There can also be issues with electricity, like it can affect your ability to get electricity. Well, then you can't run your system because you don't have electricity. It can affect the pipes of the fires hot enough. You can actually have the plastic pipes start to melt.

Carly Bowling: Wow!

Heather Himmelberger: Which can be you know, really bad. It doesn't always happen, but if the pipes are near the surface, which in New Mexico, we don't have to bury them that deep because we're not that cold, and if the fire's super-hot, the heat can cause issues with the pipes. So we really have to be careful. And then, of course, all the damage to the facility. So, it could be like if you had a building that had a pump in it, then, you know, it could be that the building burned or it could be that all your homeowners have had losses and how are you going to serve them? So, it can have all kinds of impacts to drinking water. So we have those kinds of impacts and then we have issues with climate change, whereas it's getting hotter and drier, we have more evaporation and we have less water falling, you know, as snow or rain or groundwater resources are dwindling. So, it can be harder to find a source or the sources can start drying up or the levels in the wells can start going down.

Carly Bowling: Developing water resiliency is not a problem for tomorrow. Already, cities in New Mexico have faced contaminated surface water from ash and dwindling groundwater levels. These problems require innovative, inexpensive solutions that involve everything from consumers, conserving water to systems undergoing massive expansions to reach new water sources. Just as an example, the eastern New Mexico Water Utility Authority is facing such low aquifer levels that a report from the New Mexico Legislative Finance Committee estimated its aquifer could have as few as seven years of fresh water left. The Water Authority, which serves people in Clovis, Portales, Texaco, and Elida, as well as an Air Force base, is building infrastructure here to pipe in water from a nearby reservoir. And even though it may sound simple, it's really not. According to the authority, the project will need 110 miles of transmission pipeline to rob water pump stations, one finished water pump station and a water treatment plant. When it's all said and done, the project is projected to cost more than \$1,000,000,000, but the communities will have an additional water source to rely on. These are not simple problems with easy solutions in the alternative to development of a resilient water system could

mean running out of water if your main source is contaminated or if your groundwater levels get too low to pump.

Heather Himmelberger: So, we do have quite a few systems in New Mexico that have one source, maybe one. Well, and that's kind of scary because if that goes down for any reason, you know, you really don't have anything else. So, what can systems do, especially small ones? So, we really have to be careful for, you know, how are we going to plan for that in the future. So, one of the things we'd like systems to think about is can they team up with another system? So, it might be really hard for you to be resilient by yourself if you're just a small system somewhere. So, can they run a line to the neighboring system? And maybe it's not normally open, but if one of them has a problem, can they serve water to the other ones just to make that sharing arrangement? Or could somebody truck water to you if you needed it? So, thinking about ways that they can work together, can you have more than one source and then thinking about the future and can you get conservation in your community to cut down how much you're using to help protect resources? Or can you go look for other resources to be ready in case your resource starts to dry up? And you know, if that's a spring that isn't flowing anymore or again, like the water level drops and you're well and you can't pump it anymore, you know, these are really, really serious problems. And we're going to have to think hard about, you know, how to move forward.

Carly Bowling: So, at this point, you know, how cities in the west get water from the Colorado River and you've heard Heather discuss the challenges water utilities face. So, who exactly is doing the behind-the-scenes work? Well, if you listened to the artificial intelligence episode and you're interested in pursuing a career that's more, let's say, future-proofed, you'll be interested to hear this.

Heather Himmelberger: We need so many more people in the water profession at every level from laboratories to operators to managers to engineers who can design them, construction people can build them. We need every single level of water, professional and so if you're looking for a job, consider water! Yeah, and it could be anything from a high school graduate all the way up to a Ph.D. like there's someplace in water for everybody and I think we really, really have to start attracting more people and the kind of jobs that artificial intelligence is not going to replace, and they can't be outsourced.

Carly Bowling: So good job security!

Heather Himmelberger: Kind of like really good job security, because the water pipes are not going anywhere and, you know, AI is not going to be fixing your pipe breaks and reading meters and things like that. So, it's a really good job and I think we need to do more to encourage people to come in because we're losing a lot of workers and they're not being replaced. And that's something we talk a lot about with our water utilities is just how can they hire an operator? Even if they have a really high salary, sometimes in remote areas, it's still hard to attract somebody, you know, to move to those areas. So, I think looking at home-growing your

talent, you know, trying to get people who are in those towns to want to take those jobs. But that is a huge issue of just getting the water workforce.

Carly Bowling: So those jobs are going to exist in nearly every place.

Heather Himmelberger: Yes. Yes. Almost everywhere we can find water jobs of some type or another. It's a really good career. It's just people don't always know that that is a career path. Oftentimes, if we can get them started, if we can get them like started in a water area, they're happy to stay. And again, there's so many different kinds of jobs that it can be an office job. It could be a financial job if you like, you know, budgeting and that kind of thing. It can be out in the field, if you like to be an operator and like working with your hands, you can be out in the field all the time. So, it's lots and lots of different possibilities. So, it is a really good career for those who are looking for something.

Carly Bowling: Yes.

Heather Himmelberger: Consider water!

Carly Bowling: Awesome. What tips do you have for people in general who want to conserve water?

Heather Himmelberger: One of the big tips is if you have not already purchased a low flow toilet, that is number one, because toilets back in the day, we're about seven gallons of flush and then they went down to about five and then three, and now they're down to just over one gallon of flush. So just thinking about the products in your home that when you do have to replace them, you can look for more efficient appliances and then you can just sort of think about, you know, during the day, how are you using water? You know, are there times when using more water than you need to longer showers or letting the water run like, say you are washing your dishes by hand, and you just keep the water running the whole time? You know, probably not a great idea. So really trying to think through like when can you use less water and how can you cut back? And we've done a lot in New Mexico to really cut back our usage but doesn't mean we can't do more. But over the years we've certainly improved quite a bit with our, you know, gallons per person per day usage has gone down a lot.

Carly Bowling: That's good to hear, especially as these resources continue to kind of decrease. Do you have any closing thoughts on things that we haven't talked about?

Heather Himmelberger: I guess in closing; this is water is moment. We finally have a lot of attention in a lot of different places on water and we need to really take advantage of it. So, this is where we need to really try to bring in that workforce. This is where we try to bring the money to the right places to fix things, really focus on the need to maintain our facilities. So, I am so hopeful that we don't lose this moment in time and that we really do show collectively what we can do across the country to really make drinking water more prominent, more supported. You know, people will pay so much more for a cell phone than they will for their

drinking water. But you can live without your cell phone, believe it or not, a whole lot easier than you can live without water.

Carly Bowling: Yeah, it sounds like despite the fact that a lot of the conversations around water right now are kind of negative, it's almost never been like a more hopeful time.

Heather Himmelberger: Yeah, absolutely. I really do believe that that is the difference now, is there is hope. So, we have all these challenges for sure, but there's also hope. There's a lot of things that we can do and if we work together, a lot of positive changes that we can make. So, I think it is a hopeful time and it's a really optimistic time, and it hasn't felt that way for a long time. So, it's really, really good.

Carly Bowling: Well, I hope these conversations about water were a good refresher for you. UNM is conducting so much research around so many different elements of this topic that I know we'll be revisiting it in future episodes, but until then, we will be back in two weeks with a new episode about substance use disorders, new research about treatments, and how we can all play a part in reducing stigma. I'm Carly Bowling and this has been It's (Probably) Not Rocket Science. If you enjoyed today's conversations, be sure to subscribe and leave us a review on Spotify, Apple Podcasts, or wherever else you may listen. A special thanks to our guests and to the members of the University Communication and Marketing Department for helping put this show together. Bye!