Speaker 1: If you looked at a place like Singapore, they get 180 inches of rain a year, except the majority of it years ago used to just run off the island because they were getting it away from their urban areas as quickly as possible. They instituted a program called Active Beautiful Clean, where they re-naturalized all their streams and rivers and their parks are all catchment zones now. Now they can take that water, they can reintroduce it back into the water cycle for treatment and it becomes part of their reuse that they utilize with respect to that. It's an example of some of the things that many communities are adopting on lesser scale but adopting more frequently.

Speaker 2: Welcome to Inflection Points, a podcast series from Jacobs. I'm your host, Steven Ludwig. That was the voice of Peter Nicol, global director of water. It was a great conversation about water and wastewater and how being innovative around water use and treatment is becoming more important around the world. Inflection Points is where we meet the people of Jacobs that help create solutions that deliver a more connected sustainable world. Just a quick note, we recorded today's episode at a conference, so you may hear some background noise. With that out of the way, it's on with the podcast.

Peter what's your background, you an engineer, or what's your training?

Speaker 1: Geological engineer actually, and mostly on the job training for all intents and purposes. Worked in this industry my entire career. So it's really school of hard knocks.

Speaker 2: Wow. What are some of the major lessons you think you've learned along the way?

Speaker 1: Probably the biggest lesson is: be mentored by as many as possible, really follow the marketplace, try to understand the organization you work for and where you're trying to go, what your strategy is moving forward, but who are some of the people you can learn from? How do you partner up with them and learn as much as you can? And then bring other people along behind you. Really support your team, try to give them opportunities for growth and really build on that as you move forward.

Speaker 2: So, you're in charge of water for the company.

Speaker 1: Yes.

Speaker 2: What about industrial water? How important is that? And then before we say that, what is industrial water?

Speaker 1: Yeah, so it's a misnomer from that perspective. I look at industrial water as the private sector that we deal with for all intents and purposes. So we deal with a lot of public sector clients, utilities and entities around the world that really provide drinking water and wastewater treatment, flood management, conveyance, and a variety of things like that. At the same time, all of our private sector clients require the same types of services. Water is at the core of just about everything as a raw material or as a source material for different things that are going on. And so how do we work with those clients? When we look at it globally, how important is it? Industrial water globally is

probably about 10% of water use. When you think about that, agricultural is about 70%. So industrial water is about 10, and then municipal drinking water, firefighting, all that kind of thing really makes up the rest.

So from an industrial perspective, very important with respect to that because it's, again, at the core of pretty well everything that we're doing, we're making, all the manufacturing that's going on and the role that it plays in that. And so, we're very active with private sector clients. Certainly on the operational side, we, I think run probably 50 facilities today for private sector clients and mostly in North America with respect to that, so room for growth when we look at the global world and leveraging off of the platform that Jacobs has. On the public sector side, just comparing that, probably about 200 facilities. So much broader but certainly something to build off of as we look to providing more services to the private sector.

And that's a range of different things, certainly very active in the food and beverage market, active with pharmaceuticals, with life sciences, with the micro electronics, with data centers, all those kinds of things. They all have water as a component of what they're doing, sometimes cooling, sometimes source supply. And then all of those clients also look for the sites that they build. How do they manage storm events? So they have flood management and landscaping requirements. We can provide services around all of those. So we really look at industrial water as a key piece as the one water platform that we support. And so it's a piece of our business, a very important piece of our business. We've got about 6,000 water staff across the globe that are providing services to our clients, partnering with them and delivering on the important roles that we do. So lots of backup, lots of strength and lots of capability.

Speaker 2: So 6,000 people working on water issues across the world, that has to mean amazing talent pool, no pun intended, since we're talking about water, that you can draw on again, no pun intended... I'm just going to stop talking, apparently... To help clients with whatever their water issue is.

Speaker 1: It's an incredible team of people, and we've really worked hard at figuring out how to connect them all so that we can really leverage and build on that global expertise. How do we make that available? Because you don't have it in your office, but it is available sometimes in the firm. And similar to going down and doing "ask a friend" or something like that, we do the networking amongst those teams. So we have all the subsets across the water spectrum that we actually service and we build communication loops associated with those so people can ask questions. And almost always someplace in the firm, we've done something for a client that is something that we can learn from and leverage and build on to provide an answer to another client that is reaching out and trying to have some other solutions provided for them.

Speaker 2: I think it would occur to me that with climate change and the increasing volatility of weather, and then the major concerns about water, especially in South Africa and some communities in India, that the commercial side in industrial water; I'm sure businesses are much more worried about it than maybe 10 or 15 years ago.

Speaker 1: I think that's fair. We've seen an uptick with respect to just the awareness around supply, awareness around the quality of the product that you're getting. When we look at places like India, which are eroding groundwater tremendously, and to where is the source supply going to come from? Cause there's no new water in the world. The water we have is just moving around and it's in various places. So it's either in the ocean, it's in the groundwater, it's in the lakes, it's in the rivers, and how do we manage that, mitigate it? And we're not going to control mother nature, but how do we work with mother nature to minimize the impact when there are these extreme storm events? Because we are seeing an increase with respect to that. Certainly Houston had another significant rainfall. All intents were that they would not have flooding. All the Noah reports coming out, in the middle of the storm, all of a sudden the intensity increased and they ended up 30 inches of rain in some parts of the city, the airport ended up being closed and just the impact on the infrastructure overall.

And so our infrastructure really isn't built for the extremes that we're seeing today. It was a 1 in 100 or 1 in 200. Well that's a 1% chance, but we're seeing a 1% chance much more frequently. And so we're seeing flooding along the Mississippi. We're seeing flooding in the Great Lakes that we haven't seen before, and some of that comes from extreme storm events. Great Lakes comes from the fact that they're freezing in the winter now where they didn't freeze for a number of years, and so they were dropping. All of a sudden now we're not getting evaporation through the winter months because they're covered in ice. And I know in the community I live in, water levels have gone up six feet.

Speaker 2: Wow.

Speaker 1: And you know, I'm on one of the Great Lakes.

And so that's just caused all sorts of challenges associated with that. And then you look at climate change for coastal communities, even more so, because all of their mitigation strategies, all of their walls, their ports, their whatever aren't built for the extremes that they're facing now. And so they're being impacted by that. And how do they plan for the future? How do you spend your money so that you get value for what you're doing, recognizing that you're probably not going to stop flooding? You're probably not going to be able to control droughts and floods, but you can balance it so that you can mitigate the impact when it does happen. You can help direct it so that you can manage where the water's going and how you're going to manage the water in the recovery efforts that are going to come as part of that.

Speaker 2: What are some mitigation strategies for municipality? And then what are some for an industry?

Speaker 1: A lot of them are the same because it's how you manage your sites in a lot of cases. So if you look at it, a lot of municipalities and a lot of industries now are looking at how their sites are developed so that they've got a collection area. They plan their sites so that they can collect the runoff from their parking lots or from some of their manufacturing areas or some of their waste treatment areas. And they can buffer it before it goes back

into the environment. So they have some control over the quality of it, but they can collect it so that they are feeding it back to the system in volumes that it can support, as opposed to overwhelming the systems because you've got this flash flood that comes off of impervious pavement or something like that.

Some of the other things is how industries and municipalities are building parking lots or building roads. They're going to much more innovation around the imperviousness of the products that they're using so that water doesn't always run off. At certain times, it actually will penetrate through and be absorbed in the ground around it so that there's much more utilization of that, there's a lot more tree growth on sites today. People are very sensitive. The fact that they were getting erosion because they were clear cutting, to a certain extent, their sites and putting in lots of grass, which was great, except grass needs maintenance. It also needs water. But if you return more to the natural side of things, there's that.

Part of the other thing is a lot of them had concrete ditches or pipes and stuff like that, to get it away from their facilities as quickly as possible. Now they're going to more natural solutions to slow it down, give it a chance to breathe a little bit and reintegrate itself back into the environment. It doesn't solve all the problems, but it does mitigate some of the impacts that come with it.

Speaker 2: So you don't really see communities building those big, long cement troughs through the neighborhoods anymore do you?

Speaker 1: What we've seen is more going back to, really, more of the naturalization of a lot of those area. You can take your soccer pitches or baseball fields or a variety of things like that. You can turn them into catchment zones. So that during storm events, they're actually a large area that is allowed to flood. And so as long as you've protected your community, and they understand that there are times when those fields are not going to be available to them...

Speaker 2: Game canceled, because it's under two feet of water.

Speaker 1: But then next week, it's great because everything's back to normal. And so we're seeing a lot more of that integrated into both industrial sites and in the municipal locations in the cities and urban areas. If you looked at a place like Singapore, they get 180 inches of rain a year, except the majority of it years ago used to just run off the island because they were getting it away from their urban areas as quickly as possible. They instituted a program called Active Beautiful Clean, where they re-naturalized all their streams and rivers and their parks are all catchment zones now. Now they can take that water, they can reintroduce it back into the water cycle for treatment and it becomes part of their reuse that they utilize with respect to that.

It's an example of some of the things that many communities are adopting on lesser scale, but adopting more frequently. And if you look at what Los Angeles is planning to do, the Mayor's come out and said within the next 15 to 20 years, he wants 85% of their source water to come from local sources, whereas today it's all piped in. That's going to

take some innovation, but it's also pretty bold to be going down that pathway. And so I think we're going to see some exciting things coming in California, as those communities look to manage water differently than what they have over the last 50 years.

Speaker 2: It sounds like there's some real innovation taking place in certain parts, like you mentioned California, you mentioned Singapore. Are there other areas that you're noticing that are really doing an interesting job?

Speaker 1: Very much so. And one of the big things we're seeing is that communities are now networking with one another. Industries are now networking with one another, and sharing ideas, really telling their story and really taking the ideas that they've brought to the table that they've had success with, putting it out there for others to consider. And so we're seeing an awful lot more of that and a desire for that. Certainly there's a real thirst, and we are talking water, but there's a real thirst for knowledge, with respect to "Why do I need to reinvent it if somebody else has come up with an idea that has really proved to be successful? I'll adapt that. I'll adapt it to my own local conditions, but I will learn from and adapt what they've put together." So we're seeing a very active role with respect to associations and networking groups, opportunities for people to be able to share and tell their stories.

And certainly in the industrial ranks, as much as any of the urban utilities because they're all facing the same thing. And in a lot of cases, the utilities are providing to the industries. So industries are partnering with utilities to do things that are going to make sure that they have a source supply, that they can continue to make their product, because they're looking for seven days a week, 24 hours a day. They can't always get that everywhere in the world. In North America, we're spoiled from that perspective, but there are other parts of the world where water is a sporadic feed based on supply and what they can do. And so how do we improve that for the global overall? And those opportunities, again, are out there for all to consider.

Speaker 2: What are some issues that you think major water users on the industrial side should be thinking about? Like textiles, or mining, or oil and gas. When it comes to wastewater, how they should treat it, or what the issues are coming. What do you think they should be thinking about?

Speaker 1: I think they need to be looking at the full water cycle. So my hope in my lifetime is: we won't have something called wastewater. We will have water that's moving through to be recycled to be reused in some other form. And so it's reintroducing the water that you've already used, treating it back to qualities that you can maybe use it in a different way, but it's still available to you. So you're not just disposing of it out to the ocean or to the river or to the ground again or something like that. Because the water cycle itself is: you get rain, it falls down, we collect it, it flows in rivers, it's collected in lakes. And then if we don't have enough of that, then we take from the ocean, we treat that we use desal and a variety of other things to treat it, to take the salt out.

Then we come up with a different waste stream because now we're with brine, and how do you manage the brine that comes out of those kinds of things? Plus, they're high

energy uses. So the majority of things we can do with water, we've already been working with. If there's a way to collect that, treat it, and that kind of thing, it's already usually a source supply that is something that we can utilize in such a way. So just being more innovative, more aware of the fact that we've got that. And that's one of the areas that we see a lot of growth and development, innovation. And industry is probably at the forefront of that because water's precious to them, they're paying for it in most cases. And so it's a cost of anything that they're doing. And so they're building that into their business model because they're much more aware of that as a piece of their source supply now, whereas before I think it was just something that wasn't really part of the business case that they were dealing with.

Speaker 2: Are there any new technologies coming down the pipe or that are currently pretty new that you think are making a difference in industrial water or wastewater?

Speaker 1: I think there's always innovation with respect to a variety of things. I think the whole digitalization of water is going to be a big piece of it because there's opportunities to optimize your water use and water management in ways that we just couldn't manage previously. And so how that adapts and how industries utilized that, how utilities utilized that, I think is just the efficient use of water and understanding when you've got a leak or something like that, making sure that you plug it because you've already collected that water, you've treated it, now you're losing it. And that's your cheapest water out there to really do and to collect. So how do we look at that? There's a lot of leak detection that's out there, there's a lot of systems to plug those leaks. Find them and plug them and manage that. Be able to figure out how to best manage your system, and looking at it from a systemic approach as opposed to bits and pieces.

There's a lot less approach from a bandaid perspective where we're out there and we're plugging holes. It's really more, "Okay, this is my system. What have I got in the system? And how do I figure out how to maximize that and make best use of what I've got?" So I think that there are a number of technologies that are being improved. If you look at desalination, 40 years ago it was all thermal desal, high energy, high expense. Today, much more innovation around that. Certainly the energy costs have come way down. The impact on the environment is less with respect to what they're doing in some of the filtration areas, how it's being filtered and utilized.

And then we look at even how we collect flood waters and how we manage those kinds of things. We're treating it before it goes back into the environment. So we're making sure that we at least disinfect and provide less impact from that. So, I think all of those collectively go together and I think that as there is continued focus and certainly in North America, very visible focus around water since Flint, Michigan, and a variety of other things. I think it's had a big impact on people's awareness around particularly water quality, and what can happen when you don't have the quality you need, and then the impact in your systems.

I think industries are very aware of the fact that, water as a source material for them, the product they're putting out has to be safe. Same thing for utilities. When you turn the tap, you want to have a product coming out of there that's safe to drink. And so I

think that all of these go together. I think that we will continue to see innovation because there's much more focus on it, there's much more interest in it, and there's much more study around it, I think, is really what it boils down to.

Speaker 2: How can Jacobs help companies or municipalities plan for their water? I know that's a big question. What are some buckets, if we use the water pun again, that you can help them with?

Speaker 1: Certainly from our perspective, one of the things where we think we provide the most value is when we partner with clients, as opposed to responding to projects. When a project gets developed, it's based on what the client has identified as their problem, and they put it out for the community to solve it. It's a lot easier to be in that room to better understand: What are you trying to solve? How does it fit in what you're trying to do? And are there alternative ways of approaching that?

So trying to get into more of a trusted partner relationship with clients so that we can be part of that strategizing, part of that thinking around conceptualizing where they're trying to go and what they're trying to do so that we can put other ideas out there. So when they do come to market, because we will still have to compete in most cases for the work, but when they come to market, they're coming to market with something that will likely provide them with more focus around what the solution should be, and theoretically, a better solution to meet the needs of what they were trying to accomplish.

And I think that certainly the industrial sector, the private sector, is much more open to that because they're really trying to figure out in their supply chain, how do they have service providers that can meet those needs? And so, who do they partner with to provide that level of service? They'll probably have a stable of people that they rely on it. [inaudible] likely won't be one, but we want to be part of that stable because certainly for the large multinationals, this is a platform thing for them that they have globally. And our capabilities are dispersed globally, and we'd like to be able to partner with them to meet those needs.

Speaker 2: Nice. Where can people find out more information or who to contact around these issues?

Speaker 1: Well, certainly when it comes to our organization, jacobs.com is the best choice. You go in there, and water's part of our service offering. Certainly, connectivity to myself and to our water leadership team on a global level on the solutions and technology side of things. We have Russell Ford on drinking water and reuse. We have Adam Hoskins on water resources and our resiliency platform, Susan Moisio on all the conveyance stuff, collection and conveyance and storage that we do. And then Julian Sandino on wastewater. They're our really core water team. They steward our resources around the world and support them from a global perspective, connecting the dots when people reach out, and certainly they're who we rely on as an organization. And they're all connectable through the website.

Speaker 2: And they're all over the world, right?

Speaker 1: And they're all over the world. Yes.

Speaker 2: Very exciting. This has been very interesting, Peter, thank you so much.

Speaker 1: Well, appreciate it. Thank you, and enjoyed the discussion.

Speaker 3: Thank you for listening to Inflection Points, a podcast series from Jacobs. To find out more, please visit Jacobs.com.

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