

## TWV Podcast #015:

Where Does Our Lack of Water Infrastructure Investment Lead? With Marshall Davert Show Notes at http://thewatervalues.com/pod15

**Intro:** Welcome to The Water Values Podcast. This is the podcast dedicated to water utilities, resources, treatment, reuse, and all things water. Now here's your host, Dave McGimpsey.

**Dave:** Hello and welcome to yet another session of The Water Values Podcast! Thanks for tuning in.

Well Father's Day is this upcoming Sunday, and I hope you all take time to recognize your fathers and thank them for all they do, much like you did on Mother's Day for your mother and on Memorial Day for our veterans.

Well, today is a great show. Marshall Davert, President of Government & Infrastructure for the Americas and Asia/Pacific for MWH Global, joins us. Marshall describes the infrastructure needed to bring water to your home or business, carry away the used water, and then treat it. And he provides his assessment of the state of our infrastructure. He also takes us on tour of the Americas and Asia/Pacific and how countries in those regions address water infrastructure projects. This is must-listen episode to get a handle on our infrastructure situation and learn about the models for funding infrastructure improvements around the world.

Normally, now is the time for the disclaimer, but we're trying something new today at the suggestion of a loyal listener. Stay tuned at the end of the podcast for the disclaimer. That's right, I'm moving the disclaimer to the end of the podcast, so we'll see how that goes.

With that said, let's get on with it. Open the valves, fasten your seatbelts and here we go.

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**Dave:** Well, Marshall, thanks for coming on to The Water Values Podcast, greatly appreciate your time. I know you're very busy and you have some international travels coming up. So could you, real quickly, tell us about your background and how you got interested in water?

**Marshall**: Sure and thanks, David. Thank you for having me here. I think venues like this where you can put some thought leadership out there is very important to our business. So I appreciate you taking some of the leadership that you are showing here, as well.

My background, I started out as an applied math guy. But got into applied science and engineering early in my career. It really was a step backward to where I was headed. When I was in sixth grade, my parents took me to Hoover Dam and I thought it was the most beautiful thing I



had ever seen in my life. And the fact that you could take falling water and turn it into electricity and deliver that electricity somewhere else in the country. I thought that was magic. So I was hooked on engineering and science from a very early age.

I started out as a structural engineer which I quickly found to be just a little bit tedious and gravitated toward water resources and water resources planning and management, very quickly in my career. Especially because of what I found about water resources is that it ties you to growth and to economic policy and public policy, and I took great interest in how you could shape economies and shape growth through producing water.

So I became a water resources planning and management, got my Masters and PhD in Water Resources from UCLA, came to work for MWH in the 90's, ran our California operation. I became the Director of Strategy for the Americas and then became the President of our Asia-Pacific operation in 2008. I ran that group for four years. Now I am back here in the U.S., but I run both of our Americas operation and our Asia-Pacific operations in water.

**Dave:** You deal a lot with infrastructure. Tell us a little bit about who MHW is and the type of projects they work on.

**Marshall:** MWH is a global company. We have about 8,000 people in thirty-five countries, so infrastructure is at the core of what we do. We specialize in water and in environmental engineering. Our mission statement is building a better world, and our vision is about how do we work in infrastructure in both the natural and the built environment to produce better outcomes for people around the planet. So water infrastructure is at the core of what we do whether it's constructing dams, hydropower facilities, treatment plants, pump stations, pipelines, water treatment plants. Anything in the water cycle, how you deliver water to the clients, that's what we specialize in globally.

**Dave:** Ok. There's a lot of talk about the state of infrastructure in the U.S. Let's focus on the U.S. initially. Could you enlighten us a little on what that state of infrastructure is in the U.S. and specifically to the water assets.

**Marshall:** Sure. I always tell people we're a victim of our success in this country. The public is - they don't realize what a miracle it is that when they flip the light switch, the power comes on every time. When the turn on the tap, the water comes out every time and it is good to drink. They flush the toilet and it goes away, every time. And that really is a miracle. You go to most parts of the planet, and that's not the case. Even in this first world, people are struggling.

But the greatest problem in the U.S. at the moment is if when you think about when our infrastructure was constructed. When we came out of World War II, the U.S. had about 75% of the industrial capacity of the planet, and all the economic power that went behind that. And there



was nothing we couldn't do. Engineering is easy. Tell an engineer what do you want me to do? I can do it. Give me enough money and give me enough time, I can construct it.

We built a great deal of infrastructure in the U.S. in the 50's and the 60's from the dams to the diversion plants to the treatment and the cities were growing. And so a lot of our infrastructure is coming up on fifty or sixty years old. And it is not so much that - it was well planned and it wasn't deficient in any manner - but there are two things that are happening to our infrastructure right now.

One, we overbuilt in the 50's and 60's because we could and so for the first time in several generations we're beginning to bump up against the capacity of that infrastructure. Before, we would always be able to grow and just use some of the unused capacity and just grow and grow and grow and never have to deal with building new projects. We were just using unused capacity. So that's why we became a little bit fat and happy as a country there on what you needed to set aside as reserve accounts and the capitalization for future projects, which then allowed us to stumble into our current problem which is, as that infrastructure starts to reach the end of its economic life, there's been several generations who really haven't had to look at what's the next increment of infrastructure that needs to be constructed and why?

And when you look at the infrastructure we have nationally, it varies. There are places where the infrastructure is new, we've had greenfield growth, we have modern treatment plants, pipelines, pump stations. There really is not too problematic. But, there are areas where the infrastructure is seventy-five years old and things wear out, and it's time to replace it. And the single greatest barrier to us at the moment is the lack of capital. The money has not been set aside to turn over the infrastructure. And so as you're balancing new growth versus rehab and rehabilitation, there's a tension there, and it certainly is not as attractive or exciting to go back and rebuild deficient infrastructure as it is to go build brand new stuff with a clean sheet of paper.

**Dave:** Right. You've said a couple there things that I think are very interesting. The first is access to capital as a barrier to infrastructure investment and replacement, and the second is just the state of the infrastructure itself and the varying degrees to which that infrastructure exists in its current state. I think it'd be helpful to explain what the elements of our water infrastructure are? And as you're doing that to also give us the current state, in general obviously, what that infrastructure exists in? Is it in good shape or is it in bad shape?

**Marshall:** I like to, let's just follow the water cycle. When the water falls from the skies on to the mountains or on to the ground to percolate, and we end up with essentially two types of water. We have surface water that's in lakes or reservoirs, whether man-made or natural and we have groundwater. And the first thing you need to look at is how do you extract that water and capture it and then make it available at the right time.



The beauty of groundwater is it's always there. You put in a well, you pump it up, and it's almost this unlimited source of supply.

With dams and reservoirs and streams, of course, we know we get snow in the winter and we capture it in the mountains, and it slowly flows down into reservoirs. We regulate when it is released, so we can impact reliability and availability from year to year, season to season. But there's these two basic sources of supply.

There's two things we need to look at there. One, many of our dams are fifty, sixty, seventy years old or older, and it's extremely difficult to build new dams today given the current environmental ethos we have as a country. So we have a real challenge on the source of supply of surface water. Similar with groundwater, there's some challenges as that rain falls from the sky and percolates into the ground, and it is available to us, but everything else we dump on it percolates, as well, so pollutants and things like that. So our groundwater supplies, while plentiful, are overly polluted in many parts of the country, which causes a treatment challenge.

But as you move down that supply chain of water from the corpus, the next thing you have to do is divert it. Either divert it out of river into a treatment plant or pump it from the ground and into treatment plants. If you look at the treatment facilities we have nationally, by and large, the treatment plants are in pretty good shape for a number of reasons. One, the Clean Water Act coming out of the 60's and 70's drove a whole new set of technologies from primary, to secondary, to tertiary treatment, and the technology in how we design water treatment plants has kept up, and there is something about providing a good potable supply to people, elected officials and environmentalists, as well. Delivering a safe water supply is always less problematic than creating new supplies, building dams. So our treatment plants, by and large, in my view, are in pretty good shape nationally. Of course there are some that are aging or older, but by and large, our treatment plants are in pretty good shape.

As you deliver that water through cities, you really start to have a challenge. Again, there are pipelines there that are fifty, sixty, seventy, eighty years old. They're re buried underground. It's not like a roadway where it starts to wear out and there's a pothole. You get a quick phone call saying come and fix this. Pipelines are buried, so, out of sight, out of mind. And quite frankly, we don't really know what's down there, but as you start to have pipe failures, and as you look at your loss rates, how much is leaking out of pipes through the system, we know that we have a considerable R & R, rehab and replacement, challenge in front of us for all of our distribution systems nationally.

What's used in the homes is good, and then it starts coming the other way. Similarly to the distribution pipelines on the potable side, our collection systems are, again, buried, and out of sight, out of mind. And the real challenge there is, as you start to deliver it to the treatment plants, again our wastewater plants have kept up with technologies, but the biggest challenge



from the wastewater standpoint, which drives your reuse and how you treat the water to put it back into the system, is some of the exotic contaminants that we are starting to see. You know fifty years ago, all you had to worry about was your sewerage, what went down the pipeline. Now we are looking at endocrine disrupters, exotic fuels and solvents, as we've gone separate systems of sewer and storm water into combined systems, we're bringing all kinds of solvents and different kinds of chemicals to the treatment plants. So, we're always playing a catch up game at the wastewater plants to see what's the next thing we need to treat before we are allowed to reuse it and put it into the system. And then as you just push that water downstream, just the challenge that we have of water rights and who owns the water, is a big challenge for us. The infrastructure it varies in pieces and parts, but I don't think anyone denies that there is literally trillions of dollars of investment necessary for us to maintain that same standard of delivery that we've had over the last thirty, forty or fifty years, what we've become accustomed to.

**Dave:** Sure and that leads right back into the access to capital. Where are we going to get this capital? Do you have any thoughts on where that capital is going to come from? What we need in order to get that investment rolling?

Marshall: I want to take just a little bit of a historical view. If you went back to the early 1900's, a little bit before our time, you would've seen that they always talked about the local power and light company. Much of water and power was delivered in the U.S. was by private companies. And so there was a profit motive. The good thing about a profit motive is that it gives you some certainty of outcome because investors will come. They'll build the infrastructure. They know there's return on that investment, and so it's a very clean way of ensuring that you are charging for the good what it costs to produce it. As we came out of the Depression, and I think of the Works Act and how we put the country to work, you really saw the change from private entities to public good for water – thought of the Rural Electrification Act - and much of how water became delivered in the U.S. became the purview of local governments. So that changed to dynamic.

Now, rather than have a business case decision on whether projects should get built or not, we decided as a country that everyone had the right to have access to water, to power, to good sewerage, and so it really became a subsidized good. If you look now at the water you drink in the cities or water that's even delivered to farms, that corpus of the water, the value of the water supply is essentially zero. What we pay at a maximum, is what it costs to deliver it. What is the investment in the infrastructure? what's the cost of that capital? and then what's the O & M and the cost of service to collect it, divert it, treat it, deliver it?

In order to drive that kind of subsidy, you would have seen, just in the municipal market, low cost money available to local governments to build infrastructure. They wanted to minimize the impact on constituents and the users. So that drove the industry in a certain direction where



we're just essentially, as I said, paying the bare minimum of what it costs to deliver that water, and the water was free.

And in an up economy coming out of World War II, the "can do spirit", plenty of capital, that works. There's always upward mobility. There's always growth, you're supporting the next project, and you are beginning to subsidize your installed base with new growth. You always hear developers complain about the cost of connection fees. And we're always rolling, sometimes, the cost of the old user base on to the new users. Eventually, that runs out. And that is where we are as a country right now.

There's this deficiency of infrastructure but there's a deficiency of capital. We haven't set aside good reserve accounts, what we would, in the business world, say look, we know we're going to have to replace that pipeline or that treatment plant at a time certain. So we start to put away a little bit every year, so when it comes time to build that pipeline, we have saved the money.

That whole process of building up reserves, that became anathema in local governments because it was construed as a tax. You saw elected officials gazing longingly at these big piles of money in the enterprise fund, and they couldn't go in and take for the general fund. But I don't know a client in the United States, in the water, wastewater, director of utilities that I know where, they're not holding an IOU from the general fund of the city in which they operate.

So that money has not been left in place and set aside to drive new projects. So you have these cities, they don't have money set aside, they're tapped out a bit, what they can bond, what they can put on their balance sheet, so they're just trying to make do. And you see cities all over the U.S. just sweating the assets, sweating the assets, saying can we get by, can we get by?

So, traditionally where a need like that shows up, that's where private capital would step in. We talk a lot about P3's in the U.S., public - private partnerships in different forms: design-build-operate, design-build-finance, there's many, many names that we use.

But when you look at water and wastewater, it comes back, you have to start all the way at the top of the supply chain. How is the water made available. Ground water and surface water? If you were an investor and wanted to invest in infrastructure and just think about water treatment plants. You have to have some feed-stock. That feed-stock is the water, the raw water that you put through your plant and you treat it and you deliver it. So, you have to have some certainty of the feed-stock. And we have a challenge in this country, in that, water, by and large, across the country is not treated as a property right. It's not just bought and sold across tables. There is a whole rights hierarchy and that presents a real, real challenge - is how do you ensure yourself that you are going to have the raw material to put through your plant?



Then similarly, as you look at the treatment of water supply, you think about most P3 partnerships, the ones that are successful. We've all seen those in toll roads and thing like that. There are a couple of defining characteristics. One, we want to have some certainty of a customer base. There has to be some forward sell. And then to do that, we always like to have a monopoly. There's no alternative good. So as we look at water treatment and how we could lure investors in there, they really need to look at if we invest in a plan, what's the certainty that we have a customer to deliver it to. And then what's the certainty that we can control the long-term costs, not just capital costs, but operational costs. And I think most people know if x is the cost of a treatment plant, running that plant over its economic life is typically 3x-5x. So the total cost of the project, if you are an investor looking at the return over the life of your investment and your asset, being able to control those operational costs is a much bigger challenge than just building the plant initially.

And that runs us into our next real big challenge - if you look at most of the enterprise functions in our cities and counties today, water and wastewater, the employees who run those plants are unionized, and so you quickly run into a challenge when dealing with elected officials. It's the source of supply that's a challenge as is water as a commodity right, the long-term cost of the infrastructure and then how do you deal with elected officials who are looking at a unionized base of employees and how does that play with all their decision-making. The business case analysis for investors is extremely complex.

**Dave:** Marshall, I think we could talk a long time about all this, but I want to make sure we get into some of your international experience before we go. Could you talk a little about how, what does the Asia-Pacific Region look like in terms of water infrastructure and could you compare and contrast that a little with the U.S. and the North American infrastructure situation?

Marshall: I am going to break Asia up into a couple of pieces. I'm going to say there's China with centralized planning and how they look at things. I'll look at Singapore, Inc., Korea, Inc., China, Inc. and how they're doing government-to-government transactions for infrastructure. They're exporting a model to different parts of the world, the Middle East and Africa. And then maybe talk about Australia and New Zealand who are a little bit closer in model to the United States.

One of the things I find fascinating in Australia, is there's two things they've done. One, they passed an Australian Water Act where they really address that fundamental issue I raised of what is the value of the corpus of the water? And they have actually turned water into a property right. So it gets bought and sold over the counter, and that gives you some certainty of supply. Maybe it's a little bit easier in a country of 22 million people versus a country with 316 million people. But they had to have two or three goes at it to get it done, but by putting some certainty around the water supply, that was a great driver. On the infrastructure side, you'll see this in both Australia and New Zealand, but let's focus on Australia for a moment. They have an interesting



model for their large municipal service providers, like Sydney Water or Melbourne Water. They're quasi-public private entities. So like Sydney Water is a publicly-owned corporation, owned by the government of New South Wales, the state in which it sits, but they run it like a private company, i.e. they have to return a dividend for the New South Wales government every year. So it's not allowed to run fat and happy. It runs lean, and it runs just like you would run a business. So they have laid this foundation where, public-private partnerships are an easy extension.

The second thing is, again, maybe it's easier with a country of 22 million people, but they talk about the recycling of capital. And we're going to see, we've seen it in rail and roads in Australia, and it's coming to the water business where these government-owned entities, public-private entities, they actually sell off the assets. They privatize it, and just hold an auction and sell it to a privatizer.

Then they take that money that goes into to the public coffers, and they recycle it. They reinvest it into the next turn of infrastructure. Privatizers typically, they run the asset at a profit. They'll sweat the asset down throughout its economic life, and then in twenty-five or thirty years when they don't want to make the investment at the next turn of the crank, they sell that infrastructure back to the government, and the process begins anew. The government has sold other assets, they have capital, they put it into rebuilding a new asset. They build the asset back up again. They get all the bugs out, they get it operationally perfected, then they'll privatize it again. So they recycle the capital.

And the intent there is, on the face of it you might think, well that's just a subsidy by the taxpayers of private industry. But when you look at basic economics, we all know that when you put a dollar into the economy, there's a multiplier effect. Well, this recycling is actually part of their economic policy. And they do that in all their infrastructure. It's roads, it's the water and the waste and things like that. They're always looking to recycle. So there's a whole different model of how they look at investment and infrastructure.

There's a similar approach in New Zealand. It's not as extreme but they do recycle. But the major point there is there's much more closely aligned interests of the government and private industry to provide a level of service at a reasonable price to the customers. So they start talking about outcomes rather than outputs. Here we talk about an output. We need a treatment plant or we need a pipeline or we need a dam. In that part of the world, and it's been perfected in the U.K., they talk about outcomes. We want to provide a certain reliability of service at a certain price with a certain standard of quality. And you, private industry, you figure how to deliver that outcome. How you do it, what the outputs are to get to that outcome, that's not our business. You drive efficiency and effectiveness. So you'll see a very different approach in Australia and New Zealand.



If you go to Asia, to China, of course, centralized planning, they just decide in five-year increments, what's the focus during these next five years, and your centralize planning - The money is just made available and they just drive to outputs. They need a dam, they build a dam. They need a pipeline, they build a pipeline. They need a treatment plant, they build a treatment plant. And it's very fascinating in China at the moment, as they've gone through their economic rise over the last thirty or forty years, they've polluted the country, the water, the air and now they are looking at how do we start to clean that up? And they're taking a more environmental bent in this next five-year plan that's just being implemented. But they make the money available from the central government. So it really is just about planning and the sequencing the infrastructure. Capital is not really a challenge in China.

If you start looking at how some of the Asian countries are competing into the Middle East and into Africa, again it's a very different model. It's typically government-to-government. And they're following, in some ways, an old European model or even U.S. model where they lead with aid and that aid is to build infrastructure to improve the quality of life, build cities, build agricultural areas, deliver water to mining and oil and gas. The money comes in, they build infrastructure, then they quickly follow it with a commercial model. So again, it's similar that's there's an expectation that there is a return on investment, but the return on that investment comes from other parts of the economy, not the pure infrastructure itself. Everywhere we go, we have the same issues of aging infrastructure, fifty, sixty, seventy years old, turning the crank. But I think the basic way they approach it is just a little bit different.

**Dave:** Fascinating thoughts on, and a good comparison and contrast with, the various ways infrastructure finance has worked in these countries. What about the state of infrastructure? Just from someone who doesn't know a whole lot about, say, infrastructure in Asia, is their infrastructure, do they have the same age issues as we do in the United States? Because just off the top of my head, I would think that their infrastructure is probably newer than it is in the U.S.

Marshall: You're right on to it. Let's talk about China. I don't know when the last time you've been to Shanghai, or Hong Kong or Beijing, but they've been building at a dramatic pace there in the last five, ten, fifteen years. And I never really noticed how tired our infrastructure here in the U.S. was until I moved to Asian-Pacific in 2008 and spent four years in that part of the world, and you see the brand-spanking new infrastructure, what it looks like and I thought, "Boy, this is kind of neat stuff." When I came back to the U.S. in 2012 and started looking around, I said it really becomes quite obvious for a number of reasons. One, in the U.S. you see this amalgam of old technology and new technology where you changing things on the fly. You're not abandoning your current installed asset base, but you're adding to it. So you can really contrast old and new technology side-by-side and just the age of it. And then, as you said, in some place like China, it's just all brand-spanking new, and so it is quite obvious.



Now you go to other parts of Asia-Pacific and they have some of the same issues we do. There's a perversion. We do a lot of work in Fiji, and we've all picked up a bottle of Fiji Water at the grocery store, but if you go to Fiji, you find out that 50% of the population there doesn't have access to safe drinking water, while we're drinking that water on the other side of the planet. You think to yourself there's something wrong here with the incentives and how capital is being allocated and where water's being sent.

But it speaks to that original question we talked about - what's the value of the corpus of the water? Someone has figured out that potable water, pure water is extremely valuable to people. They will drink it. The irony or the perversion is but if you try to talk to them about building the infrastructure so that they could have the same water delivered right to their home to the tap, at a lower price than what they pay for it at the grocery store, all of a sudden they're up in arms about this is an unfair tax and why are you doing this to me? It comes down to that basic valuation of the corpus of the water and is the water a property right? Get that piece right and that allows certainty of investment the other pieces for delivery of supply.

**Dave:** Fascinating stuff, fascinating stuff. One other thing, are you familiar with the Chinese project where they are diverting water from the South to the North?

Marshall: Yes.

**Dave:** Could you please talk to us a little about that project? Because that is a massive, massive public works project that the Chinese are undertaking.

**Marshall:** Sure. It's this old adage - there's no shortage of water on this planet, right? Most of the planet is covered with oceans. It's a matter of getting the water to where it's needed, whether it's needed for agriculture or for municipalities. So they have the inverse problem in China that we have in California for those of you who are familiar with California where 85% of the water sits in the Northern part of the state and 85% of the people sit in the Southern part of the state. We did the same thing there in the 50's. We diverted water out of the delta. We put it in massive canals and just ran it to the South and then put it in big pump stations and pumped it over the Tehachapi Mountains and delivered into the L.A. basin and into San Diego.

They have the same issue there. They have the demand for the water in the North whether for agricultural purposes or for major cities, and they've looked at the same thing. But there's no source of supply in the North, so they have to move the water there. As we started out earlier in the chat, tell an engineer we need to do this, and it's a big audacious problem, engineers just say give me enough time, give me enough money, I can do anything. So it is quite a project. There's a number of major tributaries of rivers that they are impounding and then they're pumping those into canals and they're moving that water to the North and they're lifting it periodically against the gradient and pushing it all the way to the North. So it is a massive engineering project in its



scale, but the engineering principals and what you do, it's quite simple. It's a very simple project, it is just massive.

**Dave:** Marshall, great answer on the fly. For those of you listening, Marshall and I didn't really discuss getting into that massive Chinese public works project, but Marshall, I thought you did a fantastic job giving us a high-level overview of i.

Well, we're at the end of our time, and I just wanted to thank you very much, Marshall, for coming on to The Water Values Podcast. You were a fantastic guest. Before you go, could you just tell folks how they could find out more about you or MWH and where they can go to do that?

**Marshall:** My email is <u>marshall.davert@mwhglobal.com</u>, and I am always happy to engage in conversations with people, to trade ideas. Send me an email, I'll respond. If you want to know more about our company, it's <u>www.mwhglobal.com</u>.

**Dave:** Terrific. Thanks very much for your time, Marshall. Great job.

Marshall: Thanks, David.

Dave: You bet.

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**Dave:** That was my interview with Marshall Davert. What a fantastic interview and what a great guy. I think it's very indicative – Marshall was going to be taking off on international travel shortly after we did the interview and I just think it speaks volumes that an executive of his stature was interested enough in giving back to the water community to come on the podcast. So I just want to thank Marshall for that – terrific guy.

Lots of takeaways in there, the state of our infrastructure being the biggest. I'm sure you're well aware that our infrastructure grades out at a D. There have been many reports about that. But I thought it was interesting to hear that, in Marshall's opinion, our treatment plants are generally in pretty good shape. It's the distribution and collection systems are problematic due to their significant age and because a lot of those systems were undergrounded so long ago, we may not even know where that infrastructure is.

The different models for funding infrastructure around I also found really interesting. It just begs the question of which model is going win out –which region is going to export its model to other areas to the greatest success. Most of the models that Marshall discussed existed within a political system of capitalism – which allowed various models to develop and for tweaks to those models. China was the exception where with their centralized planning, or as Marshall called it,



outcome driven planning was the norm. It's also very interesting to note the role, even in countries with a capitalism political model, how integral the governments of those countries are in promoting capital investment. I think it just highlights that governments are almost a necessary party, not an absolutely necessary party but getting close, when it comes to the delivery of basic needs and services.

Well, you can check the Show Notes out for this session at <a href="http://thewatervalues.com/pod15">http://thewatervalues.com/pod15</a>. And please don't be bashful in letting me know what interested you about the interview by leaving a comment on the Show Notes or by emailing me at <a href="mailto:david@thewatervalues.com">david@thewatervalues.com</a>. You can also tweet at me @DTM1993.

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