**DevelopmentAid Dialogues**

# Season 2. Episode 8: Water Shortage Isn't the Problem – We Are. | Navigating the Water Crisis with David Shackelton

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**Hisham Allam:** Hello everyone. Welcome to DevelopmentAid Dialogues. Thank you for joining us. I'm your host, Hisham Allam. Today we will dive deep into one of the most urgent yet misunderstood global issues - the water crisis. This is not a crisis of shortage, but one of quality where natural water sources are increasingly burdened by population growth, pollution, and outdated infrastructure.

Today's guest is David Shackleton, CEO of SIS.BIO, who leads an innovative team at the forefront of tackling this issue with cutting edge bio technological solutions. SIS.BIO has developed a unique biotechnology solutions platform that transforms rivers, lakes, reservoirs, and even wastewater to renewable sustainable water resources critical for communities worldwide, particularly in underserved regions.

David brings extensive experience in scaling sustainable technology. Under his leadership, SIS.BIO became a leader in integrated water resources management. Together we will explore how SIS.BIO approach redefines the potential for water recovery, helping restore the natural infrastructure that keeps our water ecosystem healthy.

Hello, David. We are happy to have you today.

**David Shackelton:** Happy to be here, Hisham. Thank you.

**Hisham Allam:** David, could you start by explaining why you view the water crisis as a quality issue rather than a shortage problem?

**David Shackelton:** I guess the first point, which I think everybody's aware of is there's the fixed amount of water on the planet. If you include all water, a subset of that, there's a fixed amount of fresh water that, we can readily use without desalination and so on. Historically, that fixed amount has always been sufficient because it's endlessly recyclable and renewable. What's happening now is the quality of water in our natural resources has degraded to such an extent that we can't use it.

So, the prime illustration of this is in 2014 Toledo, Ohio in the U.S. which draws us water from Lake Erie. Lake Erie is one of the great lakes. You know, it's one of probably the 10 or 15 biggest lakes in the world. And the amount of water in Lake Erie is unchanged. But it was so contaminated with toxic cyanobacteria and high toxin levels that it couldn't be treated for potable use.

So, the headlines, because there was no water coming out of the taps, the headlines all said “Water shortage! water shortage!”. You know, that implies that it's a quantity problem. But like I say, the amount of water in Lake Erie was exactly the same as it always had been. Had we been able to add more water, it wouldn't have made any difference. It was a quality issue, and that is what's happening increasingly all the way around the world. You know, rivers, lakes, dams, which previously had water quality that allowed you to walk up and drink it. A lot of those are now toxic and unusable, and the reason for that is because of this whole process of eutrophication which follows population growth, and urban development. Historically human waste was basically deposited into deep holes in the ground. You know, we all had a toilet outside if it was a rural, a farm sort of set up. With urbanization, really starting only the late 1800s, we had to start waterborne sanitation.

And after we had treated the wastewater, it's discharged back into our natural water resources, a hundred years or more of that. It means that the compounding effect of increasingly adding a little bit more, a little bit more residual nutrients has created a nutrient stockpile in a lot of those natural water resources that they are now, full of invasive weeds, excessive algae, toxic cyanobacteria, and the water's being degraded, and that natural infrastructure cannot perform its function anymore.

**Hisham Allam:** So as a conclusion, if the quality of water is improved, there is not a quantity problem?

**David Shackelton:** Well, because, water's infinitely renewable. We have demonstration projects where we've had sewage treatment plants, which are receiving double their design capacity and were way overloaded and non-compliant for over a decade.

And we have got those wastewater treatment plants not only compliant with standards for wastewater discharge, but the treated water affluent coming from a wastewater treatment plant was actually of better quality than the water being drawn from the dam for that town to provide drinking water.

So, what that means is it would actually be, you know, cheaper and easier to take the treated wastewater and process it to a safe, drinkable, potable standard and reuse it. And once you create that sort of local loop of using it, treating it, making it potable, then you in essence have an infinite loop and by improving quality, you have quantity.

**Hisham Allam:** So, SIS.BIO emphasized the concept of renewable water rather than just clean water. Could you clarify what this term means and why it's essential for building sustainable water solutions?

**David Shackelton:** The concept of renewable water really is how water has always operated.

So, there's always been organic matter, whether it's leaves or animal waste or human waste or urine or, or whatever going into the water. But your natural water infrastructure has always been able to perform its function of clearing those nutrients, clearing those contaminants, and restoring water quality.

But its ability to do that is being degraded now so that the water is not renewed, and therefore, cannot be reused. A very classic example of this is Johannesburg in South Africa, where most cities develop around a river, a lake, the sea basically develop around water. Johannesburg developed around the gold, and the gold is right up at the top of the watershed.

So, the virtually - no water. What happens in Johannesburg is they draw water from the vile river system up to 5,500 - 6,000 feet, which is where Johannesburg is. That water is used and goes through wastewater treatment plants, and flows then into other dams that surround the Johannesburg metropolitan area.

One of them is called Hartbeespoort Dam that was originally built as a dam for irrigation and for drinking water purposes, but it has become so atrophic now that the water's no longer suitable for irrigation in many instances because if you want to export your produce to places like the EU, they have standards for the irrigation water, and it can't be treated to produce drinking water.

So basically, that water is drawn from the vial river system. It's used once, it then discharges into these dams and can't be used again. If those dams are restored and the water quality is restored. You could then treat that water and have a brand new supply of drinking water for the city of Johannesburg and the city of Johannesburg at the moment they are suffering from extreme water shortages, and yet there are three or four or five dams in the area that are full of water that basically can't be treated to potable water standards to save drinking water standards. So there's an abundance of water, but it's not being renewed in that natural state so that it can be reused.

That is where, we are saying that if you restore and reestablish this renewable water paradigm by restoring the capability and the capacity of that natural water infrastructure, you're then better able to integrate your natural water infrastructure with your manmade water infrastructure so that you have an infinite recyclable loop of water and by managing water quality, not only in the pipes of the manmade infrastructure, because at the moment what we do is when we treat water in our water treatment plant to potable standards, we make it clean as long as it's in our pipes. Until we use it, we manage the water quality, we send it to wastewater treatment plants, and then we just abandon it to nature, and nature can no longer cloak, so we're only managing the water in the pipes.

And less than 1% of our water spends less than 1% of its time in the pipes. What we have to do is develop technologies, and this is what we focus on to manage that more than 99% of water that spends more than 99% of its time in natural water infrastructure, rivers, lakes, dams, reservoirs, so that you have an integrated water resource management policy and strategy and approach.

**Hisham Allam:** We will come later to water management. Now, I would like to ask you about your pipe technology solutions platform where you are treating water across the entire water cycle. Can you walk us through this process and what makes it different from traditional engineering based approaches?

**David Shackelton:** So, if you look at sort of the life cycle of water, we have a water treatment plant where we treat it to approachable standard.

And in essence, what that treatment process is, is to eradicate all biological activity from the water. We precipitate out using flocculent, we precipitate out any suspended solids and so on. We filter it. We might use chlorine to make sure that all biological life is dead and then it goes through to the taps or the bathrooms it's used. Once it goes back to our wastewater treatment plants, basically what a wastewater treatment plant is, our attempt to recreate a biological environment and reinvoke all the biological activity that allows the nutrients and contaminants to be removed from the water. So, what happens in a wastewater treatment plant typically is the wastewater will come into big settling tanks that allows us to settle off the fecal sludge.

The water then is still rich in contaminants that have been dissolved and suspended. That goes into an environment where microbes take up those nutrients and those microbes proliferate at a very rapid rate in order to produce a microbial sludge.

And we then put that into a secondary settlement tank. Separate off the microbial sludge, and now we have water that is very much cleaner than when it arrived. It still has residual nutrients, but we've used biology, in order to clean that water up. Where this breaks down at the moment is when we discharge that water into a stream, a river that goes downstream into a lake or a dam, the residual nutrients.

Even if there are only 10 milligrams per liter or five milligrams per liter, when you are discharging hundreds of thousands of millions megaliters of this treated wastewater per day, that load mounts up. And what happens to those nutrients is they produce algae and things, those sort of organisms, they die off and sink to the bottom.

And as they accumulate at the bottom, it forms a nutrient stockpile at the bottom of the river, the lake, the dam, whatever. And that nutrient accumulates. There are some dams that we've seen when they were constructed, they were 45 meters deep. They're now only 30 meters deep because it's 15 meters of this organic sludge, which when it decomposes, depletes oxygen from the water. That means that all the fish life that would normally be consuming the algae, clearing those nutrients and the fish life would be consumed by bird life and by men, fish, that all gets constrained.

And what you have is a perpetual recycling of those nutrients to produce more and more algae. And over time, the type of algae that's produced shifts from bringing good, green, beneficial algae that would be consumed by the food, web and the fish life to toxic cyanobacteria. Which is a different form of phytoplankton, which makes the water toxic, and that's when you get animals that are drinking at the water, you know, they die, humans get sick and so on, and the water becomes untreatable and unusable.

**Hisham Allam:** This is really impressive. David, your team has seen success in diverse environments from large reservoirs in the USA to lagoons in Zambia. I'm curious to know how your solutions adapt to different environments and needs.

**David Shackelton:** Well, I guess the first point of departure there is that we've developed our, biotechnology and our approach from first principles, and by starting at first principles, the underlying metabolic biochemistry, in a wastewater treatment plant is in essence the same as in a river, a lake, or a dam.

The only difference is you don't have fish life and things like that. In a conventional engineered wastewater treatment plant. Whereas in a lake or river you have access to all that nutrient clearing capacity of the food web, which we are decimating. We are shutting that down.

You know, the fish life is reduced and so on. By reactivating that we're able to then change the whole capacity of that natural water infrastructure to perform. And the underlying at first principles, the underlying science and technology and what is required is the same for both.

And what that really breaks down to is you need oxygen you need an aerobic environment. Aerobic processes are far quicker and far more efficient than anaerobic processes. So once your water becomes anaerobic in a wastewater treatment plant or in a lake or anything like that, everything starts to shut down.

So, oxygenation is key. Then you need to boost the biological aspects of what is going on. There are two main aspects to that. One is what they call catabolic, which is breaking stuff down. So, you have your contaminants coming in, your organic waste, your dead leaves, whatever. You need to break that down.

And we use enzymes to help break that down. Those enzymes can also break down and metabolize the accumulated organic sediment at the bottom of the lake that's causing the problem. Then the second thing you need to do is the anabolic side, which is building up. Again, you need to make sure that the nutrients are taken up to produce beneficial algae to produce the sort of organisms that provide good nutrition for the food web, so that the food web will reestablish itself.

So, if the nutrients are purely going into the production of algae and there's no food, web and toxic cyanobacteria, you can't break that cycle. By applying micronutrients and influencing the metabolic biochemistry at that level of zooplankton and phytoplankton, we can shift the balance of the phytoplankton so that the cyanobacteria they are outcompeted because we create an environment in which the beneficial algae can outcompete them and then we ensure that the zooplankton and the food web can consume them, and we reestablish that natural processes by which water is renewed. So, that's the kind of basics of how we go about it. What that allows us to do is to be able to configure our technology for anything from a conventional, concrete and steel wastewater treatment plant to lagoons pond systems and things like that, to rivers, lakes, dams, rivers. We've shown improvements across over 40 kilometers of river.

We've taken lakes and reservoirs that might range from15, 20 acres up to a thousand acres range from 10 to 15 feet deep, or three to four, five meters deep to 50, 60 meters deep. So the scalability, when you have the sort of base principles is there and the real advantage that we believe we can do this by having that configurability is it lessens the need for expensive manmade infrastructure because we can use nature to help us rather than be fighting against nature in essence.

**Hisham Allam:** That is a powerful point, it makes me think about areas like Zambia and South Africa, as you have mentioned earlier, where technology has improved wastewater treatment, and in some cases made water suitable for reuse. What are the key components that make this possible?

**David Shackelton:** Oxygenation. And like I said, we developed proprietary oxygenation technology that allows us to meet the oxygen demand of a healthy productive water body. Whether that is a wastewater treatment tank or a lagoon, or a river or a lake. And then we have the bio augmentation products and typically where people's mind has always gone when it comes to bio augmentation is microbes. They want to throw microbes into lakes, reservoirs, and things like that. We say that's a fundamental misunderstanding and misappropriation of technology.

If we go back to what I said about wastewater treatment. What you have there is you are encouraging microbes to take up as much nutrients as possible to produce a microbial sludge, but in a wastewater treatment plant, you can then separate that from the water and discharge the clean water. The reason in a wastewater plant, as I say, you don't have fish and things like that, so you are restricted to microbes and within that restriction and constraint you have to physically construct settling tanks, clarifies where you can remove that sludge.

If you start putting microbes into a river or a lake or a reservoir. If you've created an environment in which they can flourish and proliferate, you're going to create a microbial sludge, that organic sludge at the bottom of the lake is the root cause of your problems, because as that decomposes and breaks down, it recycles the nutrients and that refuels invasive weeds into that mucky sediment and refuels and sustains accessibility and cyanobacteria.

So, it's really important to understand that distinction in trying to rectify natural water bodies rather than lots of microbes what you want is bending zooplankton, consuming the sludge and reestablishing the food we have to clear it.

**Hisham Allam:** But that ties into another aspect of your work. You mentioned eutrophication as a global threat to water security. Could you explain eutrophication and how SIS.BIO technology tackles it?

**David Shackelton:** Уutrophication obviously is a big complicated scientific word. A lot of people who are familiar with the term and think they understand it think that it means excessive nutrients.

If you go back to the root of the word, which comes from ancient Greek, it actually means well-nourished. So, the logical question you must ask is, why would a well-nourished or eutrophic water body be a problem? Surely, you know, being well-nourished is a good thing. And what the problem is, it is the invasive weeds, the excessive algae, and the toxic cyanobacteria that are well-nourished.

What are not well-nourished? Is the animal life in the food web. So, to understand that a little better you almost have to imagine a cycle. Nutrients flow into a water body. Those nutrients, the primary production of all life is done by photosynthesis. And in a water body, that primary production is gonna be algae.

That's inevitable. Algae is gonna be produced. So the question is, what happens to that algae in a healthy environment? The majority of it will be consumed by animal life in the food web. And that goes up, a hierarchy at Benthic Zoo. Planton and crustaceans and small fish and big fish. And a large amounts of that biomass will then be cleared by animals on the land, birds on the land, fishermen, and so on.

So, you have a natural clearance path where algae biomass, plant biomass is converted into animal biomass, which is cleared from the water. The other thing that can happen to the algae is too much of it is produced for the food web to consume, and algae cells only live a matter of a few days, so the excess dies off and sinks to the bottom.

It's a bit like we go to a big feast or a wedding there's a big banquet. We eat as much as we can, and the rest goes to waste or, or goes off, can't be consumed. So the excess algae dies off and sinks to the bottom when it gets to the bottom, as it decomposers, it depletes oxygen from the water at the bottom of the lake or river or dam and so you have now a vicious cycle going whereby more and more algae is produce oxygen in the water is depleted as it decomposers to the extent that the water lacks oxygen, the animal life in the food where cannot function in hypoxic water, so the animal life gets constrained, so less and less algae is consumed so more and more algae sinks to the bottom, and now you have a positive feedback loop, which has been driven for, decades in most places, and you have excessive hypoxia in the water, excessive depletion of oxygen, excessive buildup of these sediment, nutrient stockpiles. The food web becomes constrained and this perpetual nutrient recycling means that algae and cyanobacteria are produced. And as that mucky, slimy black, horrible sediment accumulates, invasive weeds are able to grow in it as well. So eutrophication we say, if you look at it in the bigger picture, in the longer term, is the accumulation of sediment, nutrient stockpiles that are recycled, that deplete oxygen, that constrain the food web, and shift the whole ecosystem from an aerobic one that is full of animal life that can clear the nutrients to a very hypoxic and aerobic environment that perpetually recycles the nutrients and produces algae, and then toxic cyanobacteria makes it water unusable.

**Hisham Allam:** Given what you just shared restoring large water bodies like dams and rivers involves both water quality and ecosystem health. How does the SIS pile approach ensure the long-term sustainable health of those water bodies?

**David Shackelton:** What we are really striving for and what, what we, what we aim to achieve and what we do achieve is a shift in the nature of the ecosystem. Conventionally and I guess this applies more to the US, what happens is when there's excess algae or when there's excess invasive weeds we apply a biocide.

So, a toxic chemical that will kill algae, that will kill weeds. But that's not sustainable at all because what you actually do by killing that biomass off as. I've just described it dies off, it sinks to the bottom it decomposers, it deplete oxygen, it recycles the nutrients. You're actually just enhancing the atrophic process.

What you have to do is shift the ecosystem from one that is recycling nutrients back to one that is clearing nutrients. And in order to do that, you need to sustainably and consistently oxygenate and keep fully oxygenated water. That's the primary thing for the food web to be able to exist. Thereafter like I say, we monitor the ecosystem in order to track what is happening with that nutrient processing in terms of what type of algae is being produced, is cyanobacteria being produced, what type of zooplankton are being produced to ensure that you have shifted from nutrient recycling to nutrient clearing, and you have a food web, which is fully biodiverse and fully capable of clearing all those nutrients. And the biodiversity is very important because if you only have a limited range and scope of animal life available, seasonal changes they may not be able to adapt to that well. So, the biodiversity gives you the ability for the food web to be able to adapt to seasonal changes and keep productive throughout the year.

**Hisham Allam:** David, your technology appears to offer a leapfrog solutions for water infrastructure. Much like how wireless networks bypassed the need for copper lines in Africa. Could you explain how your modular local loop model could transform water access and treatment, especially in foster growing cities in emerging markets?

**David Shackelton:** The agenda in emerging markets is always to try and replicate and duplicate, what has happened in more sophisticated, more developed markets. First thing you gotta understand is what was done a hundred years ago, was done within the constraints of the technology that was available a hundred years ago.

We have technology available now, which means we don't have to follow and duplicate what was done then. The second thing is to understand that in general the big cities in the west , they suffered a lot of these same problems in the late 1800s. In cities like London and New York and Paris, you name them, there were high levels of typhoid dysentery cholera, those sort of diseases because of the poor-quality water. All the time, infrastructure was put in as they developed. Unfortunately, in a lot of the emerging economies, urban development has taken place in the form of shacks and shanty towns and so on, where there is no infrastructure. In the advanced cities in the west that Chicago, for instance, has the biggest wastewater treatment plant in the world as I understand it. But it's a centralized system that has been developed over the last hundred years. It treats over a million megaliters of water per day.

You can't go back it is just not cost feasible. You'd have to move people in order to do it. It's just not practical to try and do that sort of centralized big infrastructure stuff in cities like Delhi, Johannesburg, Nairobi and so on. So, what we have to do is, as you say, the analogy I use is cellular.

30 years ago, Africa was facing the bleak prospect that as the world became connected up to this thing that was looming on the horizon and people were talking about called the internet, Africa would be left out because there's no ways you could run copy cable all the way around Africa and connect everybody.

But what happened was, new wireless technology came in and we leapfrog the need to go and install all that copper wire. And what we are saying is in the emerging markets, you can leapfrog the need for big, extensive plumbing, pipelines, pump stations, and so on. You can do this on, on a local oops, sort of basis.

So, in a suburb, supply the water, put a small localized wastewater treatment plant and, in a lot of towns, the space is still available. This can be simple lagoon systems, and with simple lagoon systems using biotechnology, you can treat the water to a standard which is good enough to be able to be re-treated, to produce drinking water as part of that wastewater treatment.

You can have aquaculture going on in those ponds and providing protein for the residents. But the water can be recycled and reused on a modular basis per suburb rather than on a macro engineering basis for every big city of big, urban complex and so on. So that has big impact for a lot of the emerging market governments who are severely constrained by debt, it obviates the needs for big capital infrastructure construction because we can scale down the level of capital expenditure needed. And it translates a lot of the expenditure into operational expense much, much, much lower levels spread out over time. So, from a fiscal management point of view that has major positive impacts.

**Hisham Allam:** Then let's shift to another area of interest. In addition to addressing immediate water quality needs, SIS. BIO seems to have broader impacts, such as supporting food security through aquaculture. How does water quality restoration tie into these other sectors, and what potential do you see for multipurpose benefits?

**David Shackelton:** There's a number of things. In intensive aquaculture as a farming operation when you farming a lot of fish in a confined area, in essence what happens is those fish are fed, they will convert certain amount of the food into fish biomass as they grow, the risk gets excreted, and you're back to the old situation that fish excrement drops down to the bottom starts to form a level of sludge that depletes oxygen, that creates a very anaerobic environment. In such an anaerobic environment you've created ideal conditions for pathogens for the fish. So, the fish become diseased, the rate of growth reduces, the mortality rate goes up and so on. So, our sort of approach oxygenation and biotechnology and getting rid of that organic sediment boost the performance of intensive aquaculture.

The other area that we can look at, as I say, is in wastewater treatment lagoons. You have these lagoons, they're full of water. The water will have residual nutrients to some extent; that's an ideal environment in which to grow fish. We had one client once in a municipality, he had a series, I think it's four or five different lagoons.

The fifth lagoon, they fenced off and they actually charged people fishing licenses to go and fish there. So, it became this minor source of revenue. But you know, there is, there's that aspect to it. We were introduced to scientists working on Lake Victoria in Central Africa, Uganda, Kenya, Tanzania, around there.

And the people, there are water people, they're out of the water all the time. They are fishing, they eat a lot of fish. There was a really good regional economy supplying fish. Inland to Nairobi and Aru and places like that.

And I, I was amazed to hear because when I was a child, we actually lived in that sort of area. I was told but a lot of the people who live on the shores of Lake Victoria are now eating canned fish imported from China because the eutrophication and the toxic cyanobacteria in the lake has become so bad that source of food, source of protein has been cut off. So, restoring a lake like that would, you know, not only restore the water quality, you could potentially restore a whole region of the industry with the fishing. That's where, better water quality has big benefits on aquaculture, whether it's intensive or kind of more passive and natural. We think that's something that really should be explored more and more.

**Hisham Allam:** I think an official part for your projects requires collaborating with local governments, NGOs, and communities. Could you share more about these partnerships and the challenges you have encountered along the way?

**David Shackelton:** Governments are always slow to move, slow to take decisions. Got a lot of inertia. But also very conservative. So, new technologies, new approaches it's difficult to get governments to adopt them, particularly when these sort of decisions are being made at municipal level because, the municipal level people are not necessarily specialists.

Your typical municipal engineer is responsible for roads and electricity and water and sanitation and goodness knows what else So there're sort of inherent constraints in government structures in making decisions around changes of policy innovation and so on. So, we are kind of doing two things.

One is we trying to engage at the national level to point out the policy changes that would be needed to take advantage of this sort of technology and the other thing that we become aware of in the us they've recognized as the US government that in a time when there's very rapid technology development and innovation, government has been left behind and the US government has set up specific structures and people responsibility for identifying and engaging with innovative technology and that's kind of across the board.

I think the focus is primarily to date being on kind of military and cybersecurity and IT and that sort of stuff. But we are seeing signs that the realization that this works, it's a way to accelerate technology adoption. It's a way to reduce expenditure and so on fiscal benefits.

And so that's something else that we are trying to speak to governments about is that this sort of technology cannot be adopted by as osmosis. It's just too slow. There has to be changes in the policy, changes of practice in order to adopt it and get the benefits.

And with the global water crisis being what it is, you have to find ways to speed that up and accelerate it.

**Hisham Allam:** Looking ahead, what do you envision at the next big leap or innovation and power remediation to technology, especially as global demand for sustainable water solutions continue to grow?

**David Shackelton:** I think it's gonna be about the integration of biotechnology with conventional engineering.

To try and do everything with conventional engineering and only manage the water in the pipes with big expensive, concrete and steel chemical treatments wastewater plants, water purification plants. Trying to do everything with that technology alone is not gonna be sustainable. It's not gonna be able to do the job.

Too much of our natural water infrastructure has become a liability. It's a public health liability. It's unusable. The toxins often make it unusable for irrigation. It can't be treated for potable use, can't be used for recreational use. It's become liabilities. The fundamental changes I see it is converting natural infrastructure from being a liability, as so much of it is at the moment into being a functional asset, functional infrastructure, and this is where the integrated water resource management comes into play.

We have to integrate the natural water, infrastructure with our built, constructed manmade infrastructure so that we have an integrated, seamless, perpetual renewable cycle that water can constantly and perpetually be processed through. Water quality can be maintained, and as long as water quality is maintained, we can reuse that as often as frequently and faster and faster and faster. And by doing that, we get the quantity that we're gonna need for a sustainable future where everybody has an acceptable standard of life. One of the big mistakes I think I'm seeing in policy thinking, particularly in southern Africa, is that they want everybody to reduce the amount of water they use.

The emphasis should be on those that hardly have any water to use. How can we increase the amount of water available so those people who are living with one tap in a shanty township of a hundred shacks with 500 people living there, how can we create more water so that their water usage can increase and everybody can have waterborne sanitation, safe drinking water, and abundant supply of good quality water.

**Hisham Allam:** David, the major donor nations like the US, the Netherlands, Germany, and the UK have recently reduced development aid funding, which often flows through institutions like the Worls bBnk or regional development banks to support critical water infrastructure projects. How do these cuts risk delaying or derailing efforts to combat eutrophication in lakes or deploy modular water systems in underserved regions?

**David Shackelton:** Well, it's a tricky one for us. We've never really got involved in any projects or the aid agencies never gotten involved in any of the projects we've done. The only sort of interaction we've had with aid agencies or NGOs supported by aid agencies has been pretty like.

What we don't see is, is a movement to, upgrade, provide waterborne sanitation and so on. We got a classic example. We had a call just a week ago about a situation where there's a lake in Africa covered in water hyacinth. And what that has done is it's killed off a lot of the fishing. A lot of the boats can't go out onto the lake because it gets surrounded by the water hyacinth and so on. The fishing industry has collapsed and people are actually eating imported fish. The initiative at the moment is to harvest the hyacinth and make biochar so people have a cheaper fuel. That's kind of a, if life gives you lemons, make lemonade. So, it's accepting the problem and saying, how can we live with the problem?

Our approach would be. Let's remediate the lake, then we could provide drinking water from the lake. Then you could provide waterborne sewage and put the investment into building a factory where you can, can the fish and, and export it sort of thing. But we seem to sit in a gap between big, big projects and, these small palliative sort of things.

There's another example we had. There's a town where there's a dam downstream of the town's wastewater treatment plants, which was historically used for the drinking water. The condition of the dam is so bad now that drinking water is very intermittent and it's really disrupted commerce industry, everything.

There's a plan to build a big new dam about 30 kilometers downstream, high profile, high prestige project from sponsored by one of the big European aid agencies. But that eutrophication problem will transfer down to that dam. So again, our view would be better fix the dam you've got, and then you be cheaper.

But we seem to sit in the middle space there that people don't see clearly. But my big concern around this thing, this inability to provide you know, proper water, proper sanitation, drinking water and things like that is one of the drivers of migration.

And there was an interview with Rachel Reeves, the British Minister of Finance at the G20 meeting and Rachel Reeves was saying one of the reasons that they're cutting back the aid money that they are sending out of the country. Is because they've had to spend so much money on accommodating looking after migrants who've arrived in the UK. So there's a feedback loop here where you know if, if the aid money is not spent on genuinely uplifting people's quality of life and improving economic prospects. Then migration is driven. The money's used up in Europe and then they don't have aid money to spend in the emerging economies. So, I think overall there really needs to be a rethink on how this aid money is allocated, what it's spent on and so on, to try and get more value for money out of it and deal with the real issues and try and move the needle and make a real impact.

**Hisham Allam:** So, to wrap up what you have just said, that the impact of the aid cut can extend from affecting, developing or fixing the nation's infrastructure, like building or fixing dams to the life or the quality of life of people. Poor people like fishermen, right?

**David Shackelton:** Absolutely. Absolutely. And you know, in big parts of Africa, particularly Central and East Africa fishing in the lakes and so on are very much a big part of the economic activity, a big part of the food that people have.

And you know, that becomes degraded it, it's a serious problem. But you know, to think that so much money has been spent on aid and yet so many people still do not have water on tap, flushing, toilets and things like that and instead we kind of spending money on the peripheral. So, we're spending money on treating pit latrines, trying to develop better toilets, trying to stop mosquito infections and so on. Those are kind of all symptoms and not the root causes. And if you address the root causes and upgraded everything, that would have far more impact on improving quality of life, sanitation, health, reducing the motivation to migrate elsewhere and so on.

**Hisham Allam:** Thank you, David. Thank you for your time and for dedication.

As we close this episode, I'd like to thank David Shackelton for joining us and sharing SIS.BIO transformative approach to tackling the global water crisis.

To our listener, thank you for joining us on DevelopmentAid Dialogues. We hope this conversation has sparked ideas and hope for a future where sustainable water solutions become the norm, especially in underserved communities worldwide. We will be back soon with more voices and sites and solutions.

Until then, stay informed and stay inspired. I'm your host Hisham Allam, and this is DevelopmentAid Dialogues!