Economic Architecture Podcast

Episode 22 Transcript:

The following transcript has been edited for clarity:

Leonard Nelson: In particularly where there's an economic benefit with that upfront cost, you know, they almost always choose the nature-based approach. But I think the challenge is that just the size and scale of traditional construction, it's a $10 trillion global market, right? Heavy infrastructure. And, you know, the people are used to doing things the way that they're used to doing it, right? So there's some inertia in the status quo.

Stuart Yasgur: I am Stuart Yasgur, and this is Economic Architecture, the podcast

Stuart Yasgur: There's a lot of places where we live, where we work, where we play, that are right at the intersection between land and water, coastlines, rivers, seas, lakes, harbors, all of those things. And at that juncture point, now that meeting point, we're there because it's gorgeous, beautiful. It really supports life and activity, but there are also risks that we have to manage and actively manage. And, we have a long history of doing that through building hard, impervious barriers between the sea, the lake, the river, and the land, the town, and where people are living.

Stuart Yasgur: And those sea walls, for example, enable us to, to kind of live and work with the water. But they have some real disadvantages as well. They're incredibly costly. They degrade quickly with time, and they have a real impact on the natural environments, which are so valuable and so integral to our living and working with water and the sea in its different forms.

Stuart Yasgur: It's remarkable that this is technology that's thousands of years old in some way, but also just in the recent years is going through a radical transformation.

Leonard Nelson: So people, they naturally, they're drawn to the coastline, they're drawn to creeks and rivers and lakes and streams. And they're drawn because of that beauty of what nature provides, right? And with living infrastructure, we can take those cues from nature and work to build in more nature compatible ways

Stuart Yasgur: In this week's conversation, we explore the boundary between land and water, and how to make these boundaries safer and more secure.

Stuart Yasgur: Leonard Nelson is the CEO and Co-founder of Natrx in North Carolina. His organization looks to nature for inspiration on how we can live with water in more innovative ways. Natrx incorporates nature-based solutions to integrate natural habitats and protective structures for waterfront assets. So, for example, instead of creating a seawall as a total barrier between land and water, it creates a permeable region so water can pass through it to still protect the water that's behind it.

Stuart Yasgur: The issue is that this is becoming even more relevant today as the climate is changing, extreme weather events are getting more severe. As we've seen in some of the previous conversations, we're seeing increased levels of flooding, of either tidal flooding or nuisance flooding, or severe storm flooding, and all those different water formats. So that's putting increased demand on our ability to really make sure that the boundaries between land and water are safe and secure.

Leonard Nelson: When you look at the big picture at how we build, look at the infrastructure that supports societies. So, think of roads, bridges power infrastructure. We're oftentimes using impermeable materials like asphalt, concrete, heavy aggregates, which are heavy rock-type materials; those

tend to be impervious, right? And they tend to speed water up. So when you look at things like storm surge, hurricanes, floods, when water gets moving fast, it can be very dangerous, right? And that can cause harm both economically and can even cause loss of life.

Leonard Nelson: So as we think about how to modernize our infrastructure, we can look to nature for cues. And if you look at things like coral reefs or oyster reefs or mussel beds, or down trees in a creek or a stream, they tend to slow water down, so it allows water to flow, but it keeps it moving slowly.

Leonard Nelson: And I think when you see water that's clean and moving slowly, you could really create a lot of value. You can create a lot of beauty.

Leonard Nelson: Over 50% of the world's GDP is actually near a major body of water. So people, they naturally, they're drawn to the coastline, they're drawn to creeks and rivers and lakes and streams. And they're drawn because of that beauty of what nature provides, right?

Leonard Nelson: And with living infrastructure, we can take those cues from nature and work to build in more nature compatible ways instead of just always using impervious, bulk products like say, steel-reinforced concrete, rock, plastics, sheet pile, those types of impervious, more manmade type materials.

Stuart Yasgur: So this is especially true in like coastlines, along the eastern seaboard, for example. So, rivers, creeks, anywhere connected to a mountain, hillsides, so it's not just the coast. We also think, like if I'm moving from east to west, also the whole Appalachian Mountain range, right? 'Cause we have rivers here, and then we're starting going into the plains.

Stuart Yasgur: We have the whole Mississippi system, then we're going right into the Rockies.

Stuart Yasgur: So, and of course, we have the coast on the West Coast, kind of across the country, we have these kinds of infrastructure functions that are really kind of, and that are getting exacerbated with more extreme weather. I imagine that how water interacts with our infrastructure is a really big issue.

Leonard Nelson: That's right.

Stuart Yasgur: And if we wanna make it safer, then learning from nature, how we might do that and move away from just creating hard infrastructure.

Leonard Nelson: That's right. If you just think about your water interactions in your daily life, if you've ever owned a house or rented an apartment, you're gonna have drainage issues, you're gonna have water challenges with how water flows and moves.

Leonard Nelson: And, if you consistently speed it up, if you try to solve every problem by hardening, what tends to happen is you harden one spot and that speeds water up. And then you have to harden another spot, and harden another spot.

Leonard Nelson: And that can become a downward spiral, right? Where water then starts moving really fast, which is exactly what we're trying to avoid. And so, if you think of the reverse, think of, say, a coral reef, right? That is knocking down wave brakes. It's doing multiple things at once, right?

Leonard Nelson: So, it's providing a functional benefit for that shoreline and perhaps the properties behind it by knocking those waves down and slowing down the flow of water. But it's got a lot of nooks and crannies and complexity, and that provides habitat for a wide variety of species, that can be important economically, that can be important visually, bring beauty to the area. It can drive up property values.

Leonard Nelson: So if you destroy the coral reef and build a giant concrete sea wall, you've just destroyed economic value, just destroyed the habitat. The whole reason that you moved to that coastline in the first place, right? And that same thing is true in a creek or a river, or a stream, a lake. We need to look for ways that we can harness the adaptive power of natural systems to protect, not just our assets, but just overall the properties that we're entrusted with. And then secondly, to look at how can we do that in a way that adds value to our properties and communities.

Stuart Yasgur: So, like learning from nature, there's been great examples of that in a bunch of different fields. In your space, kinda, where are we? Is this really early days? This is an insight. Now we need to learn to make it practical, or you're actually already making this practical. How widespread is it? Or are we really talking about early adopters here?

Leonard Nelson: Well, I think it's a little bit of both. Our team has been at it for about 20 years with modular nature-based shoreline protection solutions. And I guess we really came out of the living shoreline space.

Leonard Nelson: So how do you protect a shoreline in a way that's more biodiverse or attractive and more resilient than, say, a plain flat sea wall? And that's been about 20 to 30 years that that field has been developing, we've been leaders in that since the beginning, and we've deployed over 115,000 modular nature-based breakwaters. Kinda coastal protection units.

Leonard Nelson: So, we're a big part in trying to scale up this technique, all across the country in the future, all across the world. And there are a lot of other practitioners and innovators out there that are doing work similar to Natrx.

Stuart Yasgur: That's an enormous number, 115,000.

Stuart Yasgur: So what's the the magnitude here? Is this a, 'cause in some cases we're talking about a home, some cases we're talking about a town that needs a breakwater, like what does that look like, 115,000?

Leonard Nelson: Yeah, so these are modular reflect units. So generally, they're about one ton, either, I'd say, normally a half ton to a ton. So up to about 2000 pounds.

Leonard Nelson: They are porous, and they have a lot of roughness. They have a lot of habitat spaces. And again, the idea is that you let water flow, but you slow it down, right? So rather than having a flat wall and taking the impact of flow or a wave. We're trying to create something that can diffuse or mitigate that flow of water, but still allow for water exchange, right?

Leonard Nelson: So, going back to that coral reef analogy, you're not completely stopping the wave, right? You wanna let the water flow through rather than having a flat wall. But you wanna have some flow, but you want to take some of the energy out of that, outta that flow or that wave.

Stuart Yasgur: Are there any great examples you can point us to, like where this has been kind of implemented in communities that are experiencing this?

Leonard Nelson: I'd say some of my favorite projects are where we have, let's say, a private sector organization, let's say an energy firm or a port.

Leonard Nelson: And they're really excited about a nature-based project, and they're working alongside a conservation organization, let's say Ducks Unlimited or the Nature Conservancy, and you get two groups that oftentimes you wouldn't think would, you know, that they may not get along, or you may think that they may not share a lot in common.

Leonard Nelson: But when you look at the opportunity to use nature to solve problems operationally and to provide functional benefits to a private sector firm, while you're providing benefits to biodiversity, fisheries, water

quality, you know, those are some of my favorite examples. Multiple states, North Carolina, Louisiana, Mississippi, Texas. So, we've done this all across the US.

Stuart Yasgur: So this is a place you have a port where you might need a sea wall 'cause you can't have that wave action you need to protect ships, the machines, all the activity that's going on. But if you were just to go with kind of like an old fashioned version of a seawall, now you kind of separated that one body of water into two different bodies of water where you know, you have large interchange of maybe plant life and animal life and nutrient richness.

Stuart Yasgur: But that might, now that harbor or that port that you've just kind of walled off isn't getting the benefits of that. It's not getting the exchanges, et cetera. And so, by moving instead to a nature-based solution where you can actually, water actually is permeable, water goes through, you start to have more of those kind of nutrient exchanges, sea life, plant life kind of exchange going through that barrier.

Stuart Yasgur: And so now you can get a harbor that's not as kind of lacking in all of the richness that's really important in our kind of waterways.

Leonard Nelson: That's right. That's right. And economically it can be impactful too. If you take a port, for example, you know, a concrete sea wall at somewhere like a port to build that would be something on the order of $1000 to $2,000 a linear foot.

Leonard Nelson: We can provide a permeable nature base, an oyster reflex solution for let's say $300 to $600 linear foot. Right? So, a fraction of the cost, because we're not mobilizing as much material. We're not bringing out concrete pumps and trucks. We're simply placing permeable modules on the shoreline that mimic the function of a natural oyster reef for a natural coral reef, right?

Leonard Nelson: And because there's some permeability you don't have to do nearly as much engineering and heavy kind of soil management and tiebacks and anchoring, 'cause the water can flow through, right? So you're taking pressure off of that protective device because there's some ability to flow. And it's really fascinating how these systems fail in big hurricanes, and we've seen quite a bit of that.

Stuart Yasgur: So, on the economics, it's really surprising and kind of interesting to hear that, I had long thought about the benefits of this kind of nature-based solutions, in part because, in the traditional method, you put a large seawall in place, the moment you put that seawall in place, it's now a depreciating asset, right?

Stuart Yasgur: Because it's getting pounded by the sea. It's gonna deteriorate if you need it to be in place. As soon as you've spent the money to put it in place, you gotta start budgeting to put its replacement in place, right?

Stuart Yasgur: But a nature-based solution, as nature's actually growing, it's gonna get more robust with time, right? So plants and animals live amongst that nature-based solution, and it becomes more robust and resilient over time.

Stuart Yasgur: So, I thought one of the great economic benefits of this thing is you're taking a depreciating asset and turning it into an appreciating asset, which is massive. But now you're also pointing out that even the initial investment is gonna be cheaper on a per foot basis. Thirty to 60% cheaper per linear foot.

Leonard Nelson: That's right. That's right. And it's all dependent on location and context and design, but what we bring to the table are new tools and techniques, right? So, everybody knows how to build a seawall, right? And the cost is the cost. And with today's labor and equipment prices

and the cost of materials, it's not like the 1970s anymore, when that stuff was super cheap.

Leonard Nelson: Those solutions are costly, and we have the ability to come in and look at the conditions, analyze the requirements, and say, hey, we've got a new tool, we've got a new technique. And in many cases, it's much more cost effective than traditional infrastructure construction.

Leonard Nelson: I'd say the main impediment really is just a mindset shift, right? Like people need to be open to trying new tools, to try new techniques. We generally find that when clients seriously consider a nature-based technique, in particular where there's an economic benefit with that upfront cost, you know, they almost always choose the nature-based approach.

Leonard Nelson: But I think the challenge is that just the size and scale of traditional construction, it's a $10 trillion global market, right? Heavy infrastructure. And, you know, the people are used to doing things the way that they're used to doing it, right? So, there's some inertia in the status quo.

Stuart Yasgur: That's fascinating. What you're describing is an actually superior alternative, right? It's better on the short-term price. It's better on the long-term economics, and it has better environmental outcomes, right?

Stuart Yasgur: So what's the timescale of these kind of infrastructure decisions? I mean, these are massive expenditures. There's a lot involved, and it must take a long time for people to wrap their head around making these kinds of decisions.

Leonard Nelson: It can. You know, I think one of the advantages of kind of adaptive nature-based management, though, is it provides a different procedure and a mindset for asset protection and asset improvement. You

know, as you mentioned, with a manmade asset, it is more of a big bang approach, right?

Leonard Nelson: So I'm gonna, lay out a bunch of capital expense. I'm gonna do some huge three-year study. Maybe pay some fines or some mitigation, because I'm, say, harming the shoreline, that can take five years.

Leonard Nelson: And when you do that, it takes so long to go down that road with traditional construction, particularly on the waterfront, that there's a tendency to overbuild, right? So, well, I only have one shot of this, so I'm just gonna make this thing as big as humanly possible. And so that drives your budgets up, your timelines up even higher.

Leonard Nelson: With nature-based techniques, you can manage it more adaptively. I'm just gonna go place these things out here where I see that I'm maybe say, losing some land or have some erosion or water's moving too fast. And oftentimes, while you're doing that, you're providing an environmental benefit so that streamlines permitting. There's not a lot of pushback because there's all these positive elements to what you're doing,

Leonard Nelson: If you need to, you can go out and put a few more in later, right? Or if you get hit by a massive hurricane, oftentimes they're just fine, and the natural system grows back, and it recovers, and you don't have to fix it like you would a traditional hard asset which would fail catastrophically. If you're gonna put a giant seawall on a port, that's gonna take five years plus, right? That's kinda how it goes.

Stuart Yasgur: That's fascinating. And are you seeing regulators? Especially, I guess, environmental regulators. Are you seeing them recognize the benefit, and is that flowing through to actually being able to get projects approved more quickly?

Leonard Nelson: We are. So I think there's a lot of regulatory consensus around nature-based solutions.

Leonard Nelson: So, the US Army Corps of Engineers has a group called Engineering with Nature. They've really touted that approach. It doesn't mean that it's always completely smooth, but I think most resource agencies are looking at impact, right? And if we can show them clearly, hey, here's our habitat to impact ratio, right?

Leonard Nelson: So, we give them simple numbers, simple metrics, and say a seawall would be, you know, a negative three x habitat to impact ratio. You're impacting a lot of habitat, and you're not really providing any net benefit, right? In terms of surface area or voids or crevices, that say coral can grow on. And what we're able to do is do the opposite.

Leonard Nelson: We're providing five times the habitat to the bottom that we're actually covering up. And so, providing some of those simple metrics really helps to make the resource agencies, makes their decisions easier 'cause they can understand and weigh in the cost of the benefits of these type techniques.

Stuart Yasgur: And regulatory infrastructure, it takes a long time to set up. It requires a lot of complex thinking, sophisticated thinking, and sometimes it can take a long time as a result to change. And there's also care, right? Like people are exercising, you know, they're being prudent and careful. So sometimes that can take a while to shift.

Stuart Yasgur: So, we've largely been talking about public entities. There are also private entities who have huge water demands and are engaged in the water side. Are you seeing private sector players adopt this?

Leonard Nelson: Yeah, absolutely. So, about a third of our business is private commercial. About a third is say public sector of all flavors, so federal, state, local, and municipal, et cetera.

Leonard Nelson: And then a third is kind of everything else that's individual property owners, homeowners, conservation organizations, just a mix of all kinds of different unique opportunities. So, it's kind of a third or third or third. And I'd say that we see you know, fairly consistent adoption across industry verticals.

Leonard Nelson: It's not like there's any one that, it doesn't only work for government or only work for private industry. I guess one way to look at it's the water doesn't really care who owns the land, right? It's gonna work in the same way. And so that's really what we focus on, is how do we solve the problem for the client in the most efficient economic and the most straightforward way possible, right? So how do we bring a new tool to the table, solve their problem, and kind of allowed 'em to shift into a kind of a new way of thinking with adaptive management and designing nature into how they build versus trying to exclude it, which is the kind of the old mindset that I think we've all had.

Stuart Yasgur: So you're talking about very different kinds of clients, so that must mean that the dollar size also varies. Are you able to kind of go up and down that range because of the modular approach you're taking?

Leonard Nelson: That's right. Yeah. So, a small owner homeowner might be 30 modules, and some clients are 3000, right, modules.

Leonard Nelson: So, for something big, you just, it's just more, it's like Legos, right? So if you need something bigger or longer or you know, larger structure, you just, just more Legos to solve that problem.

Stuart Yasgur: That's fascinating. And how does it affect temperature? How does temperature affect it, right? So, we're talking about things like coral reefs. I can think of you know, in the US, I could think about the, like the southern shoreline, but we also have some great lakes and, you know, other places that have very different kind of temperatures. How do these nature-based solutions work in different contexts?

Leonard Nelson: You know, I think the answer in our world is always, it depends. And that's a good and a bad thing. So we have done a project in the Great Lakes, it was a kind of a habitat-based project for an endangered species. It's doing really well. So that's had, so far great results.

Leonard Nelson: And I think we've kind of settled, I guess. Our business is based in the Southeast. We do a lot of work in the US Southeast, but really do stuff all over the country. So I think we're in 12 US states, maybe 13 now. And so, I wouldn't say that there's really anything, any gotchas with temperature or location.

Leonard Nelson: And I think that's the advantage of…I haven't even shared yet that we have an advanced manufacturing process, right? So we make these modular nature-based exoforms, we call them. And we make them through our own patented advanced manufacturing process.

Leonard Nelson: And it was designed specifically so that we can design with nature. So, we have the ability to make modules that have lots of holes and voids and structure and, you know, things that resemble a natural, if you look at anything natural, whether you're in the Amazon Rainforest or a coral reef, it's gonna have a lot of complexity, a lot of surface area, a lot of roughness, and we can uniquely make shapes that, that use those kind of naturalistic features to solve functional problems.

Leonard Nelson: The advantage of having that is we can kind of tailor the size, weight, structure, flow pattern to whatever the situation is. If we need a 3000 pound block, we do that. If we need something that's 500 pounds, we do that. If we want water to flow left, we can engineer that in. We want it to flow through, we can engineer that in.

Leonard Nelson: So, that allows us to solve all kinds of different problems in different areas of the country, different contexts.

Stuart Yasgur: Wow. So I didn't realize it was that customizable. So you can actually engineer blocks per site in a very different way.

Leonard Nelson: We can. We've kinda learned that it's also smart to have some level of standardization, right?

Leonard Nelson: So, you know, we wanna solve problems that are consistent that we see in multiple areas, and as we're solving the problem in sight, we also have to think about handling and packing, and moving. So, you can make the best module in the world, but if you can't transport it, install it safely and efficiently, that's part of the equation as well.

Leonard Nelson: So we looked to balance all those factors, and oftentimes we can take a standard shape, and if there's unique requirement, we can do a couple modifications to it. That's something we can do with the click of a button. Send that to the printer, print that out, and if that works, that might be a new kind of standard module for us.

Stuart Yasgur: Right, right. So you have kind of an open innovation process internally, and how these things are evolving.

Leonard Nelson: That's right.

Stuart Yasgur: Where do you see this going from here? So, if you know this technology, it's remarkable, it's starting to get uptake. Where's the technology going? So five years from now, is it going to look similar or are we gonna kind of, is it this accumulation of knowledge from applying this in many different contexts, it's gonna start giving us different insights about how to build these kind of standard modules. Where do you see it going?

Leonard Nelson: I think what we'll see and what we have been seeing in our business is a real convergence of the digital and the physical. You know, we started out selling modules and like I mentioned, our clients said, hey, we need some software. Tell us where we should focus on?

Leonard Nelson: And, how do I pinpoint where I've got risk? And so, you start with that. And then we've taken that, that tool set, and we've added on additional features to help look at the biological response, how are you helping endangered species? What's the biodiversity benefit of what you're doing?

Leonard Nelson: And then, you know, with today's AI tools, we're finding ways to share that back with the community, share that back with the client, and to get better and better about how we build and how do we share this story. You know, I think over time I think what we'll see is more and more of a platform-type approach.

Leonard Nelson: So, we've done a lot of projects, right, 115,000 units out there. But as we start tying some of these results together at scale and pulling that back into our platform that's informed and enriched with AI, we can get a lot smarter about how do we scale this up? How do we understand the biological response? How do we support the species and the functional goals that we're trying to accomplish with these modular techniques?

Stuart Yasgur: And what do you think is the biggest thing that's gonna help unlock the uptake of this? So, education, awareness, absolutely. That's always critical. Is it a financing mechanism? Is it something else? Or is it just as it starts to become more pervasive?

Leonard Nelson: Yeah, I really think it's a combination of people having the willingness to try new things, right? That's a cultural tendency that we often coach our clients on is that it's always easier to do things the old way. If you've got economic benefit, functional benefit, environmental benefit, and aesthetic benefit. That's not really the issue. It's really just people being willing to try something or consider something new.

Leonard Nelson: In order to help facilitate that, I think one thing that we've learned, and I think our entire industry is learning, is that we have to simplify these solutions down.

Leonard Nelson: Simplify the language. Show our clients the math, show 'em the numbers, show 'em the economic benefits. So that's a little bit easier to try those new things and a little bit easier to justify it. I do think that some of us, you know, we get so passionate, and I'm guilty of this myself.

Leonard Nelson: Probably even in this conversation, you get so excited about say the biodiversity benefits or all the environmental elements of what you're doing and all the technology that you can talk over your clients, you can talk past them, right? And it's really important for us all to have that kind of a simple, straightforward value proposition. As people are making decisions whether to build traditional hardened infrastructure or go with living infrastructure, you need to boil it down, make it simple not talk over them.

Stuart Yasgur: Leonard, I realize even in our earlier conversation, I don't think I've mentioned this. As a kid, we moved one summer, we moved 15 tons of stone down to the shoreline to create a hardened sea wall to protect that shoreline. It was down a long hill. And I have to say that was not easier. We would've loved to have had a nature-based solution that was still in place 'cause that needed to be replaced. So, viscerally, picture it, and then see the benefits that this starts to create.

Leonard Nelson: Yeah, and another interesting thing, and this is where the software comes in, wouldn't you have liked to know if you could have gotten by with six tons instead of 15 tons, right?

Leonard Nelson: You got 15 tons, but did you really need 15 tons? And wouldn't it be great to have a digital model of that creek bed or that bank? And to know, hey, you know, we don't need 15 tons. We can save that

money. We can save all that backbreaking labor and just put the six tons in, in this way, and then plant these types of plants to support it, and we're done.

Leonard Nelson: Right. So the first tool that I would encourage people to use is just their eyes. So, if you, no matter where you live, no matter where you are, if you see a lot of, say, impervious services or say turf grass, right? There are simple ways to slow water down and make your life easier. So if you've got runoff issues in your own yard or at a local community park you know, and it rains and you get that really muddy water that goes into the creeks and rivers, all you really have to do is maybe plant, say more biodiverse seed mix, right?

Leonard Nelson: Instead of turf grass in a few areas. Or put a little rain garden, which is just a little shallow depression and some wood chips. So they're simple, low-cost, really easy ways to get started.

Leonard Nelson: We are building a lot of different tools and kits that have a kind of a lower price point, lower entry point for that purpose, because I think nature-based solutions are not just for the coast. They're not just for deep water, ocean-based coral restoration. This could be in your backyard.

Leonard Nelson: There's a really neat YouTube series called National Park at Home. A professor who, you know, spent his career looking at how can someone in their very own yard do small things that can say, bring in pollinators or birds?

Leonard Nelson: As you start to do that, you can find ways to solve problems functionally, as you're making your yard more attractive and more resilient, and you're taking pressure off of all the environmental systems downstream of your yard, right?

Leonard Nelson: You know, public works type projects, when those open up for community comments, just to do incremental adaptive management. It can bring people a lot of joy and a lot of beauty.

Leonard Nelson: Make your property more valuable. So that's, that's what I usually encourage people to do.

Stuart Yasgur: You point out another important theme, which is that, water flows, so we're connected, right? What happens upstream affects all those downstream. You know, I'm talking to you now from the Washington, DC area, and we have rivers and the Chesapeake Bay, which is an incredible resource, but it also is directly impacted by all of those kinds of behaviors that people do in their own homes. All the way through that watershed, and it's really it's one of those places where we recognize how much as a large community really impacts one another.

Leonard Nelson: When you think about the water, let's say in Virginia, right? In a lake, supposedly, you own a certain amount towards the center point of the lake. And then in Virginia, you own, quote unquote, own the water up to mean low water. But the reality is that everybody owns it.

Leonard Nelson: It's everybody's water, right? And it's not any one person's responsibility. So if we can all take small incremental efforts and steps to improve how we interact with the water, how we interact with natural species in the natural world, that provides an uplift for all of society, right?

Leonard Nelson: You know, I was looking at an economic report on North Carolina, and there's $200 billion of coastal assets in the state of North Carolina, right? So enormous tax base, enormous economic base, and the things that happen upstream of the coast, right? What we do in Raleigh or Fayetteville or New Bern, that's gonna flow down and impact what's happening at the beach where we go to vacation and where we like to fish and swim.

Leonard Nelson: I think it's really important that we think through the economic opportunities for enhancing and restoring natural systems. And in my opinion, I think that these should be, not just by the public sector, but by the private sector as well. These are sensible investments that create economic value.

Leonard Nelson: It creates assets. Just like you said at the beginning of our talk here, if you build a sea wall or a road, you've kind of got yourself a liability. But if you deploy a nature-based solution, you have an asset that creates value over time.

Stuart Yasgur: Leonard, that's a perfect last line to leave us on. I really appreciate that you're taking the time to speak today and share this information. I think people are gonna find it really informative. Thanks for taking the time with us.

Leonard Nelson: Appreciate it, Stuart. Thank you.

Stuart Yasgur: So at a time when we need more of these kind of solutions, we have a solution that can really play a key role, and we have an innovation that can play a key role in kind of providing solutions. We're gonna have to need to ramp up entirely new production systems to create these new nature-based solutions.

Stuart Yasgur: Companies like Natrx are really taking a step forward and doing that. They've fascinatingly created a modular-based approach. They can semi-customize their approach to many different contexts, but they find where there's commonalities, they can standardize it and create modules that can scale from the individual homeowners size solution, all the way up to the port level, large commercial port level solution.

Stuart Yasgur: And these are applicable and, you know, anywhere we have interactions with seas, lakes, and rivers, so it's a massive part of our

society and our productive capacity that really requires these kinds of things.

Stuart Yasgur: Leonard and his organization are kind of front runners in a really big transformation that's occurring, which is going from kind of barriers and taming of the sea and water to instead looking to nature for inspiration on how we can live with water in far more productive ways.

Stuart Yasgur: And there's a whole category of solutions that they're calling nature-based solutions, which do this effectively.

Stuart Yasgur: And these nature-based solutions, just to give you a sense, instead of creating a sea wall that's a complete barrier between land and water. Instead creates a permeable region so that water can, for example, pass through it. But still protect the land that's behind it.

Stuart Yasgur: And that's right for a sea wall. Similarly, there are times when we need to create barriers, not just right at the boundary between the land and the sea, but close to those barriers, right? So harbors need to be protected from very large waves.

Stuart Yasgur: Historically you'd take huge amounts of stone or concrete or other hard, really hard materials and put it outside of a harbor in what we call a breakwater. And the waves will break on those stones, and therefore it'll be peaceful inside the harbor.

Stuart Yasgur: So, let's do a side by side comparison for a second. You take big stones, hard material, you put it outside of a harbor to create a breakwater. Or you do the same thing with a nature-based solution. In the traditional approach, it can be really effective. The waves break on that sea wall. It can help protect the harbor and create a much calmer space inside the harbor.

Stuart Yasgur: Nature-based solution, you install the nature-based solution, which looks similar to the stones, but it's designed differently. You

put it outside the harbor. It also will protect the harbor and creek in a safe space within the harbor.

Stuart Yasgur: But the breakwater using hard stones, doesn't allow water to permeate. It doesn't allow water to go in and out. That means that, water carries nutrients, it enables plant life to grow, enables animal life to grow. All of that is impeded by using a traditional breakwater.

Stuart Yasgur: Whereas if you use a nature-based solution, water can permeate, it slows down the water, but water is actually able to permeate the barrier. So you get nutrient exchanges from inside the harbor to outside the harbor.

Stuart Yasgur: You get plant life growing. You have kind of vibrant animal life. Fish stocks, others that actually can live inside and outside the harbors, if you use a nature-based solution.

Stuart Yasgur: There are other advantages, which I think is really interesting, come to light in this episode. Because the traditional approach is blocking out the sea, it requires so much more mass and strength. So, you have to move that many more materials often from very far away. You move them. It doesn't have nearly as much force supply to it.

Stuart Yasgur: So, the amount of materials you have to apply is much less. The amount of damage you have to do while installing it in the seabed is much less. So, it's much lighter on the ecosystem.

Stuart Yasgur: And incredibly, seawalls, the traditional approach, because they are this hard non-living material. As soon as you implant, put them in place, they're gonna start degrading. You're gonna need to start planning for the replacement. And it's a constant part of living with these kind of traditional approaches, which is getting even more exacerbated now that climate is changing, and we're getting more extreme weather.

Stuart Yasgur: Nature-based solutions, because they work with the way that the sea and plant life and animal life work, plant life and animal life start to grow around these nature-based solutions, almost like a coral reef. And so those nature-based solutions get more effective with time, and they get more robust and more resilient with time.

Stuart Yasgur: Instead of having a depreciating asset in the old system, we now start to have an appreciating asset that gets more effective, that's more valuable with time.

Stuart Yasgur: So it's remarkable to see how many benefits this new transition to nature-based solutions really creates.

Stuart Yasgur: One of the things we discussed in this conversation is that it's one of these rare occurrences where we don't have a series of trade-offs between an old model and a new model. Instead, the new model, the nature-based solutions in many instances, are really straightforwardly what are called a superior alternative. They're better on each of the dimensions that you think of in evaluating which one to go with.

Stuart Yasgur: They're cheaper to make. They're cheaper to install. Less impact on the environment that they come from, and they last longer, and they become more valuable with time as opposed to depreciating.

Stuart Yasgur: The other major change is we've changed the technology, we've changed the production system, we're gonna need to change the decision-making system.

Stuart Yasgur: Policy makers, procurement officers, people are making decisions about what kinds of solutions to implement; they're the folks who really need to become acquainted with this, to learn about it, to become comfortable with it, to shift behavior in the aggregate level. And that's really kind of where the frontier is right now.

Stuart Yasgur: And so, conversations like today, we're helping to go through this in an accessible level, but also a level of kind of detail, and are really important because they help address the critical factor, which is we need to increase awareness of the potential and the productive nature of these kinds of solutions.

Stuart Yasgur: I just would wanna point out that Natrx and the organization that Leonard is leading is an example of a market-based company. You know, it's a straightforward market-based company that is advancing resilient solutions to extreme weather and the changing climate.

Stuart Yasgur: Some of that work was really enabled by a non-for-profit, a citizen sector organization that we talked to earlier in this process, RISE, who received funding from in part a federal response to Sandy that led to a state-based intention to create an innovation lab that is run by RISE, a nonprofit, and now here is contributing to the success of a for-profit company that is advancing nature-based solutions in a scalable way. And you can learn more about RISE in our episode where I interview Paul Robinson, the executive director.

Stuart Yasgur: And so this is also just a wonderful example, and I think it's really helpful for us to see how a federal policy difference can lead to state action, local citizen sector organizations, kinda creating a living laboratory that are kind of really advancing the work of for-profit companies that will scale these solutions to the magnitude of the problem.

Stuart Yasgur: I am Stuart Yasgur, and this is Economic Architecture, the podcast.