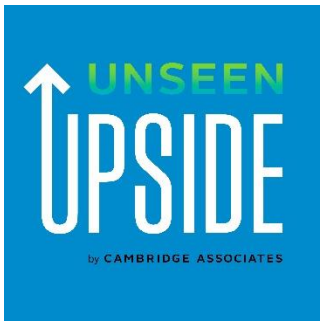

Season Two: Episode Four
Water: Carbon Sinking Kelp Farms
Launch Date: June 2, 2022

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[Sounds from Running Tide visit]

ADAM BASKE: Oh, lookout. There's welding going on. Don't, don't look at that.

LUKE CHAREST: I'm Luke Charest… and I'm in my home state of Maine, on a pier in downtown Portland. And I'm here to learn about how the ocean can be our ally in sequestering carbon.

ADAM: This is what we call one of our verification buoys.

LUKE: It looks like a ton of things going on.

ADAM: It looks a little bit like, uh, is that R2D2

[Laughter / R2D2 Sounds]

LUKE: Here at Running Tide, a group of engineers, software developers, marine operators, fishing captains, biologists, geneticists, and even agronomists! are sequestering carbon by growing seaweed and kelp and sinking it into the ocean. And this cousin of R2D2 is a robot helping them do it.

ADAM: This is an aluminum cage here with some solar panels on the top of it, and some mesh netting on the side. It's basically one of our verification systems for our kelp operation.

[Theme Music]

LUKE: Our history as a species is tied to the ocean. It has inspired iconic works of literature like the Odyssey, Moby Dick, and 10,000 leagues under the sea. More than 70 percent of the surface of our planet is covered by water — it's our life support system. We depend on the ocean for food, transportation, and commerce, and oceans are crucial in regulating global climate.

And as we continue to explore ideas that will help mitigate climate change, the ocean has become an interesting space for innovation and investment.

It even has a catchy new term - the Blue Economy! And Running Tide is one initiative in a sea of many seeking to harness the power of water to build a better future.

This is Unseen Upside from Cambridge Associates, and this season we're exploring investments that are protecting or enhancing life on our planet and talking to the people making it happen.

[Theme Music]

ACT 1

[Sound from Running Tide visit]

ADAM: Commercial fishermen, they see all this stuff out on the dock and are like "what is going on here?"

LUKE: Adam Baske is the head of shellfish and restoration at Running Tide.

At its core, Running Tide uses science and engineering to build a highly advanced aquaculture system to sustainably grow two things - shellfish and macroalgae, specifically kelp.

100 Kg of oysters can remove about 12 Kg of CO_2. And Kelp has the potential to remove even more. The Energy Futures Initiative -a nonprofit organization dedicated to driving innovation in energy tech and policy- estimated that kelp could sequester about 1 to 10 billion tons of CO_2 annually.

ADAM: And we tell them and they're like, wow, that's awesome.

LUKE: In the background, you can hear the sounds of a Running Tide employee power washing shellfish bins. And all around here, there's this assortment of equipment and tools, there are buoys, big metal motored things, bins, nets, and of course fishing boats.

ADAM: We got great relationship with the fishermen, you know, they are ground zero for like what the changes that are happening in the ocean. They're like, oh, you guys are out there to do something about that. That's awesome.

LUKE: Adam has been in the seafood industry for almost 2 decades. And he says this place has changed a lot.

ADAM: I mean, you'd see hundreds of people walking down here every day, looking for jobs, getting on boats that are going out fishing, and the wild fishery just isn't what it used to be.

LUKE: The industry is not the only thing that has changed here, the water has too.

ADAM: With climate change we are getting like tropical species in the ocean up here now. The last five years we're getting Benito, false albacore, lobstermen are catching trigger fish in their traps, like normally got to go down Virginia to get stuff like that.

LUKE: And that's just the warming of the water?

ADAM: The warming of the water and the Gulf of Maine is getting warm pretty quick.

MARTY: At least in the United States there's a presumption that there's sort of a purely extractive mindset among people that engage in fisheries, meaning, they're looking at the ocean and solely thinking about what can come out of it.

LUKE: Marty Odlin is the CEO and founder of Running Tide.

MARTY: And I don't think that's actually the right way to think about how these communities operate. I think that there's generally like a deep level of respect and understanding of what the ocean has to offer but also just like what's required for that to happen and how dynamic the ecosystem is.

LUKE: Marty grew up in a family of commercial fishermen with 13 fishing captains across both sides of the family.

MARTY: I got to hang out with all of them on the Portland waterfront and growing up was hanging out in shipyards and seeing big things get built and being around the entrepreneurial activity of the waterfront.

LUKE: Marty's career has allowed him to work around the world on product design, manufacturing, research, and he also stayed involved in his family's fishing business. But over the years there was an idea that never left his mind: carbon removal.

MARTY: you know, I just kind of went through all the carbon removal techniques that were out there, and ironically, I know people are like, oh, you must have had this epiphany that ocean CDR was like the future because of your background.

LUKE: Ocean-based CDR stands for Carbon Dioxide Removal, basically using the ocean to remove carbon dioxide from the atmosphere.

MARTY: By 2011, I felt pretty confident that ocean-based CDR was kind of what could scale to the size of the problem.

I started running tide in 2017, not that long ago but in the carbon removal world, that was like the dark ages. So, it was really hard the communicate to people like the size and scope of the problem.

LUKE: So, Marty found a monstrous example to explain the issue.

[Movie clip plays]

MARTY: The carbon in the atmosphere is effectively Godzilla.

LUKE: This is a segment from the 2002 film Godzilla against Mechagodzilla.

MARTY: It's like burning cities to the ground and destroying industries and destroying people's lives.

It's a monster up in the sky that you can't see, but it's still there. we wouldn't let Godzilla just stomp around the world, you know, if it was a monster, we would stop it because we can't see it. We're not trying to stop. this is a monster that we can slay and stop from doing these things. We don't have to have wildfires get worse every year for the rest of our lives. We don't have to accept that.

LUKE: And this idea of vanquishing Godzilla, AKA the climate crisis, drove Marty to create Running Tide.

MARTY: We build the tools, techniques, and infrastructure in order to radically scale aquaculture in the ocean.

LUKE: But to truly harness the power of the ocean, there are problems to solve. One of them is ocean acidification. It's estimated that at least one-quarter of the CO2 released when we burn coal, oil, and gas doesn't just stay in the atmosphere. It dissolves into seawater, where it reacts to form carbonic acid, which is not good for marine life for example. Since the industrial revolution, CO2 levels have increased, causing the ocean to become more and more acidic.

MARTY: In order to counteract that negativity, we have to develop the capacity to manipulate ocean chemistry across a wide geographic area. Just like we have no capability to get to Mars and there's people working on that. We should have the capability to change ocean chemistry in a meaningful and purposeful and thoughtful way. And that's what Running Tide is doing.

Now, our major levers for that are biological but, there's any number of techniques that can be used and we're interested in all of them and we're building systems that can actually be quite flexible

[Diving sounds]

LUKE: Many applications at Running Tide are based on macroalgae, a large, plant-like species of marine algae. Which you might know as seaweed.

MARTY: Macroalgae is algae that creates a structure and attaches to a surface.

LUKE: The species of macroalgae are divided into three groups according to their color: red, green, and brown. Many of the brown algae are referred to as kelp.

You're listening to a diver collecting sorus, the reproductive tissue of Kelp. Running Tide uses this in their hatcheries for lab experiments and deployments.

ADAM: You plant it in the winter, and then a few months later. Yeah. You can have many meters of growth.

LUKE: Adam explains that the idea is to grow kelp, then sink it to the bottom of the ocean to effectively remove CO2 from the ocean.

ADAM: That's why we're focusing on kelp. I mean, it's the most efficient thing we have on this planet for turning sunlight into captured carbon and then send it to the deep sea and lock it away.

LUKE: But not all kelp needs to go to the bottom of the ocean. Here's Marty again.

MARTY: There's been a huge loss of kelp on coastal areas around the world and, just we're working on developing the capacity to the rebuild these coastal ecosystems through seeding kelp or seeding substrate, and then spreading those out in coastal areas.

LUKE: A substrate is basically what they attach the kelp to so it can grow in the ocean.

MARTY: The thing we're most interested in at the moment, in order to kill Godzilla is seeding macroalgae to substrates that we can float out in the open ocean over really deep areas of the ocean, so that when macroalgae grows, absorbs carbon from the water, the substrate will degrade and then sink and it'll sink over something that can store the CO2, so really deep ocean waters can store CO2 for about, you know, 800 to a thousand years minimum.

LUKE: Adam showed us how the team is experimenting with this substrate.

ADAM: You know, we can't just throw little seeds of kelp out in the open ocean. They need to be attached to something that's going to float for a known amount of time. And so, the substrate is okay, what is that buoy? What, what are the different materials? And we want to use carbon-rich materials, cause that's also another vector for carbon removal for us.

We're doing experimentation now with woody biomass, so this is wood waste that we can actually turn into buoys, grow kelp on it, and then sink that entire mass down to the deep sea for permanent carbon removal versus that getting burned and shot up into the atmosphere.

Luke: Wow. Very cool.

ADAM: So, we're looking at different, combinations of materials that would go into that substrate and understand, you know, in some areas of the ocean, we may want these buoys to float for eight months, and some, we want them to float for three, four. It really depends on the area of the ocean; ocean currents the area that you want those buoys to sink in.

[Theme Music]

LUKE: Carbon is one of the most abundant elements in the Universe. Here on Earth, carbon is mostly stored in rocks. But there's a good amount of it in the ocean, atmosphere, plants, soil, and fossil fuels. Those are called reservoirs, stay

with me for a second… The exchange of carbon between reservoirs is called the carbon cycle and it has slow, and fast components.

MARTY: The top layer of the ocean and the atmosphere are in rough equilibrium. It's all one system that we call the fast carbon cycle.

LUKE: The fast carbon cycle is largely the movement of carbon through living beings on Earth, like plants. But we have dumped a lot of carbon dioxide — from smokestacks, tailpipes, and pollution — into the fast carbon cycle.

MARTY: That's Godzilla, so that CO2 in the upper layer of the ocean causing acidification. CO2 in the atmosphere causing warming. And our job is to move that into storage, what we call the slow carbon cycle. That's the definition of carbon removal is you're moving it from the fast carbon cycle to storage. Or into this low carbon cycle. Now the slow carbon cycle is like geologic storage. So, sinking carbon to the deep sea, over a thousand meters deep. That counts. We're just using macroalgae to absorb carbon in the fast cycle and then we're using gravity to push it into a reservoir storage.

LUKE: To make a difference, we have to move at least 450 gigatons of it over the next 30 years. Marty thinks we know how to solve the problem and Running Tide is working to address some of the big questions to make it a reality.

MARTY: How do we get more efficient at moving this mass around? How do we use less energy? Etc.

LUKE: And macroalgae may be the answer.

MARTY: Predominantly we're using ocean currents, the sun and gravity to accumulate carbon in the fast cycle and then put it into the slow cycle. that's a really efficient way to do it we're not running out of any of those things.

LUKE: Running Tide's efforts to grow kelp, shellfish, and other marine organisms are built on a foundation of leading-edge technologies not normally seen in the marine industry.

You guys are really employing robotics, automation. Could you give us a little more color on how you're using all that technology in the aquaculture operations?

It just seems really cool. And you don't necessarily think of like growing shellfish and kelp using all this high-octane technology.

MARTY: You know, aquaculture is an interesting industry because we've been doing it for a long time, thousands of years. The Romans were big oyster farmers. It's survived as an industry with a really high contribution of labor to cost to get sold.

Every other industry has gone through quite a radical productivity improvement, but aquaculture has resisted that for a long time. Not completely, obviously there's progress, but there's opportunities to like scale and to apply robotics and apply intelligence to improve cost to get sold, increased capacity, et cetera.

LUKE: One example of this is the use of machine vision to keep an eye on the growing organisms.

MARTY: So, we have cameras everywhere in our farms and in hatcheries. And we can use those cameras to just have like high-resolution growth data come back to us, which allows us to get smarter, faster.

[Running Tide sounds]

LUKE: Back at the pier, Adam reveals more about the camera on the R2D2ish verification buoy that we met earlier. It's a spherical device, about the size of a basketball that is meant to float at the surface.

ADAM: You can see there's a little lens down there, that dome, there's cameras in there. So that camera has full-spectrum view of what's going on in this cage.

And we're controlling when we take pictures of it. And we're given information on the water temperature, water salinity, nutrients like that have a bunch of environmental sensors on it too.

LUKE: Their cameras and sensors are operating non-stop, giving them lots of information in real-time, which paints a realistic picture of the chemistry of the water, and the growth of shellfish or kelp.

Marty: And the more information you put into them; they get better. So, we have a kind of exponentially increasing awareness of what works and what doesn't, which is pretty exciting.

LUKE: The R2D2ish buoy - and other advanced aquaculture techniques employed by Running Tide - serve a critical role.

Adam: This is meaningless without data. We need to be able to show our customers that yes, it grew, and yes, it sank. So, this has made to work anywhere in the world, communicate over satellite, transmit the images, and it gives us, you know, kind of the

start of our verification platform to say, okay, this is how much kelp has grown over this much time. And this is when it sank.

Luke: How fast does Kelp grow?

Adam: Incredibly fast, I mean, in three months you can have 10-foot-long blades.

LUKE: Wow.

To battle ocean acidification and sequester carbon, Running Tide needs to be able to scale and replicate its approach throughout the ocean.

ADAM: I mean, we try to bring in as much technology and automation as possible so we can constantly monitor what's going on.

We try to make sure it's functional, but you also need to take into consideration, okay, how are we going to mass-produce these things?

ACT 2

[Theme Music]

Marc Von Keitz: The oceans play a tremendous role in absorbing a lot of the excess CO2 that we're blowing into the atmosphere.

LUKE: Marc von Keitz is a director at The Grantham Foundation for the Protection of the Environment where his focus is on ocean-based climate solutions.

MARC: And without the oceans, I think our situations would be much more dire. At the same time. The ocean covers 70% of the surface layer and terrestrial ecosystems take a beating too.

If we can spread opportunities around a little bit more, we might be really in a position to advance the drawdown of CO2 more quickly, because that's really what is one of the most important things to be able to not just reach the quantities but reach them fast enough.

What has been attractive is to find a solution for carbon sequestrations that may work quite rapidly without very extensive capital investments.

Ultimately coming to a very compelling cost point and that's the promise of this idea, we as always need to see it along and make sure that we knock out all the uncertainties in

these processes. And that's why these investments are really critical. There's a lot that needs to be learned.

LUKE: Marc has seen a number of innovative solutions like Running Tide.

MARC: I've been very early interested in a combination of nature and biology and at the same time engineering.

LUKE: He has a diverse set of experiences from university research to founding his own company, but a milestone in his career was his time at the ARPA-E program.

MARC: The advanced research project agency at the department of energy where I was a program director

LUKE: ARPA-E is a "United States government agency tasked with promoting and funding research and development of advanced energy technologies."

MARC: The taglines in a nutshell, if it works, does it matter? We care that it works at scales, that it works fast enough, and they do try to do that in a very focused way by picking a particular topic. And so, one of the topics that I have been exploring, in that case, is the Mariner program which is focused on developing technologies that are enabling macroalgae to be grown in the open ocean at scale and at hopefully increasing lower cost that they become relevant for energy and climate.

Luke: You know, at an agency like that where I have to imagine almost everyone around the table is really well-credentialed and super smart. how do you figure out what to work on? You know, how do you come up with an idea, like Mariner and decide? Yeah, let's go for it. There are probably a million different experiments you all want to run. How do you prioritize?

MARC: We have a very clear understanding of what the energy landscape is in all its diversity, but then trying to find out where something is missing. So, one of the things, in the Mariner context was that we had seen in a lot of deep decarbonization models that came up in 2015 & 2016, that biomass plays a really critical role because it's so flexible.

LUKE: In forests, trees use photosynthesis to capture carbon dioxide from the atmosphere and transform it into their trunks, leaves, and roots. Biomass is then the organic matter that can be used as a fuel.

MARC: You can use it for making electricity, for liquid fuels and for heat, but at the same time, what was clearly visible is that. There is a constraint on the availability of this biomass because you have the issue of food versus fuel.

And there's really the need also to conserve enough nature areas. You don't want to just like burn more & more forests up just to provide energy. So, you need it to have a sustainable way of producing more biomass and the potential solution was looking towards the ocean where you're not competing with farmland. You're not competing for freshwater; you don't even need synthetic fertilizer in these systems. And so that really was transformational opportunity. And then the goal of the program was to test out the idea. Can we, do it?

The whole industry has really grown a lot. And I don't want to give all the credit to this program, but it has helped, the exchange of information and I think this community building effort is as important as the funding of an individual project.

LUKE: These days, Marc puts his expertise to work at the Grantham Foundation. Established in 1997 by Jeremy and Hannelore Grantham, the foundation is focused on tackling climate change.

MARC: The foundation does this really through grant-giving, supporting the ecosystem, but also very strongly pushing into the development of critical technologies. One of the entities that we're using to invest is called neglected climate opportunities. And it's like taking a high risk, high reward approach and really being willing to tolerate technical risk, but also, business risk in order to push a field forward. We shouldn't forget that just a few years ago, it was extremely hard to raise any money in this space. And the ability of supporting these early entrepreneurs and giving them some room to develop their ideas and pushing things forward, I think has a tremendous catalytic power.

LUKE: The Grantham Foundation has a growing number of investments in different aspects of carbon removal.

MARC: If you had talked to people just even two years ago, except for a rather esoteric scientific bunch, this was not something that was commonly talked about.

I was able to carry forward a lot of the experiences that I gained at ARPA-E into this new environment. But I also recognize that being in the investment world, broadens your perspective in another way you need, a good foundation on the science side, but just good science is not enough to succeed. You really need to tie this science and engineering solution to a meaningful business model.

SARAH EDWARDS: Having industrial technologies is really important and that's where investor capital can really help

LUKE: Sarah Edwards is my Colleague here at Cambridge Associates.

SARAH: These technologies need capital in order to prove the technology and in order to scale, and investor capital, placed in the right way can really work to build these solutions and bolster our global economy in the face of climate change.

There's a diversified portfolio of new ways of thinking about how to scale this, how to really use that deep ocean column to store carbon forever without impacting of course, the higher parts of the water column, where ocean acidification and ocean warming are having real challenges.

LUKE: Sarah is on the sustainable and impact team where she conducts investment research.

SARAH: So, I look at public equities, real assets, early-stage venture capital. I do research based on sustainability and impact themes. Think about climate change, social equity, racial justice issues, environmental conservation, carbon markets.

I'm doing a lot of thematic research and we find investment managers where we feel are investing in those areas in a smart way. And we matchmake that with the clients that we work with on endowments and foundations or private clients or pension funds that has specific sustainability or impact objectives.

[Theme]

ACT 3

[Theme/Water/Fishing sounds]

LUKE: Sarah has spent most of her life near the water including several years working at Conservation International, a nonprofit environmental organization where she gained a wider appreciation for the importance of our oceans.

SARAH: Just less than half of the global population lives within 100 miles of the coast. That's significant.

We depend on the coast for our global economy. Three out of seven people depend on fish as their main source of protein, coastal systems like mangroves, tidal marshes, and seagrasses stored sequester significant amounts of carbon in their soils up to 10 times more than terrestrial forests.

But they're not as in the mainstream as reforestation or afforestation, this is also known as blue carbon

SIDNEY MCLAURIN: If you look at the early days of the ocean, the first things I think as human beings we thought of were, removal of resources and, how can we actually move things back and forth, and so those things persist today.

LUKE: Sidney McLaurin is a partner at Material Impact, a venture capital firm working on building deep tech companies powered by material science innovation.

Sidney spends a lot of his time thinking about cities and oceans, and what investment could mean for our future there.

SIDNEY: By some estimates 80 to 90% of the world's goods that move, between countries and between different areas, have some maritime component to them, right? And so, if you think of shipping, it's still a core component of the ocean economy, oil and gas, everybody's familiar with the story there and how critical of a component that's been in our daily lives. And if you think about fishing, right? So, thinking about, the goal of, and a lot of those fishing cases was to get as many fish out as possible, regardless of then thinking about what the effects may be.

And so now I think that transition from only extraction is thinking about, two things, one, for the extractive things that we're doing, how we can do those in a sustainable way, in the sense that, you know, if you have a fish population of 10 to make it easy.

And you take out all 10 of those fish and all the fish are gone and there's nothing there to bring back more. And so how do you do that a different way where you're taking out two or three. And you're understanding, how do you put regulations around those controls around that? So you can build a market that actually then you have the others to be able to, sustain and grow, and then really be able to keep that for years to come.

Renewable energy for example, is, similarly inclined, right? So, thinking about how you shift from something that is relatively detrimental to the ocean, to something that really uses, the ocean in a renewable way.

So, wind, fortunately is something where it comes back every day, right? It has for my lifetime, hopefully it will continue to do so. And so having that ability to capture wind in tidal energy, and thermal energy

So, doing things, with these types of renewable energy sources is a real focus for, I think the world going forward and thinking about how we have those practices.

LUKE: From the investing perspective, Sarah says that in the early stages of renewable energy, many lost money because there wasn't a clear understanding of risk. So, it's healthy to consider those lessons when investing in the oceans.

SARAH: Of course, the situation has changed dramatically and the cost of solar and wind have come down significantly, such that they're even cheaper than coal and it's become a very different investment picture. But the idea is that You're investing in a long-time horizon. So, you have to really think about the right funds that you want to partner with.

LUKE: But there's this whole other suite of investment opportunities.

SIDNEY: There's another sort of whole sector, that's thinking about **how we move away from just extraction to thinking about areas that we can actually give back to the ocean. So, if you look at a lot of the work with coral reefs and thinking about how we do coral restoration and how we actually add value back to an ocean that we've taken from for so long. A lot of those, companies and concepts and things are popping up around that who are actually trying to add back, even to the end of improving the oceans quality.** And, and that's going to be really interesting in terms of CO2 sequestration, coral reef restoration, coastal resilience and how we add that first for communities. All of that work is starting to be much more popular.

You know, if you look at the momentum of the blue economy, it's just starting to pick up. So, if you look at the last five years, versus the last 10 years, 15 years, et cetera. And then if you look at what's happening over the next year, there's a huge acceleration and a lot of these topics around the ocean. And so, people are just starting to wake up to this potential, and just so people know, like the blue economy is pretty broad.

It just includes all the economic activity related to oceans. So fishing, renewable marine energy, coastal tourism,

SARAH: So, the blue economy is huge. I think that a recent statistic that the economist pointed out was that it is worth somewhere on the order of $2.5 trillion dollars.

Sidney: So, if you've ever been on a whale watch or that you participated in the blue economy, right. But a lot of the acceleration is in the use of technology with robotics machine learning, AI. And so that's what's enabling a lot of this acceleration that we haven't seen in a lot of years past.

MARC: We still have to do a lot of science in order to fully understand what is needed,

LUKE: Marc agrees that we are in the earlier stages of this renewed focus on the blue economy.

MARC: In the end, if we want to take the steps towards climate scale, we have to find bigger markets.

SIDNEY: If you think about a seaweed farm who can now absorb CO2 as they grow, but then you can now provide a product that you can use in in cosmetics and food and all kinds of different areas, you have this added benefit, and it's a really, I will say, a cool adder to what you're actually doing in a venture-backed opportunity.

LUKE: In the case of Running Tide, for instance, their shellfish are sold in restaurants from Maine to New York City. But beyond Running Tide, there are other ideas for harnessing the power of the ocean and sequestering carbon that are receiving capital.

SIDNEY: There are a lot of early technologies that have the potential to sequester carbon in a way that we couldn't before. and it's also a potential for, for being able to have, carbon credits, right? That are more available,

There's a huge gap in ability to track, the amount of carbon that's stored in a lot of those maritime applications. I don't know if it's something where we get there in 10 years and 20 years.

I can't predict the future on that, but I can't say it's something I'm super excited about. It's something I think it's a huge potential area to really have an impact on CO2 emissions.

[Theme music]

LUKE: Everyone agrees it is imperative to move forward and find solutions now.

SIDNEY: the urgency has really picked up and I think we have a short window to be able to impact a lot of these things. And so, it's not only the return, it's really about the fact that we have a human imperative if we're going to survive to be able to do something about some of these challenges.

LUKE: But when it comes to an interconnected ocean, there's the challenge of operating without fully knowing the consequences, so investing in the space might scare some.

Sarah: Because it's special from a traditional fisheries management generation upon generations have been fishing there. So, you have real meaningful stakeholders, that not only depend on the ocean for their livelihood, but they know the ocean, and how it's changed over the years.

So, you need that voice in the room when you're investing in the ocean, they've been a big voice in offshore wind, for example, in order for a project like an offshore wind to go

forward, you need that social license to operate from the coastal community that already uses it interacts with the ocean.

And ultimately what it boils down to is let's just take fish, for example, they don't stay in one place. You can't put a fence around them and count your cattle, you can't do that in the ocean. They move around all the time.

There are tides and there are storms and it's very dynamic and beyond a certain distance from the coast, the ocean belongs to everybody, and fish don't follow those boundaries. So, naturally, there's this, you could say tragedy of the commons, but there's this just real inherent challenge to operating in, the ocean that doesn't exist anywhere else.

So, you really have to think about the various stakeholders much more so than perhaps many other themes or sectors that you might invest in.

LUKE: What strikes me, what's different about the ocean or investing in ocean-based businesses is like there can be real downsides, there you can have unintended consequences. So, on a more philosophical level, how do you think about like the so-called license to operate in our oceans and trying not to do more harm than good when trying to, do some of these noble pursuits of hopefully capturing more carbon using the ocean.

SARAH: That's really a challenging space for an investor to be in because you don't know if you're locking your capital up for any amount of time with any kind of technology. What this signals to me when I'm doing my investment research is we need to really know then the expertise of the asset manager. Do they understand these trade-offs? What are they comfortable with? And how can we best articulate that in our due diligence so that we know what kinds of companies are going to show up in these portfolios. Are they going to be, high-flying on proven tech risks with lots of policy risk?

That's not a smart place, most likely to put your capital unless you have a real goal of investing in anything that could be a moonshot, anything that could really work, that maybe there's a high risk of it failing, but if it was. Then it could have a huge impact on the positive side.

So, within various aspects of the portfolios, we just have to have smart conversations with the managers while having knowledge about some of these real known unknowns so that those long-term risks can be managed.

MARC: In the Mariner program, from the very beginning we set out to not just look at technical feasibility, but also social license to operate

LUKE: Marc von Keitz again

MARC: So, as we look at any of the solutions, we need to be very aware of potential downsides. But doing nothing is not doing nothing because we are continuing to actually put enormous stress on the oceans through elevated temperatures and acidification. We've seen that with the continued dying of corals and the migration of species. We need to keep in mind that not doing anything is not really an option.

LUKE: The science might take a while to catch up, but Marc is cautiously optimistic.

MARC: a lot of the potentially detrimental downsides for the most part only come to the fore when you scale it up. So, there's a certain time that you have, as you develop a technology you need to learn during that time.

You use it as an experiment to learn and see, as we scale up, what are things that we notice that don't go as anticipated. If we pair our development efforts with good monitoring of potential downsides, we are really pretty well protected against bringing unsuitable technology to scale.

MARTY: It's some sort of original sin of humans to like mess up nature's like to take too much from nature. And therefore, like humans are bad and we have to like, change how we operate.

LUKE: Running Tide founder and CEO Marty Odlin again.

MARTY: Like if we just do less, if there were just less people somehow nature would heal itself and would all live in a garden of Eden and that's a modality of thinking that's not very realistic for where we're at right now.

I'm a zealot when it comes to conservation and taking care of the environment. We just have to be realistic about where we're at, and we are at a place that's well, beyond the ability to just let nature heal itself, like nature will not heal itself on any relevant timeline to any of us. If we just stopped tomorrow, emitting all carbon, it's not coming back to the way it was. we've seen it.

You know that they dredged in an area in the bay here, they dredged a shellfish bed, make a channel, covered it with mud 50, 60 years later, it's not better. It didn't come back. It's a desert now, so conservation alone won't do it.

Extracting from nature at the current rate is not going to do it using the ocean as a dumping ground, isn't going to do it. We have to find a way to positively intervene with the ocean, bringing nature to a place of steady state with humidity and that's going to be something that's dynamic. It's not going to be like a one thing that we just flip the switch and we just keep hitting the same button over and over again. We're going to have to like to adapt to the needs of nature moving forward.

The thing right now is we just have such an overwhelming problem of there being too much CO2 in the fast cycle, that like for a long time we are just going to hit one note, but as we get better at that, then we can start looking at, okay, well, do we have to re ice the Arctic? Do we rebuild mangrove forest? There's going to be a whole bunch of interventions to restore ecosystem services.

LUKE: When I look out at the world of like commentary and coverage around climate change like it is oppressive and it's like scary and heavy what do you think is a better motivator for humans if we're going to tackle climate change in our lifetime?

MARTY: I don't think fear is very useful. People are afraid and they think like we messed this up. We can't go any further, the time for that with 60 years. we missed that window now. We're way past it. Now we have to intervene. So, fear is useless I think rage is more useful. In some ways I feel like I rage-build the entire company.

LUKE: I'd love to see the monthly meetings that are centered around rage.

MARTY: No, I don't. I hope I don't let it out into my team, but definitely internally, like I get mad and want to fix things and don't accept the direction things are going. But I'm seeing what hope can do.

I think one of the more interesting things is how like venture capital has gotten involved in this, it was like VC was never anything I aimed at for a goal. Frankly, I was like more interested in having my own boat, but one of the coolest things about VC is that like it is based on hope. It's based on like wild optimism about what's possible and what can we build.

I think the path forward has to be just centered around hope and optimism, because I don't want to express tons of fear to my kids. I don't want them seeing like adults in front of them terrified of the future. I'd much rather than see people fighting for hope.

LUKE: Marty thinks it's going to get worse before it gets better.

MARTY: It's going to get worse before it gets better. But I think in 15 years are going to be seeing a lot of like really hopeful signs of adaptation, mitigation, and acceleration towards solutions.

I hope you come to Maine and there's people trying to do different techniques to maintain the productive ocean. You'll still see lobster men working and fishermen mending nets, and then all sorts of like cool companies layered on top of that and just a ferment of activity and a really exciting, and beautiful environment that's been maintained through those efforts.

[Theme Music]

LUKE: If you want to learn more about the blue economy or sustainable and impact investing, please visit us at cambridgeassociates.com/unseenupside or check out the show notes. Stay tuned for more upcoming episodes and if you like what you're hearing, leave us a review and tell your friends and colleagues.

At Cambridge Associates, our podcast team is led by me Luke Charest, Hillary Ribaudo, and Brittany Thurman.

From PRX Productions, Sandra Lopez-Monsalve is our producer, Ari Daniel is our editor and Courtney Fleurantin [FLOOR-AN-TEEN] is our associate producer. This episode was mixed by Terence Bernardo. The executive producer of PRX Productions is Jocelyn Gonzales.

A huge thank you to Marty, Adam, and Maddy Agnew from Running Tide for being so generous with their time and allowing us to come visit them on the Portland waterfront.

Before you go, one of my colleagues has an important message about the contents of this podcast.

[Theme Music]

[DISCLOSURE]