



After the Fact | From Lab to Life: How Indigenous Knowledge Informs Science Today

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TRANSCRIPT

Dan LeDuc, host, “After the Fact”: Welcome to “After the Fact” from The Pew Charitable Trusts. I’m Dan LeDuc and I’m joined now by producer Emily Chow. Hey Emily.

Emily Chow, senior producer, “After the Fact”: Hi Dan, great to be here. We’re continuing to talk about science today and I guess that includes clams, right?

Dan LeDuc: Well yeah, and who doesn’t like clams? But it’s even more than clams, it’s what they show us about Indigenous knowledge that goes back thousands of years and how it plays a role in conservation science right now. Our guest is Marco Hatch. He’s a marine scientist in Washington State and a member of the Samish Indian Nation. He’s going to tell us about clam gardens and a whole lot more.

Emily Chow: And we’re all about data at “After the Fact” and Marco shared some pretty amazing findings with us: Indigenous communities in the Pacific Northwest have maintained clam gardens for over 3,500 years. And beaches with clam gardens produce between 150% to 300% more clams than beaches that don’t have gardens.

Dan LeDuc: And Marco has a pretty cool personal story, too. So, let’s start there.

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Dan LeDuc: So, let’s welcome Marco Hatch. You are a marine ecologist at Western Washington University, and a Pew marine fellow, we’re delighted to say. Tell us about what you do in your current work.

Marco Hatch: So, as a marine ecologist I look at the fundamental aspects of ecosystems and how they function. And particularly, I work a lot with traditional ecological knowledge or Indigenous knowledge. Working with Tribes, First Nations, and Native Alaskan groups to understand how those communities—and my own community, the Samish Indian Nation—has managed ecosystems for thousands of years.



What ecological techniques are at play and what are the mechanisms behind them so we can learn from that management, help reactivate that management where appropriate, and apply those lessons and principles to broader ecosystem restoration.

Dan LeDuc: Take us back to the beginning of your story, which is, you know, what got you interested in this subject when you were younger and led you to do what you're doing now?

Marco Hatch: So, I grew up in eastern Washington, in Yakima, a couple hours from the salt water, but every year we'd go to Hood Canal, a narrow sort of inlet here in Puget Sound, where my grandfather had owned a small beach. And we'd go and camp out and dig clams and chase shore crabs and harvest oysters and then a little bit later, we'd go and camp out in the San Juan Islands, this chain of islands in the northern part of Washington. And so, growing up landlocked, we still spent a few weeks every summer in the marine environment, and I really fell in love with that and from a young age wanted to be a marine biologist.

Dan LeDuc: A lot of young people, you get their feet wet, there's playing with fish, and it's a great summer pastime, and then they go on to something else. But what was it about all of that really intrigued you?

Marco Hatch: That's a good question. I know—you take a youngster to the beach, and you don't really have to pry entertainment. I think it's just a fascinating world of all these different organisms and then when you start to learn about how they're all interacting, and how they're all making a living in these very small little spaces that at first glance might not be apparent.

Dan LeDuc: You didn't have a direct path to being an associate professor at a fine university. How did you get to where you are?

Marco Hatch: I started my academic career actually here at Western Washington University. And then I flunked out after a year and went to the nearby Whatcom Community College, got an associate's degree, tried to get into the computer networking field, and wound up as a banquet waiter for a couple different places in Seattle.

And it wasn't the career path I wanted to keep going down. And right at that time, my Tribe, the Samish Indian Nation, started an internship for students to spend the summers living and working out in the San Juan Islands where we camp out and do cultural and ecological work. And that provided the support to go back to school. And so, I was living in Seattle at the time, so I went to the University of Washington School of Aquatic and Fishery Sciences.



Dan LeDuc: You have now emerged as one of these leading academics who can look at science and Indigenous knowledge and incorporate the two in conservation work. Was it something very conscious for you when you were studying the science side of things: that you wanted the knowledge of the Samish people who you grew up with to sort of learn that and apply it?

Marco Hatch: For sure. When I went back to school, that was a big focus. I was studying fisheries. And so, a lot of my work was around looking at Indigenous forms of salmon fishing. One of those is reef net fishing, a very specific form of salmon fishing that's only shared by a few different communities in the kind of Northern Straits Salish area. And thinking about that technology and the way that the terms that we use in fisheries science—escapement or size selectivity or effectiveness of the gear—is all built into that technology really fascinated me.

And combined with, at that time, the dominant narrative was that Indigenous people couldn't have impacted the ocean because the ocean is so vast. I think the complexity of Indigenous resource management was underplayed and I was seeing how that wisdom had created sustainable fisheries for thousands of years. And really wanted to understand better in Western science terms what was happening and how those fishing technologies played out over centuries.

Dan LeDuc: Well, you worked alongside and in Tribal communities from the outset of your studies, right?

Marco Hatch: My undergrad was involved with my Tribe, and then I did my doctorate work at Scripps Institution of Oceanography in La Jolla and that was a bit more acultural. I worked with archaeological materials to look at how clams can be ecosystem indicators and environmental indicators for ocean change.

And then coming back to the Northwest, my first job out of grad school was to direct—to found and direct—the Salish Sea Research Center at Northwest Indian College. And I talk a lot about me re-education at a Tribal college. And so, my boss there, Dave Arrero, is Lummi and Samish, and he was really good about, when thinking about research projects and this giant research center that I had to get up off the ground, of like, why does this work matter? That often in academic spaces, we do work that it's not really clear how it matters to the general population.

And Dave was really good about making sure that there was a community connection there and thinking about how the work that we do within the Tribal college system with Native students from all around the country, how is this benefiting our partner communities? And so, starting there, I think we got more culturally grounded.



Dan LeDuc: You were saying that there was this sort of perception among some in the scientific community that Indigenous knowledge couldn't have had that much to play because that, that ocean is just so darn big. But in fact, over centuries, it's just the opposite.

Marco Hatch: One way to look at the acceptance of traditional ecological knowledge within mainstream science starts with the terrestrial realm. Leading ethnobotanists have shown how people have managed the terrestrial realm through selective harvest, selective planting, burning, these landscape-scale modifications that still shape the way our environment looks today.

When you stand at the shoreline and look out over the water, it's hard to tell what's missing and what's been lost. And when we started getting engaged in clam garden work, that offered this physical structure that you can point to and see, here's a way that people have modified the beach.

And so, what a clam garden is is large rocks are rolled to the low tide line to terrace the beach. Like you can terrace a hill to grow more grapes, you can terrace a beach to grow more clams. And that rock wall at the low tide line, then sediment filled in behind it and made these perfect clam beaches. And so, it increased the area for clams, but also, we've shown it increased the productivity by about two to four times.

And then you can zoom out a bit and think about how we can look at the forest and see certain trees are planted in certain areas. It's this continuous modification from sea floor to mountaintop. And so, when we think about these structures, we often think about them in isolation, but it's helpful to zoom out and think about how everything had been tended and cared for. And we're really just looking at faded footprints of some of that management.

Dan LeDuc: Yeah, it's interesting because one point of view is nature should be left alone and that's the best way for it to be. It's not so much the intervention of peoples. It's what they're doing when they intervene, because what you're just describing sounds like a lot of intervention, but in a very respectful way, over, over centuries.

Marco Hatch: Yeah, this area now, if you go out to the islands that are currently uninhabited, they're densely packed with Douglas fir, just one type of tree. The underbrush is really thick. Pre-contact, those islands would have been open prairies with one or two large trees, and that was maintained through burning. And so that large-scale management fundamentally changed the way that the landscape looked.

And what we have now in areas that are not being managed is actually a very unnatural system. It's a system that only occurs when you remove people from that environment. One of the things that we obviously promote and try to do through



some of our partner organizations is restoring Indigenous management within both terrestrial and marine ecosystems.

Dan LeDuc: Well, you started talking a moment ago about clam beaches, and that's where you're spending a lot of your time these days. Could you again paint a picture for someone who's listening here what the beach looks like, and how long they've been around?

Marco Hatch: One of the specific features I study are clam gardens. And so, these are intertidal rock walls that exist—so thousands of kilometers of shoreline—so you get this bedrock that extend out and then in between those two pieces of bedrock, you can build a rock wall. And that traps in sediment, a lot of the clam gardens have a high amount of shell, of calcium carbonate, both from the barnacles growing on the rocks, but then also from the clams themselves.

One of the teachings is to return the clam shells to the beach which then the shells get broken up and turned into white sand. And that type of sediment appears to be much better for growing clams and then also protecting them from heat fluctuations. Within the rock wall, you'll see seaweeds growing, a lot of edible seaweeds, tons of sea cucumber, red rock crab, and chitin, other forms of nutritional foods.

And you have this complex, sort of food system but then also this three-dimensional habitat where there's both the surface of the rock things can grow on, there's all the little holes in between all the rocks that are piled up. These little crevices are great spots for cucumbers and crabs and chitons that like to hide under them.

And so, it's fundamentally changing the habitat type. And also the overall productivity with these clams growing about two to four times faster. Clam gardens have been dated to almost 4,000 years old.

(Music transition)

Emily Chow: This season, we've been really interested in new approaches to science and what Marco is saying really fits. A lot of conservation is focused on keeping nature untouched by people. But he's saying just the opposite. Indigenous knowledge shows that hands-on tending of these beaches can really help keep them healthy.

Dan LeDuc: Exactly. And Marco has more to say on that.

Marco Hatch: Yeah, on the science side, I think our role is to better understand the ecological mechanisms in traditional teachings. And so, an example of that is



teachings around if you don't tend a beach or if you don't dig a beach, it dies. And the act of tending is widely cited as helping keeping a beach healthy.

And so, what does tending look like? It looks like turning over the sediment, just like you would turn over the sediment in your backyard raised garden bed. A beach that hasn't been tended, the sediment does turn black pretty quickly.

And that's associated with high organic content in the sediment, low oxygen, and when you have those two factors set up you can create hydrogen sulfide. That's that rotten egg smell you get in swamps. That is toxic to lots of organisms, including juvenile eelgrass and juvenile clams. And so, when you tend the beach and you turn over that sediment, it increases aeration, organic content in the sediment, which allows oxygenated water to penetrate deeper, helps keep the beach healthier.

How can we look at the way that people have maintained these ecosystems with high degrees of abundance for thousands of years and think about what that means in today's ecosystem where that's not happening in many beaches.

Dan LeDuc: That's a reflection of unfortunately, I would say, of the modern world, right? Several thousand years ago, there weren't deeds on beaches and the native Indigenous population was there. That's not the case anymore. So much of this is in private hands now, isn't it?

Marco Hatch: I think that there was always a system of governance, meaning, particularly in clam gardens, it wasn't open access, but there'd be a family that would care for that specific feature and control access, right? But now it is private tidelands, or in other cases where tidelands are public, access is hard to get.

So, by keeping people out, the landowners might think they're helping keep the beach healthy by not letting people come dig clams, but in fact it's the opposite of that, the more you tend, the more you grow. And by breaking that cycle, by removing people from those beaches, we've lost that intertwined connection between people and the seascape, which has ecological implications, and it also has big cultural implications for what does it mean to be, in my case, Coast Salish, and not being able to go out and harvest in these different areas.

Dan LeDuc: Is that part of your mission then in the work you do, is to better explain to others these connections? Because a lot of these practices that actually could be beneficial aren't happening.

Marco Hatch: I do view myself as somebody that does span that boundary of—one, helping explain that old, dated model of "to keep nature natural, we need to keep people out," doesn't apply here, doesn't work.



And by engaging Tribes in that restoration, you can build some really powerful relationships and partnerships that are beneficial to both sides. And, if done properly, can be long lasting and really rewarding.

Dan LeDuc: I read this quote from you in a different interview where you said this is all like this interesting opportunity to look at the environment from the viewpoint of a clam. How does a clam view this? I love that imagery!

Marco Hatch: It is something I say in class a lot, that I could tie everything back in through a clam. And by that, what I mean is that watersheds are foundational. Watersheds are so important. Everything that happens on the land washes into the sea. And so, if we're a clam, we're at that interface of the ocean and the land.

And so, you're being impacted by both of those things. What's happening in the ocean with release of pollutants, red tides, shipping traffic, any marine impact is also going to impact clams, but also everything on the land—our farming practices, our stormwater treatment, sewage treatment, all of that, septic—is all going to wash into the marine environment, impact the clam as well. So, they're getting it from both sides, our poor friends, the clams.

Dan LeDuc: Are you sensing some renewed interest in the traditional scientific community to embrace Indigenous knowledge?

Marco Hatch: In a lot of circles, the desire to work with Tribes and work within traditional ecological knowledge systems is really increasing, which is great to see. We also have to balance that with how do we go amongst these partnerships respectfully, and how do we prevent some of the missteps that have happened in the past around extractive knowledge?

And so, one thing that we really promote is the understanding and the elevation of individuals who, ideally, are a member from that community with an advanced degree that can help guide on how to partner with a community and then able to ensure that the community is also getting what they need out of that partnership, ensuring that there's an equitable distribution of resources on both sides that data management agreements are signed, so anything that's collected is owned by the Tribe, it can't be published without their knowledge or consent.

Marco Hatch: What we're really trying to do now is promote a lot of cross-cultural exchange. And so, if you're a Native Alaskan and you're interested in clam garden restoration, having folks that have been doing restoration for a number of years come up and visit you, or vice versa, to where we can have that community-to-community partnership.



There's no single recipe book for it but—everybody's done it differently—but I think often the community aspects are quite similar, of community buy-in, having a few key leaders really sponsor and support the project, and have youth involvement in those restoration activities.

Dan LeDuc: Marco Hatch, thank you so much for this. It's been fascinating on so many levels, and we wish you continued success.

Marco Hatch: Thank you.

(Music transition)

Emily Chow: In our next episode we leave the beach and head to Yale's School of Medicine.

Dan LeDuc: There, we'll talk with Keyla Sá who's studying the many symptoms of long-COVID and why some people get really sick, and others don't. We hope you'll join us.

Emily Chow: For more information about this season, visit our website at pewtrusts.org/afterthefact. And if you have a question, write to us at podcasts@pewtrusts.org.

Dan LeDuc: Thanks for listening. For The Pew Charitable Trusts, I'm Dan LeDuc.

Emily Chow: And I'm Emily Chow. And this is "After the Fact."