Season 3, Episode 3: Virtual Forest Modeling
Host: ESF President Joanie Mahoney
Guests: Aidan Ackerman, Dr. Colin Beier

Colin Beier:	ESF has field cred in the sense that our students not only know stuff, but they know how to do stuff and they know how to be in a variety of settings, and that makes them incredibly effective, sought-after employees, but also just effective people.
Aidan Ackerman:	The sort of central idea of these visualizations is that experience in the forest really is central to empathizing and wanting the forest to be successful, loving it, and feeling like you need it in your life and in the world.
Colin Beier:	I think what these visualizations allow us to do is they democratize in this really powerful way of saying, oh, we take all this data, all these projections of the future, and we put it into a space where you can interpret in first person.
Joanie Mahoney:	Welcome to season three of Campus Conversations, the podcast. I am Joanie Mahoney, and I have the honor and pleasure of being the president here at SUNY ESF, and we are on season three, and we are again going to explore the collaborative impact of research on our faculty and community. I continue to be absolutely blown away by the work that's done here at ESF, and I love the opportunity to talk to you about it myself, and I like that we can share it with the broader community.
	So I am joined today by two guests. First is Aidan Ackerman, an assistant professor of landscape architecture, and second is Dr. Colin Beier, who is an associate professor in sustainable resources management. Aidan, what was your path here to ESF? Where are you from?
Aidan Ackerman:	Yeah, I'm from Western Massachusetts. I grew up in Amherst, Massachusetts, very close to UMass, so I was aware of landscape architecture because they have a program at UMass, and one of my close neighbors was a landscape architecture professor. Like most of my students, I can really understand, especially the MLA students, master of landscape architecture, but even the bachelor of landscape architecture students. Almost no one grows up saying, "I want to be a landscape architect." They might say, "I want to be an architect," but usually it's more of a winding path to get there, and for me, I went to art school at Alfred University not too far from here, and art school is great at many things in life and it's not exactly great for getting a job right after, right? So I had a rude awakening. But I had done some work study in the computer lab, and so I sort of parlayed that into working in information technology, so I worked as an IT specialist for about six years.

Joanie Mahoney: It's interesting Aidan, because I wouldn't imagine an art major being an IT professional.

Aidan Ackerman: Yeah, well you know, it's like what I had for professional experience was working at a grocery store, working at the dining hall, and then just by luck last semester was working in the computer lab in the art school, the graphic design lab, just enough to be able to have a little bit of a professional foot in the door.

But I liked it, I liked the problem solving, I liked working with computers, but I at a certain point knew this is not for me. I missed the creative stuff, so I thought about going back to school for art. And then I really liked working with plants in my garden out in California, and so I went to grad school for landscape architecture, and found out like many people do when they go into school for landscape architecture, it's actually not a whole lot of playing around with plants, it's a lot of graphics and working with computers.

And so I started adjuncting at Boston Architectural College after graduation in the landscape architecture department and in the digital media side of things, and took on a full-time role as director of digital media for the whole college and landscape architecture faculty. And then I found out about this position here, which was asking for somebody who dealt with landscape architecture and digital media and I said, "This is too perfect."

Joanie Mahoney: Yeah, it sounds like it.

Aidan Ackerman: Yeah. But I had really hit the limit of what I felt like I could do on my own with science-based communications, which I was really interested in climate change and visualization of landscape change, and I was like, you know, it's not ethical for me to continue to claim these things are happening with my graphics and in the environment 20, 30, 100 years from now. We're a generalist profession. We're not scientists, we're not engineers.

And so the idea of coming to ESF and being able to work collaboratively with people who are experts in their field, world renowned, and find some way that communication graphics and ecology and biology could come together, was my hope. And I had the very good fortune of meeting up with Colin really quickly once I arrived and getting ... He had a vision for where graphics could come in and got brought into some of these amazing collaborations, and so all those hopes I had for combining IT, art, ecology, science, landscape design, I think I honestly can say have come together more wildly than I would have even thought.

Joanie Mahoney: It doesn't seem possible-

Aidan Ackerman: I know.

Joanie Mahoney: ... that you could put all of those interests together.

Aidan Ackerman: It was almost like I knew from the start, and it's too perfect. Landscape architecture has a lot of paths, there's a lot of ways you can choose your own adventure, and I say that's ... my trajectory only made sense after I got to ESF. If you had asked me a few years before, "What are you doing?" I'd say, "I'm still just figuring it out, job after job." And so you couldn't like say, "This is where I want to end up and here's how I'm going to get there." It was more just following the interests and the opportunities.

Joanie Mahoney: And I think that's a common story here among faculty at ESF because when you go to that fifth-grade career day and people come in and say, "What do you want to be when you grow up?" There probably wasn't a description like the one you just gave us about what it is you do here.

Aidan Ackerman: Exactly.

Joanie Mahoney: But I know that you said you connected pretty quickly with Colin. You put a proposal in together with the Discovery Challenge. So then, Colin, how about you? You had already been here at ESF before Aidan arrived?

Colin Beier: Yes, I've been here 15 years in August.

Joanie Mahoney: Wow. Congratulations and thank you.

Colin Beier: Thank you. I'm waiting for my 15 year pin.

Joanie Mahoney: All right. Noted.

Colin Beier: No, I'm just kidding. So I'm Colin Beier, I'm a associate professor in sustainable resources management. I'm a forest ecologist and consider myself a systems ecologist, and I'll try to explain what that means. But a little bit about my path. I grew up in the Tidewater area, southeastern Virginia, and also in Hampton Roads where the Chesapeake Bay meets the James River, and I was surrounded by Air Force bases and all kinds of things and I wanted to be an aeronautical engineer. I wanted to be a pilot, and I had a lot of engineers in my family.

I ended up going to a magnet school in high school for biology and chemistry. I ended up going to Boston University as a biomedical engineering student as a freshman. I had too much fun in Boston, and I did okay, but I realized I didn't love math quite enough to be an engineer.

I came back to Virginia and completed my undergraduate at Virginia Commonwealth University, and I was still pre-med at the time, and I took my first botany and ecology courses, which are kind of required of pre-med,

because I've kind of come full circle on some of this. But in the late '90s, we were talking about climate change, but what we were really talking about was overpopulation and we were talking about the biodiversity crisis.

Those were the two really pressing topics. And climate change has been a discussion since the '60s and '70s. There are articles pointing to it from their early '20s and '30s. But I rediscovered this love of plants that was instilled in me by my grandfather, who was an engineer, but had kept an amazing garden and greenhouse. So I got really into botany, I got really into ecology, and so I did my degree there.

I got a lot of love from the faculty at VCU because they're used to teaching pre-med students and pre-dent students, and who don't want to take any of those classes, so when there's a few of us who love all the critters and love all that stuff, they get excited.

I had a job working for an ecologist at Duke in southwestern North Carolina after I graduated. That job led to graduate opportunities at Virginia Tech, as well as a few other places. I ended up doing my master's in forest ecology at Virginia Tech. And we were studying a problem that was of great concern, and any time I tried to explain it to people, the upshot of it was a question that's like, "What's going to happen to the forest with this problem that was happening?" And I didn't have the answers. I spent two years doing very narrow ecological research that was a lot of fun and I learned a great deal, but I didn't have any answers as to, how did we get in this mess, and then what do we do to get out of this mess?

And that led me to go to Alaska to be in the first cohort of what NSF used to call an IGERT, which is Interdisciplinary Graduate Education, Research, and Training. Probably the worst acronym ever.

Joanie Mahoney: Oh, well, the government can come up with some good ones.

Colin Beier: Yeah, IGERT sounds like a narcissistic yogurt brand or something, but it essentially was an interdisciplinary PhD, which at the time, and still now to some extent, is considered an oxymoron. You're supposed to go very, very deep with a PhD and be the expert in this narrow slice of knowledge as opposed to going broad, but that's exactly what I did.

I picked up and moved to Alaska. I had the opportunity to work with an ecologist who I admired a great deal and be in the first cohort of this PhD program in resilience and adaptation in the Arctic, where change is happening so rapidly, and so I got a lot of training, in addition to ecology, in economics, in policy science, organizational theory, governance and administration of natural resources, and integrated that and focused my work on southeast Alaska or the

Tongass National Forest, which is the largest remaining stretch of temperate rainforest left in the world, and it has a really amazing and fascinating history and a really compelling future.

And seven days after defending my dissertation, I interviewed here for a position that, like Aidan, it was like this perfect fit, but this was to do similar work in the Adirondacks, and so a lot of the conversations, we see a lot of parallels ecologically, socially, economically, politically between Alaska and the Adirondacks because the Adirondacks rejects New York City and Albany as the leadership. Right? They want to do their own thing up there. Alaska's the same way. Alaska loves to feed at the federal pork trough but doesn't want any interference. Adirondack leadership is very similar in that way. Nothing against our friend Bill Farber and others, but they're very good-

Joanie Mahoney: Great, great guy. Yup.

Colin Beier: ... at getting the funding, but they don't want to be told how to live up there. So there were a lot of interesting parallels. And so when I was originally hired here, straight out of my PhD, I was 29 years old and I was based at the Newcomb Campus at Huntington Forest.

Joanie Mahoney: Which is such a spectacular setting-

Colin Beier: Amazing place.

Joanie Mahoney: ... to do your work.

Colin Beier: Amazing place.

Joanie Mahoney: How long were you up at Newcomb?

Colin Beier: About five years.

Joanie Mahoney: Where did you live up there?

Colin Beier: We lived on the property.

Joanie Mahoney: Oh, you said we, so by then you already had a family. How did they like-

Colin Beier: So, my wife April was born and raised in Alaska. I did something very rare, is I didn't bring a relationship to Alaska to die. I took a relationship that was founded in Alaska and moved it to another place. But she can-

Joanie Mahoney: She sounds like a good sport-

Colin Beier: She's amazing. Yeah.

Joanie Mahoney: ... to go from research in the Arctic to the Adirondacks.

Colin Beier: The Adirondacks was a really good stepping stone for us. But for a variety of reasons, it made a lot more sense for me to be here on campus and for us to start our family in Syracuse.

Joanie Mahoney: So you made the move down.

Colin Beier: Yeah. Aidan and I live a stone's throw from each other. At least I can throw a stone that far. I used to be able to. But we live over here in the university neighborhood and walk and bike to work every day, and we've got it pretty good.

Joanie Mahoney: No, that's very interesting, and almost a hundred percent of the time when I ask people on this podcast about their path here and their story here, I think, how did I miss these opportunities? Because I'm so interested in what you are all interested in, but I didn't have that exposure to botany or an ecology class, and I wish I did because I'm happy with where I am but I find the work that you all do fascinating.

And I think, going off on a tiny tangent here, I worry a little bit about how higher ed is moving to micro-credentials and these certifications, which I think there's a place for, and ESF certainly is going to have to be in that space, but if you didn't take a required class in botany or ecology and find out that you had this interest, you would have a very different career path, maybe one that's not as rewarding and maybe not contributing to the solutions for climate change the way this one is. So, I think a comprehensive opportunity to go to college and dip your toe in a lot of different things is really valuable, and I don't want us to swing the pendulum too far away from that.

Colin Beier: I always feel like we have to stand out from the crowd. We already do in so many ways. And while I know SUNY and a lot of other trends are pushing towards this, I think that we, as part of our identity, should push back against some of this, especially where it cuts into the experiential learning that we do so well.

Joanie Mahoney: Oh, absolutely.

Colin Beier: And it's so valuable. I say this all the time and this is ... maybe it'll get picked up someday, but I felt like a tagline for us that's always been left on the table is that we have field cred, right? Like ESF has field cred in the sense that our students not only know stuff, but they know how to do stuff and they know how

to be in a variety of settings, and that makes them incredibly effective, sought after employees, but also just effective people in the world. And I think-

Joanie Mahoney: Oh, I absolutely agree. Our students stand out.

Colin Beier: They do.

Joanie Mahoney: And any employer I have talked to just talks glowingly about the training that our students have when they show up. So, field cred.

Colin Beier: I understand there's some of this stuff that we need to adopt and COVID taught us there's more we can do online I think than a lot of us thought before, but it also taught me that it ... I mean, I taught field labs in 2020 in the fall. It was a lot to figure it out, and it was just as much for me as it was for my students.

Joanie Mahoney: Because you wanted to be out there. Hands on.

Colin Beier: That's the favorite thing that I do. I get to take Stumpies in the woods for four or five hours a week. It's my favorite. It's the best thing I do.

Joanie Mahoney: Yeah. I can imagine.

Colin Beier: Maybe that's a good segue to talk about visualization.

Joanie Mahoney: Well, I know, that's so funny that you're saying that because I'm like, you're kind of teeing up the substitution.

Colin Beier: Right. Right.

Aidan Ackerman: Exactly.

Colin Beier: Right. Right. Right. Well-

Joanie Mahoney: Which makes it accessible to a lot more people, right?

Aidan Ackerman: Yeah.

Colin Beier: Right.

Joanie Mahoney: Because we don't all have the luxury of spending four or five hours with Colin in the woods. So Aidan, talk about what it is that allows more people to experience that walk in the woods.

Aidan Ackerman: We always say there is no substitute for a walk in the woods, but for many reasons, people can't get there or are just not getting out there into the woods.

And there's lots of research to show that being in that physical environment in the woods does something for people to create connection, meaning, do something bio-physically for them, calm you down. But also, a lot of what we're trying to do is communicate with the lay public or with forest landowners or a variety of audiences about things that need to happen in the forest to combat climate change to set up a better future for the forests.The sort of central idea for me of these visualizations is that experience in the forest really is central to empathizing and wanting the forest to be successful, loving it and feeling like you need it in your life and in the world. So how do you get that sort of same elicited response for people who are not actually going to that forest?

The way that we do that is through creating these virtual experiences as if you were standing there, and then from that, VR. We can also get a variety of other types of communicative tools, because not everyone can even ... If they can't go to the forest, they may not also be able to put on a VR headset for a variety of reasons or may not want to. So we also can get video material of that same VR experience and create some curated videos to tell a story about forest management, as well as things like still images. We can get a lot out of that. But the main goal for me, in terms of where the fun and exciting stuff is, is trying to create a virtual experience of a forest and showing it changing over time according to poor forest management or sustainable forest management to try to show, sort of compress that timeline of 50, 60 years.

Some of the things that really matter for that visualization is things that have to look like spot on, the light filtering through the trees, the way the branches are moving, the species. Not just all perfect nursery trees, but ones that grow differently from what you see in the middle of a field. All these things have to click together perfectly so that you feel like I've stepped into, for example, a northeastern hardwood forest in the Adirondacks.

I love and am fully equipped, along with my students, to create those digital environments, but the first time I did one of these for an early venture with Colin's team, I got a lot of great constructive feedback, but it was clear I was ... what I thought was ready to show the scientists was not even close. And so over the years, a big part of our collaborative model has been just this natural feedback. I'm amazed at the things that some of my project partners will say. "We'd see the branches a little bit differently at this level of the tree. We might see a little bit more openness of the canopy," like they can really tell me and my students exactly what we need to adjust for them to look like a forest that's managed in the ways that we're trying to show.

Joanie Mahoney: There's so much to the work that you two are doing, and I would say the first thing is that people have a misperception of landscape architecture. I think if you just interview people out on the street, they have the idea that you'll come over and put some plantings in front of their house or something, but it's such a

complicated, significant tool for us. And by the way, I put the headset on, and it is awesome. You really feel like you are in the forest.

And even if I could go, most of my travel is around nature and being outdoors and hiking, but I can't go everywhere because I've never been up in Alaska where Colin was talking about. So even if I am somebody that is experiencing nature and being outdoors, I can't be everywhere, and this allows us to see the different forests, but what I find the most fascinating, and it's where you two collide, is taking the data that Colin is gathering and how we can use these trees to save the planet, but if we're not managing this properly, what it can look like.

It's hard for people to be motivated when you say, "Oh, if you do that thing, 50 years from now there's going to be a problem." But if I could see some kind of time lapse of the damage that we're doing collectively by not properly managing and using these forests, it can be compelling. It's also translating the research that Colin is doing so that it becomes real and urgent for people. I just think this partnership is really cool.

Colin Beier: Well you're exactly right, Joanie, because it is meant to be translational. And I think that we define research as there's fundamental research that's kind of basically knowing for the sake of knowing, there's applied research when you try to apply that knowledge to solve a problem. If the third leg of the stool is translational research, it's really about co-generating knowledge with folks outside of the academy and also bringing in different traditions, and Aidan and I have talked about this a lot. It was in our proposal around the Discovery Challenge, the pathways to net zero carbon. It's the integration of science and design, and I think that's where we've talked a lot about how having a landscape architecture department, which has a foot in design and is certainly design oriented, it's a very different tradition and a very different approach than science, but they're very complimentary potentially, but there haven't been a lot of opportunities to integrate those.

And it naturally happens here at ESF that has fundamentally, I mean, like George Curry, a number of others who have been legendary people, Rich Hawks, I don't want to leave anybody out, but these are some of the kind of giants that I know about who have reshaped our community.

Joanie Mahoney: Absolutely.

Colin Beier: Right? In ways that we experience every day and may not remember. But I think where we are now is in this translational space because ecology, it's a complex system that we're dealing with. And with complex systems, one of the things is there are emergent factors or emergent behaviors in a complex system that are not the sum of its parts.

And one of the things that emerges is sometimes counterintuitive lessons. For example, and this is very relevant to our work together, in some cases, we have a lot of forest land in New York, we're really focused on that forest land right now to help sequester carbon dioxide to get our net emissions down and everything. We obviously have a lot of other values for forests, and many of them on much higher radar screen than carbon for the average individual, but we have a lot of forests that are suffering from a variety of legacy of past disturbances, poor management, invasive species, overpopulation in some areas of deer, which again is really our fault for changing their habitat patterns. But these things that they need some management, as Aidan is getting to, they need ... They're not on a trajectory to be productive, diverse, healthy forests that can provide us with a whole variety of benefits. They're kind of stuck in this situation.

And because it's a complex system and because it's a natural system, even though it's still managed, there's a misfit between human time scales and natural time scales that makes this hard. So decisions that we make now, really, their outcomes in a forest are decades down the line. And of course, this just affirms the wisdom of many Indigenous, if not all Indigenous cultures, which is often encapsulated in the Haudenosaunee knowledge of Seven Generations. And the side-

Joanie Mahoney: Absolutely. Because, is the work that you're doing right now, are we going to have a Colin Beier in 50 years that is continuing that work? We would if we as a collective embraced that vision that what we are doing is for right seven generations from now.

Colin Beier: You're absolutely right. People see the now though. They see a managed forest and they see destruction and they see loss, and even our most strident forestry professors who we've worked with will acknowledge that it doesn't look pretty after a harvest. It's not nice to look at. It can be hard for people to see. But what we can do with some of these is tell stories based on data and experience and knowledge that says this is a resilient system that can recover, and we can set it on a better trajectory, and we can tell stories where humans aren't just strictly destroyers and usurpers, right? But we are stewards of something better, and there's many of those stories that are out there, in a variety of different contexts. We've done visualization of, for example, the story around acid rain and the Newcomb Campus' Huntington Forest's unique role in that story, and we've done visualizations just to show people the success of science, identifying a problem, informing policy, the Clean Air Act Amendments, and the Clean Air Act Amendments enacted under a completely Republican government, by the way.

Joanie Mahoney: That tends to happen sometimes, right?

Colin Beier: Yeah. Yeah. No, this is [inaudible 00:24:38]-

Joanie Mahoney: Earth Day, right?

Colin Beier: Right. No, this was George Bush the 1st and a Republican Congress in 1990 that past Clean Air Act Amendments that have essentially eliminated acid rain.

Joanie Mahoney: I think people would be shocked to be reminded of that. Yeah.

Colin Beier: Well, we think how much ... We often pat ourselves on the back for [inaudible 00:24:56] in some ways we've really regressed. That's besides the point. We've used these visualizations to try to tell stories, and the piece that I want to pass off that is important that you highlight is that they're based on data, so that when we tell some difficult stories that some people don't want to hear, we have the ability to say, "Well, this is based on a real situation in a real place." And does that make it infallible? Does that make it inscrutable? No, but this isn't just some fantasy that we've created. And so the work that we've done together has also been able to build tools and with students. Mike Mahoney, no relation?

Joanie Mahoney: No relation. I wish. None.

Colin Beier: But Mike has built these tools that have made some of this software and that the architecture accessible to everybody, open-source tools. He built a tool that's open source that you can take data, you can basically pick anywhere, at least in North America, and it brings in all this authoritative data and imagery from USGS and other places and it gives you this 3D visualization that you can walk around in.

Joanie Mahoney: I know, and it's amazing.

Colin Beier: With any place.

Joanie Mahoney: Well, there's a couple things that you've said. Let me just say that you said in the '20s and '30s you can start seeing some alarm bells about the changing climate, and then certainly '60s, '70s, '80s, people were really trying to get folks attention. If we had the work that Aidan is capable now so that we could help people visualize what it was the scientists were telling us in the '70s, '80s, and '90s, how different it could be, but we do now so there's reason to be hopeful. There are non-scientists who need to see this to really understand it.

And the other thing that I think is compelling, and I'm stealing this thought generally from David Attenborough, but nature is going to be okay. As you said, Colin, it's our impact that has been problematic, and if we're not careful, the planet won't support us anymore, but then nature will thrive. So it's not like we're doing this for the sake of nature. It's a matter of survival for the people that are here. And I don't think people totally understand that. They don't value

the forest because they don't want to go out and take a hike. Well, value the forest because it's the key to humanity surviving on the planet.

And I think now, Aidan, with your work and you're sitting here and you're thinking, "I have children, I have grandchildren. This is what this is going to look like when my grandkids are in elementary school." If you don't want that, then make the decisions back here where we are now to be a better steward.

Aidan Ackerman: Absolutely. And I think the way you're putting it, lay language or science-based language, we are collectively starting to see the time scale ahead of us. And certainly, I think when we're thinking about communicating with, say lay audience, a variety of backgrounds, attitudes, experiences, some of the things that we try to communicate are, think about all the factors that we want to encapsulate in VR experiences. A lot of it is about the character of the places we visit. So, this idea of the forest, and people get really disturbed when they see a photograph of a sustainable tree cut. So we take efforts to show those and show what happens after.

Joanie Mahoney: Exactly. It's the what's going to come. And until people see it and experience it, they won't buy it. And it's kind of like what we're seeing right now, all of these thousand year storms. 10 years ago, we're talking about the frequency of hundred year storms. Now there's these thousand year storms wiping out whole communities, and that's what it's taking for people to wake up to this idea that we have to change our ways.

Aidan Ackerman: We were having, back in late 2019, we were having a great time. We both found the limits of what we could do, whether it's on the communication side or on the science side, and found, okay, we have a little coalition here that has found a way to integrate these. We should also have our students have these same connections and have these aha moments.

So we put together an elective called Virtual Environments. We offered it in spring 2020, all remotely. And basically our charge was, we have this huge data set of data collected up at Huntington. We have these visualization tools. We have students across the college who may want to engage cross-disciplinarily with data and visualization. Let's open up this awesome class. And we had bachelor students, master students, and PhD students all working on these projects in this seminar across a range of disciplines.

One of the products that came out of it really took some of the data that was captured over several decades and had a positive story to it. And so some of the products that came out of this class are things as simple as, let's get you up into the High Peaks and experience it for yourself in VR.

Joanie Mahoney: That's the only way I'm getting to the High Peaks.

Aidan Ackerman: Totally.

Joanie Mahoney: Just so you know, is VR.

Aidan Ackerman: VR. And you know, in 2020, this also took on a whole new dimension of, well, we can't get out there anyway as a group. Colin found a way, but most people are stuck at home. And we had this moment culturally of thinking about the people who at the best of times can't make it out, out of their home or out into nature because of mobility or financial reasons. And we thought, "What can we do with these tools?"

So we had a student that did a module where you could go through and spray paint trees for keeping or cutting down, and we thought, well, this is a great kind of flipped classroom opportunity. And all these tools, by the way, I should say, are at our disposal because of the fantastic and well-resourced gaming industry. We inherit so many tools, and the scale that we want to visualize at is similar to the scale of a lot of these games now, like Skyrim, where you walk on endless quests, and you really want that rich environment. So anyway, Colin, I think segueing into this class and what the students were asked to do and what they had to work with.

Colin Beier: Yeah. So I mean Huntington Forest, our Newcomb Campus, is our biggest properties. It's 15,000 acres. It's right there in the central Adirondacks in the High Peaks. It was donated to the college in the '30s.

Joanie Mahoney: It's spectacularly beautiful.

Colin Beier: Yeah. And acid rain was discovered in the late '60s. Gene Likens and others in New Hampshire, Hubbard Brook. In 1972, the initial National Atmospheric Deposition Program was started, and Huntington was one of the inaugural cohort of sites where we started collecting precipitation every week.

Joanie Mahoney: In the 1960s.

Colin Beier: Yeah, 1972.

Joanie Mahoney: 1972. Wow, what a valuable dataset you have.

Colin Beier: Yeah, October of '72. We've had continuous data collected on a weekly basis, with occasional misses here and there, things break, but that data continuously collected of the pollution in rainwater, and then building on that and building on that and building on that, and entire careers here at ESF, and-

Joanie Mahoney: So were people physically going and taking water samples weekly?

Colin Beier: Yeah. So you've got precipitation collectors that automatically do it, but you've got people that have to collect the samples out of the collector and put it in the mail to the centralized lab that runs that. So I mean, this has been a big part of the value and the need of having staff here around there, research staff. And we have one of the premier long term monitoring sites in the northeast, and I think easily the flagship monitoring site in New York State, environmental monitoring.

We are NYSERDA's top priority for non-competitive environmental research funds to support that monitoring work. That's generated a great deal of data, a great deal of publications, a great number of graduate theses and dissertations, many, many products and many, many outputs.

That dataset is just right for telling a variety of stories of how things have changed over time, and what's fun about it is that we can put you in the place where the data was collected with these VR opportunities. We know a lot of people can't ... It's not easy to get up to Newcomb. It's three hours from everywhere. Right? And that's good in a lot of ways, but as the folks up there know, it's hard to get groups from around different locations up there. And so we can bring some of these stories to them, at least as an entree. Right?

So being able to bring people into these spaces and to be able to stand by the shore of Arbutus Pond where so much of this work has been done for 50 plus years now, and then to tell that story in a way where you literally see the sky change from a cloudy ... and you can't see the horizon and you can't see the reflection of the land in the pond, and then over time, as we've resolved this problem, for example, with sulfate emissions, which is the primary culprit of acid rain, the sky clears, and not only does the sky become blue, but you can see the reflection of the pond, and there's a very powerful message that's sent that almost anyone I think can interpret, and I think that's what's so powerful about this and why we think it has so much potential. I think we're still trying to figure out, does this work? Does this move the needle? And how-

Joanie Mahoney: You mean, does being able to show people move the ... I'm hopeful. I think it will. It's a giant leap from theoretical to real, and some people need real, but that's all they need, is real, and they'll-

Colin Beier: Right. It's a big step from a graph or a chart, which most people don't get anything from. It's a big step from, as we talked about before, earlier visualizations that I had seen, that I had always thought there was a lot of potential, but then I saw what people were producing and I was like, "Eh."

Aidan Ackerman: Yeah. Just looks kind of like 1990s-

Colin Beier: So, the comparison that I often-

Aidan Ackerman: ... but were 20 years later still, yeah.

Colin Beier: Right. Right. So I had some colleagues that had really prestigious NSF grants and were at the forefront of doing some of this work as part of bigger projects around forest change and stewardship and global change, and the visualizations that they were producing, what I often tell people is they were like the early first person shooter games, like Doom and stuff. They were bit-mapped. And then you walk into Aidan's visualizations and it was being in these current open world video games, which are so realistic, that you can actually be like, "Those plants don't grow there, they grow there," right? And that kind of thing where you can actually interact with them to the point where it doesn't feel like a simulation as much.

Joanie Mahoney: Absolutely. It felt very real.

Colin Beier: Right. And so I think part of my role has been, in addition to bringing some of the data, is being able to just give you this kind of casual feedback of like, the ground looks weird, or that bark's wrong, or the light feels like this coming through, or some of these different things where they're just purely based on the amount of time I spend in the woods, which is never enough.

Aidan Ackerman: I think that just to build off that, when I think of a healthy collaborative working relationship, when we get in our own disciplines, I am never more defensive of my research than when I go to American Society of Landscape Architects Conference. When I get together with someone Colin or other people who cross disciplines, I can't get enough of it. I'm like, "Tell me what needs to change. Be brutal," because I want this to be the best it can be.

Joanie Mahoney: So when you go to that conference, you can tell them it's the best.

Aidan Ackerman: Yeah. It's the best. And I want to have the best product that you will find anywhere on the planet. There are plenty of people can do VR great. There are plenty of people who can do the science great. But what we try to find is this space where we find people want to come to us and have us help them, whether they're talking to landowners or public or politicians, because you really can't find a seamless science and graphics type shop where we are all on the same page, first of all, about what our goals are, but have a way to easily make sure that the science and the visual product are completely aligned without bringing in outside consultants.

Joanie Mahoney: And that's the beautiful thing about ESF, is the people that you need are here. So I want to just touch real quickly on, to what end, right? First and foremost, save the planet. But in the short term, you all are working on that climate legislation helping the state, which the state of New York, last I heard, still has

the most aggressive stake in the ground really for where we're going to go and we're going to be, am I using the right term, carbon neutral by 2050?

Colin Beier: The idea is to have a net zero carbon economy by 2050. So, there's reductions in emissions and then there's sequestration that's meant to offset the rest.

Joanie Mahoney: Okay. And that's the work that's really going to be the scale that'll move the needle. Right? If New York State can get to that goal in 2050, that's meaningful.

Colin Beier: It's a very, very ambitious goal, and some might argue it's not realistic, but I think if you aim high, even if you end up missing, you still gained a lot.

Joanie Mahoney: Yeah, like it's stretch goal.

Colin Beier: I think, yeah, but I think it's good. I mean, it's not just a recommendation or a guideline. It is the-

Joanie Mahoney: But there's no way they could do it without the work that you are doing, the data that you have.

Colin Beier: Well, I think that that's part of the picture. I mean, to put it in context, the CLCPA mandates 85% reduction of emissions, so that's cutting off those sources of emissions to the atmosphere, electrifying a variety of sectors, and really reducing and greatly eliminating our reliance on fossil fuels. But there's about 15% of those emissions that they've estimated, and Joanie, as you know well, the policy process is a different sausage making process and there's very little science that gets sprinkled into that sausage making, right?

Joanie Mahoney: Not enough.

Colin Beier: But it does gets sprinkled in. But that 15% they need to offset, so those are emissions that we don't think we can eliminate. I mean, examples are, as my colleague Tristan Brown likes to say, we're not going to be electrifying the 747s anytime soon. It's going to take some time.

So, there's a lot of really interesting dynamics playing out, but fundamentally, if we're going to even attempt to do this, and this is what the state is doing now, is going through this process of developing a very elaborate scoping plan, I think the scoping plan is up to 600 pages now full of recommendations from everything from buildings to transportation to agriculture and forestry, which is what we've worked on together, which is what our colleagues have contributed to. And so our colleague, Bob Malmsheimer, put a great deal of work in on the Ag and Forestry Advisory Panel, along with our partners, some of our partners and friends and collaborators at Cornell, and really shaping this in a direction that represents the current state of knowledge in science and practice, and

leaves everything on the table so that ... Because almost everything's got to be on the table here if we're really going to address this.

And I think where this dovetails with the work that Aidan, and where I see the potential and where we talked about very early on with our Discovery Challenge, where this is going to transform our landscape, right? And it's going to change every decision space about landscapes, whether it's about individual yards, about community public spaces, whether it's at the municipal, the county, the state level, and I think what these visualizations allow us to do is they democratize in this really powerful way of saying, oh, we take all this data, all these projections of the future, and we put it into a space where you can interpret in first person. It's providing a basis, we hope, to allow everybody to come into this space and build consensus and understanding about these alternative futures that lay in front of us.

Joanie Mahoney: So I said, you know, we want to save the planet, and then in the shorter term, or maybe the same amount of time, we want to meet the goals of the climate legislation that New York State has. But what you just said about individuals and small governments, how do we get this work out to people at that level? What's our best vehicle?

Aidan Ackerman: Could I jump in there? I mean, I think-

Joanie Mahoney: Please.

Aidan Ackerman: ... in the very short term, I think there's two audiences I have in mind, and I'll start with the forest landowners. As part of meeting these targets, forests are going to play a big role in sequestering that carbon. Over half the forests in New York State are privately owned.

Joanie Mahoney: Private.

Aidan Ackerman: Right? So these are actual people who are receiving information about incentives that they can participate in, or just practices they can change, often which in the immediate short term are not the most lucrative, but in the long term actually end up being more lucrative because you have more trees to ... and I should have an aside and say it's hard to fundamentally accept the image of a tree being cut down, but when you think about that those trees, if turned into sustainable wood products, are sequestering carbon and can replace some of the concrete and steel, that wood products are an important part of this reality. And so people who really think wood skyscrapers are more sustainable may also not in the same breath say cutting down trees is okay. Right? So we try to make sure that that whole story of forest management, which includes sustainable tree harvesting for sustainable wood products.

Joanie Mahoney: For mass timber buildings.

Aidan Ackerman: Yeah, exactly. And-

Joanie Mahoney: Which we also do here, right? This science-

Aidan Ackerman: Yeah. So mass timber's the perfect example of, wouldn't we like to have less reliance on steel and concrete and all of the byproducts that come along with that?

So in the short term, trying to help those landowners see the potential of the decisions that they might make that are more sustainable, but in the short term may not meet their immediate needs. It's forest character. I want my forest to be great to walk in, as well as grow these hardwood species and keep out deer, and so data overlays on some of these visualizations help knit together the science and the character and the what's happening in front of you, what's going to happen to my landscape and how should it look?

So, we don't know yet because we haven't been doing this for long enough how that does or does not affect change, but we're starting to put together some proposals for funding that actually build that in, understanding how this ... And we have some great faculty at ESF who can do things like Jaime Mirowsky, measure people's biophysical reactions to certain visualizations, so she's involved in some of these projects too. So we actually start to understand what's working, all towards advancing the goals of growing and maintaining our bio-diverse forests.

The other audience I think is general public, where just accepting some of the pieces of this story may not ... I will be the first to say, before I came to ESF, I thought, "Leave the forest alone. It knows best," and we are well past that, right? With all that I knew from landscape architecture, I was still like, I really very more aligned with the lay public sense of what's best for the forest. That's quite a story to tell. It can involve, one of the most recent things we're trying to talk about is this phenomenon going down at Arnot Forest of slash walls, which involves taking the leftover parts of harvested trees and building a perimeter fence that's a much more sustainable alternative to a deer exclusion fencing, and the outcomes already are amazing. We want to tell that story.

But for the lay person to walk through the forest and see what to them might look like a clear cut forest, we know it's much more sustainably cut, but it looks like a place where there's not as many trees as they used to see, and then this pile of trees going all around. That's a story that is not going to tell itself.

Joanie Mahoney: And even people with great intentions don't understand that you have to tell that story.

Aidan Ackerman:	Exactly. Colin, I don't know if you want to build on that with the audiences or what we're looking for behavior change or attitude change.
Colin Beier:	I think there's a lot of potential. The way things are set up right now, we have to more than double the size of the carbon sink in New York States forests by 2050 and keep it there for them to achieve that 15% emissions offset.
Joanie Mahoney:	That's a lot.
Colin Beier:	Well, and two-thirds of the state is forested already. 80% of that forested land is owned by private individuals and companies, and the vast majority of that is small wood lots. These are small individual landowners, many of which have been told for a very long time, "There's nothing that can be done on your land."
	The other thing that's important too is that most of these people are not managing for revenue. They're not managing for timber. There's a group out of UMass, Brett Butler and Forest Service, and they do a national woodland owner survey every year. And they ask people, "What are your top priorities?" And wood products is like, barely makes the top 10. The aesthetic, the visual, the recreational, the wildlife characteristics are what people are managing their land for.
Joanie Mahoney:	This is where the policy makers have a role, because we're talking now in our community about Micron coming here and the prospect of thousands of new jobs and people are saying, "How are we going to make sure that we don't sprawl?"
	Well, you talked about all these municipalities that we have. We have these tiny villages and a little bit bigger towns, and the only way with our current tax policies that they get more revenue for their school districts and to be able to plow their roads and fix the potholes is to have more people there. So, they will pay for some of this forested land and it'll be completely clear cut, not in a sustainable way, with a little cul-de-sac of new houses, right?
Colin Beier:	You're getting to the difference between managing the forest and deforestation.
Joanie Mahoney:	Oh, no, that's ... Yeah.
Colin Beier:	And that distinction is lost on the general public in most cases. Yeah.
Joanie Mahoney:	Oh. And that's what I mean, even well intentioned people.
Colin Beier:	Clearing the forest, cutting some of the trees or cutting all of the trees, but then practicing forestry to regenerate a forest afterwards, versus clearing the forest

and using it for residential or commercial, agricultural development, whatever it might be. We have forests being cleared in the lower Hudson valley right now for solar farms.

Joanie Mahoney: Which might be counterproductive.

Colin Beier: Well, from a climate standpoint, it's nuts. It's-

Joanie Mahoney: Is that the scientific use of the word nuts?

Colin Beier: That's the scientific term. Yeah. Well, I have some other words, but I'm trying to keep this PG. The incentives make sense from the standpoint of being close to the grid and you're close to where the powers are going to be used down state, but to clear a mature forest and liquidate all of that carbon that's stored there and release it back to the atmosphere to build a solar farm, the carbon debt that you create when you do that, it offsets most of the benefit of the solar farm for years and years and years.

And so these are the kinds of things that we're working on to not only ... Some of the work that I'm doing that's related to this, but that you've mentioned before with CAFRI, is to map all of this across the state and provide a map-based decision support basis to evaluate these things, but then being able to zoom down and go on from a map view, like from a bird's eye view to walk down and have that first person view from on the land. That transition and that transferability is something that we're working on a lot so that you can move between these spaces and you can tell these stories from multiple perspectives. And I think that's very important right now, kind of locally and immediately around New York's climate law, and around a lot of the perceptions and values and beliefs of the average New York resident, but especially those in New York City, which is, we know, there's justifiably a very strong political and financial influence of those constituencies on the state policy.

Joanie Mahoney: But if you are working, you're gathering the data and you have been part of a team that's done it for decades, and now Aidan's team is able to show us what this looks like. We have folks here at ESF then that could be providing more nuanced, complicated, maybe policies for the state so that those regions that are willing to remain rural and willing to host our forests are not left out of the revenue that's collected by the state as a whole. So instead of, this little village over here is completely on its own in terms of the revenue that it generates and the expenses that it has, we're all going to be overdeveloped if we do it that way. But if you go up to the state level, where thank goodness they're listening to people from ESF, and you say, "Put these policies in place so that we share some of that tax revenue.: There's a lot of tax revenue that comes out in New York City, but use it to reward the parts of our state that are willing to be better managers of our forests.

Colin Beier: There are forests that, right now, leaving them be is probably the best option, but we shouldn't be locked into that. I mean, we are in the sense-

Joanie Mahoney: Just to hang on for a second while we do what we can on these public lands and learn, and then inform what's going to happen, but don't just turn those into cul-de-sacs of new houses until we figure-

Colin Beier: Right. But we have some of the strictest protections of anywhere in the world in the Forest Preserve. That's a constitutional protection. You want to cut a tree on the roughly four million acres of Forest Preserve in New York State? You have to pass a constitutional amendment, which is not a minor hurdle.

Joanie Mahoney: No, we've seen it on the ballot over the years.

Colin Beier: Yeah, we have. And you know, have entire villages and towns and communities in the Adirondacks that need to cut a handful of trees to access clean drinking water, and all it takes is a couple square blocks of Manhattan to swamp out those votes of the entire Adirondack Park.

Joanie Mahoney: It's like, no, we do not want to cut any trees. Right.

Colin Beier: Right. Right. Well, no, and understandably both have valid viewpoints. So one of the things I want to stress, and I'm not a card carrying social scientist by any stretch of the imagination. I want to make that very clear. It's not about telling people their perceptions, values, and beliefs are wrong. What this is about, at least for me, is that we know from years and years of research and experience, and maybe have a chance to have René Germain, who's run the Frost Valley YMCA Model Forest for 25 years, which is in the New York City drinking watershed. Right? Very significant on a variety of levels, and an actively managed forest. Demonstration forests work in terms of educating people and showing people the wisdom, the practice, the trial and error, because there always is, right?

And the outcomes of some of these decisions and the forestry that's practiced and the forestry that we teach here, those can be different things, what people practice versus what is taught, right? And there's other economic factors, but demonstration forests are incredibly effective at helping people understand the rationale and the outcomes of these decisions and realizing the reality on the ground of like, if we don't deal with this, then we are going to have an outcome that's really undesirable.

Joanie Mahoney: And you saying that is very different than Aidan showing it to us.

Colin Beier: Exactly. Well, the thing is, is that there aren't many demonstration forests. They don't have roller coasters or water slides. Right? They don't have big IMAX

screens. They tend to be removed from population centers. They tend to be poorly funded. So, can we bring the demonstration forest to people through digital venues as a first step or set of steps, and also to engage a much broader audience, which we all know we need to do in STEM, but especially in environmental STEM and engaging audiences that have been disengaged in the past.

Maybe for people who have grown up in certain settings where the forest is a very scary place for them to be, initially experiencing some of these forest settings through VR, through game types of experiences, can get them prepared for what they might experience in reality. So I think we can give them some immersive experiences that are potentially on ramps into the real experience, which we really do believe there's no substitute for, but it is a path to make those connections. It's a practical question, but also an academic one to say, does this actually move the needle? Does this change perceptions, values, and beliefs?

Joanie Mahoney: Well, I will say it's awesome, and I just, it's ... You two are a perfect example of what I talk about when I'm out about the amazing work that's done here at ESF, and it's literally changing the world. And I just can't believe how lucky I am that I get to ask both of you to stop what you're doing and sit down and talk, and because I have these microphones and you're talking to a lot of other people, you really can start that communication. So, thank you both. This has just been fascinating, and I could talk to the two of you forever, so I really want to thank you.

Aidan Ackerman: Yeah, you're welcome. Thank you for having us. It's been a pleasure getting to have the opportunity to share some of what we're doing, and so I really appreciate being asked to participate in this cool podcast series.

Joanie Mahoney: Thanks, Aidan.

Aidan Ackerman: Yeah.

Colin Beier: Yeah. Thanks for having us.

Joanie Mahoney: Yeah, thanks Colin. It's really-

Colin Beier: It's been fun.

Joanie Mahoney: ... it's wonderful to talk to you both, and we'll try to get some of that video up so people can see-

Aidan Ackerman: Definitely.

Joanie Mahoney: ... what it is we've been talking about. So, see you again soon.

Aidan Ackerman: All right, bye.

Colin Beier: Excellent. Thank you.