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NA2753 Ivan Fernandez, interviewed by Adam Lee Cilli

Ivan J. Fernandez
University of Maine - Main

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Interviewer Adam Lee Cilli					
/Depositor:					
				Narrator: Ivan Fernandez	

Address 5773 South Stevens Hall
& University of Maine
phone: Orono, ME 04469

Address School of Forest Resources
& **phone:** University of Maine
Orono, ME 04469

Description: 2753 Ivan Fernandez, interviewed by Adam Lee Cilli, September 19, 2013, in his office in Deering Hall at the University of Maine, Orono. Fernandez talks about the beginnings of his career in soil science; the nature of his research; his collaborative research with Steven Norton; changes in the Climate Change Institute over the years; the CCI's contributions; the reality of anthropogenic climate change; and the importance of public outreach in informing policy.

Text: 8 pp. transcript

Recording: **mfc_na2753_audio001** 44 minutes

Related Collections & Accessions Restrictions

Formats Included Document: Original= .docx, Master= .odt, Access= .pdf; Sound: Original= .mp3, Master= .wav, Access= .mp3

Notes

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Narrator: Ivan Fernandez

Interviewer: Adam Lee Cilli

Transcriber: Adam Lee Cilli

Date of interview: September 19, 2013

ABSTRACT: This interview took place in Ivan Fernandez's office in Deering Hall at the University of Maine in Orono. In the first half of the interview, Fernandez discussed his intellectual gravitation towards soils science, explained the nature of his research, and discussed his collaborative work with Steven Norton. Later, he reflected upon how the Institute changed over the years, its most important scientific contributions, and the so-called climate change debate. Towards the end of the interview, he shared his views on the importance of public outreach, in terms of informing policy.

Note: This is the transcriber's best effort to convert audio to text, the audio is the primary material.

Cilli: Today is September 19, 2013. This is Adam Cilli, PhD candidate in history. And I'm here in the office of Ivan Fernandez to talk about his experiences with the Climate Change Institute. I'm wondering if you could tell me a little bit about how you got interested in soil science.

Fernandez: Well, when I was looking at graduate schools, I was not looking for programs in soil science, specifically, but programs in natural resources. And I met a professor who was a soil scientist who had an assistantship opportunity, and he explained what that would be about. So I went home, thought about the different opportunities that I had learned about in my travels (in making that decision), and I decided that sounded pretty interesting, the area of science that they were going to work on. Then I became a graduate student in soil science and I sort of found my calling. I thought it was really cool and the more of it I did, the more I enjoyed it. So I kept on doing it. Went on to PhD, and the rest is history, as they say.

Cilli: What did you do for your undergraduate?

Fernandez: I was a biology major...actually I was a plant biology person. My senior project had to do with taxonomy of plants in the Bahamas. And so I really hadn't worked, outside of a rudimentary level, in soils at all. I knew they existed. I knew they were part of ecology. But I was really a plant person at that point in time.

Cilli: So, your relationship with your adviser as a Masters student, that's what turned you on to soil science?

Fernandez: Yup, that's what did it.

Cilli: What was it about the discipline?

Fernandez: Well, probably a couple of things. One, I hadn't thought about it before and as I learned how important soils were, from the standpoint of environmental issues, and ecosystem function, and what now we would call ecosystem services, but at the time we weren't using that vernacular, I became increasingly intrigued with learning more about it. It was also an area that there seemed to be a lot of interesting questions to pursue. And there

were a lot more people who were interested in flowers and furry critters, and wildlife biology, and botany and plants, but there wasn't that many people in soils—particularly in areas that were more the traditional soils focus was in agriculture. And I was increasingly interested in forest soils and environmental issues related to those kinds of concerns. So it was relatively self-enforcing. The more I worked in that area the more I became intrigued. The more I became intrigued the more I felt I could add important new aspects that weren't present in collaborative efforts. And I kept on going from there.

Cilli: How did you come to get involved with the Quaternary Institute?

Fernandez: So, the first question starts in the beginning of my career and the second question starts...more up to the present. The arc of that journey for me was to get involved with soils and find that as a research scientist...I worked in industry for a few years and then came back to this university. And so I was doing work on ecosystem processes, environmental issues, at the system-level, with my own particular depth and expertise in soils. But I wasn't doing research on just soils, per se, but more the ecosystem. Which I did. I've continued to do. Having to do with everything from the molecular to the landscape response, to primarily environmental concerns having to do with the atmosphere, but not solely. And I view my research as being about the biochemistry of forests, focusing on soils with an emphasis on how perturbations, primarily oceans, climate change, and residuals (sludge and ash land applications), alter those ecosystem processes. And probably 20 years ago what was a primary focus on acid rain, the atmospheric deposition of pollutants, metals as well, broadened to be the emerging concern for rising CO₂ and changing climate. Both really important components of climate change, because CO₂ is important for plants as well. And obviously climate change is warming and all the things we know are associated with that issue. And I always worked with one colleague, Steve Norton, my whole career here. And he was in the Quaternary Institute for all of his career, so I knew about it. But my research is not in deep time. I'm not a paleoecologist, I'm not a climate modeler, you know, ice cores and things like that that go back into deep time. That's not what I bring to the table, not my skill set. I'm very much an ecosystem-function person. But as the climate change concern grew, my interests in the effects on ecosystems, their surfaces, and how we both mitigate (like carbon storage in Maine) as well as adapt. I became increasingly interested in those. And as I did I knew more people in the Climate Institute and eventually became part of the Climate Institute. So, over the last decade I've been part of the Climate Change Institute. And I'm involved with its various activities.

Cilli: I'm wondering if you could elaborate a bit on your collaborative work with Steven Norton.

Fernandez: Sure. He's a geochemist in Earth Science and the Climate Change Institute. I'm a soil scientist. So, early on, particularly at one of the paired-watershed research sites that we have, we began to collaborate. I was the soils person; he was the geochemistry person. And that was productive, enjoyable...that project still exists. And from there we continued to collaborate on a number of different projects. We still do today, since I don't really recognize his formal retirement. We still enjoy doing science together. Yeah, so, like most collaborations in this university... it's a small university... one of the advantages I always say to new faculty is we're not an institution that has lots of administrative walls. So, you work with pretty much whoever you want to work with, as long as it makes sense scientifically as well as the standpoint of people chemistry, so that you're having fun and it's productive. And Steve certainly is one of those people for me. I enjoyed working together on a number of different projects for a long time.

Cilli: Have you participated in collaborative research with any of the other members of the Institute?

Fernandez: Yes. Well, right now I'm one of the co-PIs on the abrupt climate change IGERT that we have in the Institute, for primarily training PhD students in that area. So, Jasmine Saros and Paul Mayewski, and Brian Olsen... a whole bunch of people associated with that. Outside of that, as far as formal research grants, it's mostly been Steve Norton. I've done a lot of things that weren't formal research grants, with George Jacobson, with Paul Mayewski, and Jasmine Saros. My appointment has been and is still in multiple units. Some direct, some cooperating. So, I've been part of what now is the School of Food and Agriculture, but that's a new school as of six months ago. [someone knocks at Fernandez's door and the recording is paused]

O.K., so, where were we?

Cilli: Collaborative research with other members of the Institute.

Fernandez: Oh, I was just explaining that because I'm associated with some people dealing with environmental science and soils in the School of Food and Agriculture, my direct appointment is actually with the School of Forest Resources. I collaborate with people there, as well as with people at other institutions. So, it doesn't matter what unit they're in, or even who their formal employer is. It's a lot of fun to pull together people who are interested in working on a problem. We enjoy working with each other.

Cilli: How do you think soil science informs climate science and vice versa?

Fernandez: What I do is study how the ecosystem, and most of mine are forest ecosystems, so that means the trees, the understory, the soils, the microbes, the mammals, the stream water, lakes, groundwater. Any interacting atmosphere. How that system is working together biologically and chemically. And then how, whatever the vector of change is that is of interest, alters that system. And why we care, and how much we know about it. So, for climate change, the kinds of things that I do are getting at the question of, what's being altered in the system. If you include chemical and physical climate change, that means atmospheric pollutants, nitrogens, sulfur, as well as temperature, moisture, rainfall, and those sorts of things. And why do we care? It could affect the kinds of forest we have, the habitat that exists, what we produce from our forests by way of wood (we store carbon in our forests), the quality of water in forested landscapes, exchanges of CO₂ with the atmosphere. So, I'm not a modeler per se. I don't build the model, but I will use it. And the models are built on the climate data that I generate. A lot of what I've done in the Institute, to some extent, has been an extension of that science to policy. Because of my involvement in thinking about the issues of climate change from the standpoint of how ecosystems respond, that's eventually brought me to, in recent years, being more concerned about how that science is informing policy and management, and what we're doing about it. Are we using that science in an appropriate way? So, it's that kind of thinking that led us, a few years ago, to do a project on Maine's climate future, which was the state-level climate change assessment. In other words we got IPCC for the globe, and we've got national and regional, but Maine has its own characteristics, from the ecosystem level as well as from a human standpoint (economics, sociology, and history). So, how is climate change affecting Maine, 'cause that's what Maine people will be most motivated by. And so that's what that assessment did, and from that has been an effort to look increasingly at adaptation, as these changes are happening around us. How can we minimize the negative and maximize the positive? So I know the most about the ecosystem side from what I do with forests and soil/plant systems, but I'm also interested in

the broader initiatives on adaptation that cut across all the sectors, although I'm not an expert in marine and other areas as well. So that's kind of the breadth of how my science extends to both the classic primary science that we do at the ecosystem scale, as well as the outreach of that science to the public. And thus lots of my activities with the Climate Change Institute.

Cilli: So, you are hoping that your work informs public understandings of climate change and the effects of climate change?

Fernandez: Yup.

Cilli: It seems to me that there's no real debate within the scientific community about global warming and the human role in creating global warming. But outside the scientific community, in American political culture, it seems to be an issue very much still up for debate. Can you comment as to why you think that might be the case?

Fernandez: I probably would have a different job and be rich if I knew the answer to the question. But I think it's partly a function of our time, and where we are in our culture.... We live in an era where lots of information gets moved quick, attention spans are really short, that if there's two sides of an issue... they will get disproportionate attention based upon how many sides there are, not about the level of confidence in either side of that opinion. So, we hear a lot about the issue of uncertainty with climate change. Every time there is a change in what was predicted, every time we have a really cold winter. Every time it doesn't get as hot as it did last year, there's a very large amount of coverage in the media as well as institutes and components of society capitalizing on that to try to say that climate change is not happening. So, the public, who are really busy with their lives doing what they do, only have snippets of time to hear about this issue, and hear both sides, and feel ambivalent. And the pendulum swings, from the era of Al Gore's height a few years ago, to politically the Tea Party Era (probably is what it will be referred to) that changed some of the momentum. And if you're not in this arena and you're looking to the news for coverage of what's this issue about, you're going to feel like it's all over the place, and you're not really sure where the truth lies. And we're all like that with lots of issues. I'm like that as I try to figure out what's going on with the finances of America. So, I think climate change is no different in that regard, from the standpoint of why the public seems ambivalent. You're right, there's, scientifically, some aspects that are debated [in public] there's no debate. Some aspects that are debated, there's small debate... But the vast majority of people in the sciences are in agreement that we altered the climate system of the planet. And one of the areas that I think a lot about and talk a lot about is adaptation, which is, what do we do about it. And we're in an era now where if I talked about it five years ago people would say, what do we do about it and when's it going to happen? Now, people are saying, "oh, we see these changes." Some are asking, "is that climate change?" And others don't care, but they know that change is happening. And that's probably what I'm most motivated by, is that these changes are real: sea level is rising, we have a longer growing season, rainstorms are more intense. So... I avoid saying global warming, 'cause it's not just the warming. And in a lot of cases it's not the warming at all that's the most important factor. It's these other changes that are taking place. Less snow melt, less snow coverage. Some of them are bad only because we're not prepared to adjust fast enough. Some of them are bad 'cause they're bad. So, when you had hurricane Sandy on the New Jersey coastline, there's nothing good about that. When you say it's going to be warmer in Connecticut and you say, "Oh, my goodness. The world's going to go to heck in a handbasket." Well, they're pretty happy in Connecticut; they have a vibrant agriculture. So, it's not that it's going to change. It's just, are we prepared for that change. Sure, there will be ecosystems. Sure, humans will survive it. But we feel like, particularly in

the economic hard times we're in, we feel like we live on the margin. We're on an economic slump, there's lots more disparity in the distribution of wealth in our country. And so how we can afford to accommodate is a really big question. I'm motivated to see more happen as far as adaptation, so we can be as smart as possible with the minimum cost and the most advantage. And in some cases there are new opportunities. If you can grow peaches in Maine, that's new. Maybe we can. Maybe we can develop a market there when we have a longer growing season. So, the issue of climate change is a broad one, and it encompasses in the public mind, the political argument that goes on about mitigation, about the release of greenhouse gases, primarily from energy production, and whether that's a cause of climate change. And the average person is saying, understandably, that "gosh, if I'm spending a lot more money on energy because I've got to use less of this fossil fuel stuff, that's going to kill us, as far as our budget goes. And I think there's some doubt, from what I hear, so why would I want to do that?" I think that's where a lot of the public is, understandably, because that's what they are exposed to. The doubt that we're causing it is pretty small, and the reality that we're dealing with now is here, and we're already spending, whether its crop failure, or Hurricane Sandy, and sea level rise. So, I'm more interested in whether we can be smarter about coordinating adaptation, so that we can be protected from surprises, as well as be able to adapt in the most economically and socially acceptable manner. And that works best by being anticipatory, rather than just waiting around for bad things to happen and then respond. So that issue is not part of the dialogue we hear every day about the climate change issue.

Cilli: What efforts do you think the Climate Change Institute has made at educating the public about climate change?

Fernandez: Well, a lot. I think everyone in the Institute that I know of has been involved in one way or another in educating the public on a number of different levels, from talking with federal and state legislators, providing testimony, giving public talks, working with teachers and students K-12, doing interviews, providing information about what climate change is, as well as some key information about the rates of change taking place. The Institute has some of the world's experts in what's happening with ice melt in Greenland and Antarctica, and so there's a general level of expertise across the entire Institute that contributes on these various levels, as well as some globally-unique experts that are informing policy in the public on the issue of climate change, what's happening now, and what we can expect in the future.

Cilli: You've been involved in the Institute in one way or another for a while. You were an outsider for a while, at least formally, but now you're a member. Over the years, how have you seen the Institute change?

Fernandez: I think the Institute's been known as a world-class group of scientists, primarily earth scientists that deal with the impacts of glaciation on our landscape and the interaction between climate and glacial cycles, and geomorphology, and geology. That's what I knew them best as many years ago, and Dr. Borns started the Institute and it grew from there. Its focus on Quaternary grew to encompass anthropology, archeology, paleoecology, as new components.... And that process pretty much continues into the present, and I'm an example of a continuation of that, a sort of modern time ecosystem (ecologists, soil scientists, geochemists), dealing with atmosphere-landscape interactions. So that's my perspective of the short arc of where it started and how it's grown. It didn't migrate from its original base; and in many ways I think it's core expertise is similar to what it's always been: earth sciences (deep time as its fundamental underpinning, as what it's best known for). But based on that

central strength, it now is a much larger Institution, with various people contributing new disciplines and everything from science, to outreach, to social science.

Cilli: You had said that earth sciences is essentially the core of the Institute, although it bills itself as an interdisciplinary institute. How important do you think that is? Do you think that the glaciologists are basically working with each other, or do you see much collaboration between disciplines?

Fernandez: Oh, I think there's a lot of collaboration between disciplines. The Institute, by its nature, is a collection of people that are appointed elsewhere as well as the Institute. So, you've got me in forestry, several faculty members in biology, earth sciences; so by its nature it really is interdisciplinary. And also by its nature there is lots of collaboration. A lot of us have shared interests, and interactions at various events. I believe we have another one this afternoon, as soon as we're done here, where the Institute gets together and everyone's going to do one slide in 60 seconds, to say what they do so that new member, students as well as faculty, get an initial sense of what everyone's about, and we all have time to interact and talk about mutual interests. And that's how those collaborations grow. And at the other end of the academic year there's the annual Borns Symposium, named after professor Borns, where everyone gives a little more lengthy scientific papers. And that goes on for two days. So, there's lots of those kinds of opportunities and events that takes place within the Institute that provides a great platform for collaborations, getting to know each other. And almost everyone in the Institute is also very active in their scholarly efforts in collaborating with lots of other people, so the network grows quite easily.

Cilli: What do you think has been the Institute's most important contribution to our understanding of climate?

Fernandez: I would not dare hazard a guess. The Institute has done a lot of amazing things to contribute to our understanding of the interactions between a climate system and our terrestrial environments. I think they're known for some critical work that comes from interpreting ice cores and interpreting the landscapes that are a product of glacial processes, to allow us to understand the history of our planet. And from that, also the work in anthropology and archeology has provided some really important information about how human civilizations over time have been influenced by climate. Paul's work is key in bring us an understanding of abrupt climate change. So, those are the kinds of areas that I think the Climate Change Institute stands out globally for... their level of expertise. But lots of people in the Institute are doing lots of cool things.

Cilli: What did you think when the name was changed from the Quaternary Institute to the Climate Change Institute? Did that seem to narrow the focus of the Institute?

Fernandez: Not for me. Now, I wasn't a part of it when it was the Quaternary Institute, so I only became part of it when it was the Climate Change Institute, and it probably led to that being more likely for me. I think of the Climate Change Institute name as being much broader than Quaternary Institute. That may be a function of being more familiar with the terminology, both in terms of the geologic period it refers to and what many of us scientists do. Anyway, I thought of that being more earth sciences. I thought of Climate Change Institute as having a broader mission, and so given the era we live in, relative climate change itself, I thought it was a great new title and better matched the need and the mission of the Institute.

Cilli: So, building off of an earlier question, in your own work, what would you point to as the contribution you've made that you're most proud of?

Fernandez: It would be a little bit hard to differentiate between two of them, and I'm not sure where either of them end up. For my day job, for the biogeochemistry work that I do, it's undoubtedly what we learn by doing whole ecosystem, system-level research. So, a lot of my research has been focused on a handful of studies that ranged everywhere from five years to twenty-five years, where we did a lot of research on a particular site, studied all facets of ecosystem function (including soils). And what we learn is that what we find out in the first year and what we find out inside of a three-year grant, is often quite different from what we know when we studied a system over decades. And lots of the questions we were asking, lots of the questions the public and Congress asks of science, is not what's going to happen in the short period, but what's going to happen in the long-term, if we control climate change. And so there's a lot of examples of us not have answers to those questions. So, in a general way I think some of the research we've done, that has demonstrated the importance of understanding ecosystem processes over longer time scales, rather than just a couple of years, is probably the most important contribution, in its refining our thinking about how we should use science and develop policy. The other area I'm proud of is during my recent Institute years with the climate change assessment, and how that has driven state-level initiatives on adaptation. Because of winds of politics in Augusta and a change in administration, that formally was dropped. But I continue to participate, on behalf of the Institute and our university, in trying to move that forward. And I think we will see that at the federal and state level into the future. So, that climate assessment gave us a framework to move forward, and as we go forward the small ways that I can contribute to that adaptation effort are really important. You get to a certain point where, I can spend a little more of my time doing that. And if I publish one or two more papers, I'm probably not going to change the course of history, but if we don't change our society to address some of the concerns relative to climate change, I think we're in trouble. I have children, I have grandchildren, and so I think the most important thing I can do now is do something that moves us in the right direction.

Cilli: Well, that's all the questions I have, but before I conclude the interview I do want to give you an opportunity to add something that I didn't think to ask you about.

Fernandez: I think you've done a wonderful job guiding our discussion here. It was pretty open-ended, so you let me ramble on. And so I really got to many of the things I would want to share. I think we have a challenge as an institute... is how do you fund the scientific enterprise to continue to do the good things that it's doing (and I would argue for the Institute the great things it's doing) as well as focusing on addressing some of the problems that are before us in a more meaningful way? There's a lot of expertise and a lot of knowledge that exists in a place like the Climate Change Institute. And on one hand we need that, the continual production of that. So we need places like the Climate Change Institute, and the really accomplished scientists that are in the Climate Change Institute; on the other hand we know way more than we need to do a better job providing for the future of our country and our neighborhoods and our planet. So, the one thing I would add to everything we just said is that our challenge is to figure out how to distribute our energies and our expertise to do both the bigger basic science mission as well as make a difference. And I say that, partly because I've been around for a while so I'm obviously not at the beginning of my career (and you think differently at the end of your career), but partly because I think some of these issues are demanding attention like no other time prior to this. And so I'm hopeful that we can make a better connection with our science, and participate in implementing adaptation as well as mitigation for climate change.

Cilli: Alright. Well, thank you once again for participating in this interview.

Fernandez: You bet. Our battery lasted? [referring to the recording device]

Cilli: Our battery lasted.

Fernandez: [laughs]