

Narrator: Alice Kelley

Interviewer: Adam Lee Cilli

Transcriber: Adam Lee Cilli

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ABSTRACT: This interview took place in Alice Kelley's office in the Bryand Global Sciences Center at the University of Maine in Orono. In the beginning of the interview, Kelley discussed how she became interested in geology and archeology. Later, she talked about the research she undertook for her doctoral dissertation and reflected on the interdisciplinary character of the Institute. In the final third of the interview, she shared her views on a number of topics, including how the Institute has evolved since she first became involved with it, the so-called climate change debate, and the Institute's relationship with the broader community.

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

Cilli: Okay. Today is August 26, 2013, and I am here at Alice Kelley's office to interview her and find out about her experiences with the Climate Change Institute. Just to get us started off, I'm wondering if you can tell me a little bit about how you got involved in...it's a blend of archeology and geology.

Kelley: Right. It goes back to the mid-1980s, when I came here with my husband to Orono. And I was working as a consulting geologist in the area, and his link was being based here as part of the Maine Geological Survey. And so I got to tag along on some of the field trips. I met David Sanger, who is now a retired faculty member here and we started talking about geology and archeology, and I had a long-term interest in geology. And we were at a site as part of a field trip, showed me some artifacts, talked about the archeology of the area; and I was hooked. That was it. And I became very interested in the archeology of this part of the world, and one thing led to another and I found myself in an individualized PhD program.

Cilli: What was the name of the site?

Kelley: Oh, the site that we were at was Machiasport; it's on the coast in Washington County. It's an eroding shell midden.

Cilli: And some of the artifacts he showed you were from aborigines from the Holocene Period?

Kelley: It was from about 4,000 years ago, so mid-Holocene. It was what archeologists in this part of the world refer to as the Ceramic Period: late-Archaic to early Ceramic period, so between four and three thousand years.

Cilli: So, you would trace your interest in interdisciplinary work back to that moment?

Kelley: Yeah, I would say that's when it all really came together.

Cilli: What about geology itself? Was that something that you were fascinated with from an early age?

Kelley: Well, I think that went along with the archeology, but I've been interested in geology since a 9th grade earth science class; and my real interest was in how landscapes formed. I like to hike; I like to camp. I was outside from an early age; my parents liked to hike and camp. And so, suddenly realizing that the landscapes that you could see had a geological beginning and an evolution... my 9th grade teacher was very good at explaining that, and so that's where the geology part came in. So I followed that right into undergraduate school and my masters as well.

Cilli: Where did you go for your undergraduate?

Kelley: My undergraduate work was at Westchester State University in Pennsylvania. It was a bachelor's of science in earth science education. Followed by a master's in geology at Lehigh University in Bethlehem, Pennsylvania.

Cilli: And then you did your PhD here at the University of Maine?

Kelley: I did. There was a bit of an academic hiatus. I worked for Bethlehem Steel while I was working on my masters, and then I worked for Chevron, as offshore research for oil and gas, for three years in New Orleans. And then came here, worked a bit as a private consultant, and then started my PhD program—which was the long-term PhD, with kids and jobs and stuff. So, I graduated in 2006.

Cilli: What kind of work did you do with Bethlehem Steel?

Kelley: I was a exploration geologist, so looking for metals, iron ore, lead/silver/zinc deposits in Mexico. Iron ore was primarily in Pennsylvania. And then coal in the Appalachians.

Cilli: And you say you've been living in the Orono area since the mid-80s?

Kelley: The early 80s.

Cilli: So you've had an affiliation with the members of what was then the Quaternary Institute for some time.

Kelley: Oh, yes.

Cilli: Did you know others besides David Sanger?

Kelley: Oh, sure. Hal Borns (who was then to be on my committee), Dan Belnap (also on my PhD committee), George Jacobson, George Denton, Terry Hughes. The whole cast of characters. It was a smaller group. People tended to know each other. Even though I wasn't a member of the Institute, because Dr. Sanger was we often were drawn into the annual field trip, because our work was here in Maine. So we did fieldtrip stops a few times.

Cilli: Do you think your involvement with the Institute was different, being one of the few females affiliated with it? I understand there are perhaps three female faculty members now, or four. But when you were there did you think your experience was different in any way because you were a female?

Kelley: No. Student/professor relationship was one of...the difference in the beginning. There's a difference between graduate students and professors, some more than others. But generally no. In geology I have certainly encountered some differences, but not with that group.

Cilli: Could you maybe elaborate on some of the differences you encountered in geology?

Kelley: In business, working in quarries, working in mines, when I was doing this it was in the late-70s and the very early 80s. And particularly in mining it wasn't very common to have a woman geologist or a woman in charge of a project. And so, some people, and not all, but some men found that a little hard to swallow. Particularly a young female. But not huge. Not a problem. It's just one of the things you deal with.

Cilli: Shifting back, when you decided to earn a PhD with the Institute, what topic did you ultimately settle on for your dissertation.

Kelley: My dissertation topic was the archeological geology of the Penobscot River valley. So, I was looking at the geological development of the valley since deglaciation, combined with the settlement history of people in the area. Although we don't have a lot of information about those early inhabitants, we can make some inferences where things are found in other areas. So, looking at how people were changing location due to landscape, how landscapes evolved, and the human/landscape interaction.

Cilli: How would you say the Penobscot and the surrounding valley have changed in the last 5,000 years or so?

Kelley: In 5,000 years? The real big changes were earlier.

Cilli: Alright.

Kelley: Shall we go there?

Cilli: Let's do that.

Kelley: If you look at the deglacial history of this area, about twelve thousand years ago, where we are sitting right now was under probably 30 feet of water. And it was a full arctic sea, with wales and walruses, and everything you might expect if you were in Greenland. This is because as the land surface was depressed by the weight of the ice, the ocean followed the ice as the ice receded across the coast of Maine, and up into the major river valleys, like the Penobscot and the Kennebec. So as that ice disappeared from the area, the land surface began to rise (with the weight of the ice removed from that area). And so it began to rise, and so this area went from full marine conditions to estuary conditions, to the freshwater valley that you see today. So that there's been a real change along the coast of Maine, from this marine setting to a terrestrial setting. In the Penobscot valley, there's also a complication of, as that adjustment takes place, there may be a bulge of mantle material from deep within the earth, which is moving along because it's very viscous. And so not all the recovery from the removal of that ice takes place immediately. But we have this bulge that can migrate, following the ice sheet. And in this area, in the headwaters of the Penobscot, was just enough to change the tilt of the landscape, so that Moosehead Lake (which in the early Holocene, ten thousand years ago, drained into the Penobscot) shifted as this bulge moved through and the northern end of the lake moved up. And

the Kennebec became the outlet for Moosehead. It changed that river from a smaller river to the large river that it is today. That was part of my work... so, there have been profound changes here, from marine to freshwater, changing draining patterns. And then the sorts of changes that you see with vegetation changes, with streams and open lakes becoming wetlands. Very productive wetlands that people wanted to live next to... and you wouldn't think much about a group of people wanting to live there at all. So, profound changes.

Cilli: And so, what were some of the human connections that you related to that?

Kelley: The human connections would be how people early on were moving through the landscape, thinking that waterways, if not using boats, were probably an easy way to move. To follow a river into an area. Also, these changes that we saw, from large lakes to then productive wetland, then to less productive peat bog. Seeing people moving into an area, using an area, and then sites being abandoned and focus going to other areas. Looking at places where changes in river flow and tidal circulation in the ocean would bring fish. So the linkage, it's not just a people and landscape; it's people and resources associated with that landscape.

Cilli: How do you see your work fitting in with the overall goals and aims of the Climate Change Institute?

Kelley: That work which I did in Maine, and current work that I'm doing in Peru with Dan Sandweiss, that is looking at past climate changes. Looking at the drivers of climate change, which my side of it, again, is looking at landscapes and looking at how people in societies have responded to past climate change, which gives us some information on how we may respond to continuing climate change. I think another really important part of the group is the interdisciplinarity aspect. I work with archeologists, geologists, climate specialists (looking at ice core records for information on how climate has changed), palynologists, a whole range of people who each have a particular technique or skill to bear on a problem. And we use all of that information to look at a big picture, and when you grow up academically in a situation like I did here with my PhD, you take that for granted, that you're going to work with various people. And if you don't know you'll just find somebody who can help you fill in one particular piece of the puzzle. It's not like that at a lot of other places; we have something really special here, with this group that works together. That's probably one of the strongest things, and one of the best outcomes, of the Institute approach of having many people from different backgrounds working together to address various issues.

Cilli: What would you say has been the Climate Change Institute's greatest contribution to our understanding of climate change?

Kelley: That's a tough one. It's hard to single out one. I think really understanding past climate change; putting a great deal of effort into understanding the timing and processes of past climate change, which has then led to an understanding of the triggers of climate change. Climate, and many of the landscape-related factors of climate change, happen very much in a threshold situation, where things are constant, nothing is changing, until some factor is exceeded. And then we get a flood or a weather patten change or something happens as a result of this building seemingly equilibrium situation, which then exceeds a threshold. [The Institute] has worked very broadly on timing of the onset of glaciations and terminations, and has made some contributions in that. In the archeological side, it's looking at the linkage between humans and

climate, and humans and landscapes. That archeology is not just material culture; there's a whole environmental aspect in that area. And then understanding the world's great ice sheets, from Antarctica to Greenland and the ones that are no longer here. So, on many fronts: great. But through all of it the interdisciplinarity comes out, as a group that really wants to work together.

Cilli: Since you first got involved in the Institute in the early 80s, how has it changed?

Kelley: Changed in perhaps size and scope. It was a much smaller group; all at the University of Maine, or virtually all at the University of Maine. Now it's much broader. We have colleagues from institutions all over the world. As the science has grown and we see more climate change-related impacts over a broader number of fields. We brought in more disciplines. So I think we've gone from a focus on Quaternary and much of the past, into including that past and looking toward the present. And the future. So that would be the scope change; and the size of the Institute, the number of people involved.

Cilli: Has the increasing number of members of the Institute... has that made it difficult to maintain a certain level of cohesion?

Kelley: That's a leading question. [laughs] Anytime you bring more people to a group it presents challenges. Just simply conveying information, trying to know many more people. I think there are certainly some challenges of wanting to make sure that everyone knows what everyone else is doing...how we could work together more profitably. We've come a long way in using the Borns Symposium as a vehicle to do that. But, yeah, I can't know everyone as well when we have so many members as when, perhaps, the group was smaller. But we've brought in more expertise, broadened horizons, so anytime something changes there are new challenges.

Cilli: There are a number of different disciplines involved in the Institute. Has it been more difficult for the archeologists in the Institute to collaborate with their colleagues, simply because, for example, some of the climatologists, who collect ice cores, are going back, sometimes, a 100,000 years. Whereas archeologists tend to deal with artifacts going back, maybe 10,000 years.

Kelley: I think it would be to look at places of intersection of ideas and expertise. I'm not conversant on atmospheric chemistry changes a 100,000 years ago, simply because that's not my time frame. But in looking at how that record is developed, certainly can be instructive for looking at past and future changes. There is certainly direct application in the parts of the ice cores that overlap with time periods that I'm interested in...changing weather patterns. I'm working on a project in the Shetland Islands looking at sand inundation of coastal farmland. There's always been a view that there's a link between little ice age storminess. But what is it about the storminess that makes this happen? Why just then? Are they older? So if I wanted to know something about conditions in the far northern hemisphere, the Greenland Ice Cap is a really nice repository of records. And I can't really interpret that data on my own. But yet I have someone in the building next door who can, because of his long experience with ice cores. That particular segment is easy for him to interpret. So, I think, yeah, we look at a smaller time frame than they do. Geologists look at 4.6 billion years of time, versus the time of our Holocene interests, so it just is an overlap. Is it good? Is it bad? It just depends on where the emphasis is.

Cilli: Can you think of specific examples, where other researchers involved in the Institute contribute to your own research or vice versa?

Kelley: Constantly. I don't think I could do what I do without working with other colleagues in the Institute. I've worked closely with David Sanger for a very long time. He's retired in name only. We still collaborate. So, that's a nice continuation. Dan Sandweiss and I work closely together. But we also work with people who do... ice cores. Work in Peru ties closely to El Nino events, so there talking to oceanographers helps, and we have oceanographers in our group. And looking at issues of sea level change. We have colleagues who specialize in sea level change. We've used palynology as a dating tool and also as a way to understand changing environments. So, I wouldn't be nearly as successful at doing what I do without all of these other folks to help.

Cilli: In today's political climate, outside the scientific community, climate change is still up for debate. Do you have any views on why that might be the case?

Kelley: One is protection of self-interest. Being afraid of change. Not seeing something as being immediate tangible. Overall distrust of science. I think all of these things go in. If I don't understand it, it's just easier not to go there. And I think the current political situation, which casts things in very partisan light, so you're either on one side or the other, and your mind is made up depending on which group you want to be a part of. I've talked to colleagues who work at Texas, and they said you don't talk about climate change if you work in the oil industry, even if you work in the oil industry. It's just bad business. I think there are a lot of factors that go into it. But it's a real problem for the country and the globe. Cause it's there.

Cilli: What does the Climate Change Institute do to try to insert itself in that debate?

Kelley: I think we've become a bit more proactive than we have in the past, but mostly through public education, websites, streaming talks, becoming involved in some of the climate issues. We had a forum (two years ago, I believe) which was about climate change in all sorts of different venues, not just what people would see as completely geological or atmospheric; but into music and the arts. So, it's education. Whether people want to listen or not is another story. But I think I'll be involved in planning for climate change in Maine, with a previous administration. Most, if not all the authors on that report were from the University of Maine and were from the Climate Change Institute. That's being shelved right now by the current administration, but it's there, and it's good work.

Cilli: That's all the questions I have, but before we conclude the interview I do want to give you a chance to, maybe, add something that I didn't think to ask you about.

Kelley: I think the Institute has grown. It's changed. I think those changes have been a result of changes in the understanding of climate and continuing interdisciplinarity of science. We don't work in our own pigeon-holes, and we haven't for a long time. And that was what this group was founded on, was the recognition that specialists working together can produce a more holistic approach to a variety of questions. Increasing numbers, as you pointed out earlier, can have some issues, but it also provides a lot of opportunities. And we've had a great impact, I think, through the work of individuals, and individuals working together on the science to the issue of climate change. And of educating the next generation of professionals, both in academia

and in the business world, in understanding the importance of other viewpoints, the importance of bringing in other disciplines in your work, and of course in the issue of climate change.

Cilli: Well, thank you once again.