A Natural History of the Pineywoods and the West Gulf Coastal Plain (Part 1): Leaving the Ice Age, With Jim Neal (Ep. 24)

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Nivien Saleh: What did the Pineywoods look like when early humans lived there?

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Nivien Saleh: I'm Nivien Saleh, with Houston and Nature.

Today we'll take a trip to the Pineywoods in Eastern Texas.

It will be a trip through time: We'll see what the area looked like when the most recent ice age began 2.6 million years ago, and we'll encounter the animals that roamed the region. We'll then observe the first humans who moved in, see how they lived and what marks they left on the land.

Our tour guide will be my friend Jim Neal. Jim has spent a lifetime smack in the middle of the Pineywoods, in the city of Nacogdoches; and he looks back at a long career in conservation, having worked for the Texas Water Quality Board, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Nature Conservancy, and Texas Parks and Wildlife.

For the last few years he's been doing research for a book on the ecology and natural history of the West Gulf Coastal Plain.

Which is it? West Gulf Coastal Plain or Piney Woods?

Now you may have noticed that I am using two different terms here: West Gulf Coastal Plain and Pineywoods. So let me tell you how they relate to each other.

Imagine yourself east of Houston in Louisiana. You are standing in the delta of the Mississippi, looking first east towards Georgia and then west along the Texas coast. That entire stretch of land from east to west is called the Gulf Coastal Plain. That stretch is broad, covering all of Louisiana from north to south.[1]

1 http://geology.teacherfriendlyguide.org/index.php/energy-sc/energy-region3-sc

Up until 70 million years ago, perhaps even longer,[2] that huge swath of land was covered by the waters of the Gulf of Mexico. Then the water pulled back – perhaps due to the ice age, which deposited lots of water in the form of snow on top of the continents rather than in the oceans. Or perhaps due to tectonic forces that lifted parts of the North American plate up.[3] Perhaps also due to the erosive power of glaciers north of us that deposited more and more sediment on the coast and thereby pushed it southwards.

Because all of this area was either underwater or shoreline, the Gulf Coastal Plain has a few rolling hills, but in general it's flat.

So imagine yourself in this flat landscape at the Mississippi River. As you gaze west into Texas and along its coast, you're seeing the West Gulf Coastal Plain. At times that stretch of land is very broad. As I mentioned, it covers all of Louisiana from North to South. In East Texas it goes all the way north to the Texas-Arkansas border. Moving west from there it follows the Balcones Escarpment, which is a big fault line that runs from Dallas to San Antonio like a big S. and separates the Hill Country north of the S from the West Gulf Coastal Plain south and east of the S.[4]

Inside the West Gulf Coastal Plain lies the Pineywoods. Its Eastern border is the state border with Louisiana, and its southern border is roughly Interstate Highway number 10. Cause south of I-10 there's really not much forest to be found.

In our conversation Jim Neal will sometimes speak of the West Gulf Coastal Plain and sometimes of the Pineywoods. And that makes sense: The Pineywoods is a political-administrative region of Texas. But the West Gulf Coastal Plain is an ecological region that has nothing to do with political boundaries. As you know, neither plants nor animals feel bound by state borders, and to an ecologist like Jim Neal, state borders only matter to the extent that they define human responses to the ecological area.

Okay. Now that you are properly situated, let's see how Jim Neal characterizes the Pineywoods.

The Pineywoods is just north of I-10

2 http://geology.teacherfriendlyguide.org/index.php/geohist-sc/geohist-cenozoic-sc. See Figure 1.15

3 https://encyclopediaofarkansas.net/entries/west-gulf-coastal-plain-443/

4 https://en.wikipedia.org/wiki/Balcones_Fault

Jim Neal: The Pineywoods is a designation that people in Texas use for this portion of the state.

It's not that there are just pine trees here - far from it. But it does have pine trees. And once you go to the west, say around Crockett or just north up to Tyler, you drop out of the pines. You're now in the oak prairies, the Post Oak Savannah.

Nivien Saleh: How, when leaving Houston, do you know that you are now in the Pineywoods? Is it the pine trees?

Jim Neal: I'll tell you a little interesting rule of thumb. When you're coming up into the Pineywoods from the coast, from west of Houston all the way to Lake Charles and almost to Lafayette, the West Gulf Coastal Plain, the Pineywoods are just north of I-10.

Out of Houston, once you start to hit the pine trees, then you're in the Pineywoods or the West Gulf Coastal Plain.

The West Gulf Coastal Plain is home to Caddo Lake, a mighty cypress swamp

Nivien Saleh: As another rule of thumb, you can say that the Pineywoods has a very high level of precipitation. We in Houston are used to lots of rain, but in the Pineywoods, which is farther east, you have even more because in Texas, the precipitation patterns go from east to west with the east having lots of rain and the west having little rain, right?

It's very forested with pine trees but also with other trees. And it is home to the only natural Texas lake. Tell me about that.

Jim Neal: That's Caddo Lake, which is up in Northeast Texas. It's part of the Cypress River basin, which then drains into the Red River in Louisiana. Caddo Lake was formed by a huge logjam on the Red River that extended for hundreds of miles. For those of you who are familiar with Louisiana, it extended from the present City of Natchitoches all the way up past Shreveport and backed up waters into Arkansas and even Oklahoma.

Caddo was one of six or so lakes that were formed as a result of that huge logjam. Most of the lakes are no longer in existence. Caddo is. Once the logjam was destroyed in the 1870s by the Corps of Engineers, the lake started dewatering. But in 1914, a weir was put in that established a lake that was about four foot shallower than it was in its original extent. But it still mirrors what was Caddo Lake. And the natural environment is similar to what it was.

Nivien Saleh: When you say " logjam", we're simply talking about lots and lots of trees that by themselves fell. So it's not like they were felled. They just fell, and they were washed out.

Jim Neal: Yeah. It seems to have been a natural event. A lot of the Red River is really sandy soils. There may have been a constriction at some point, and logs just started building up. It may have been purely accidental.

Some perturbation may have caused the trees to start sloughing off the banks. This logjam was hundreds of miles in length. It was huge. It was so solid that people described horses as walking over the logjam.

Nivien Saleh: Are you serious? Wow.

Jim Neal: Yeah, it's an interesting story. um, And Caddo is still a remarkable, very beautiful place. It's the largest cypress swamp that we have in the state and one of the largest swamps in the Southeast.

Nivien Saleh: I've never seen it. But I've seen pictures, and it seems to be very enchanted, like an enchanted lake.

Jim Neal: It is, and it's a lake of four seasons, too, because it's full of cypress. Cypress is a deciduous tree. It's a conifer. But unlike pines it does shed its leaves.

So in the fall you get this beautiful yellow, when the cypress start turning. So it can be quite different in the four seasons. It's a wonderful place to be.

Nivien Saleh: So you want to see it once every season.

Jim Neal: Yes.

The Shortleaf Pine, an upland species of the West Gulf Coastal Plain

Nivien Saleh: The region is called Pineywoods because three specific pines grow there, the shortleaf pine, the longleaf pine, and the loblolly pine. And they are fairly different from each other.

Jim Neal: Yes. Our native pines are shortleaf, longleaf and loblolly.

Nivien Saleh: The shortleaf pine, I found out, gets 70 to 100 feet tall. It's got a broad and open crown. So if you were to look from the sky, it would seem a little depressed and almost a little flat-ish at the top, but it's quite open. And the needles are, as the name suggests, short, just between two and a half and four and a half inches long.

Jim Neal: Right. And it's found more commonly in the western portions and northwestern portions of the Pineywoods. It's really not a wetland bottomland species at all. It's more of an upland species, on the drier sites.

It's scattered in a lot of places of the Pineywoods, but it's most commonly found to the west.

The Longleaf Pine, fire-resistant but slow-growing

Nivien Saleh: And then we have the longleaf pine, and that is just a tad taller than the shortleaf pine. But its crown is quite different, very open and irregular. So I imagine that if you have stuff growing on the floor, it would get a lot more light than these same plants would get if they grew next to a shortleaf pine, because there's so much more light that comes through.

Jim Neal: Yeah. And there are some commonalities with those two pines. In their native state they both were mostly in savannah situations: widely spaced, trees with openings in between 'em.

They're both fire tolerant. They respond to fire in slightly different ways. But their natural state tended to be more open communities.

Nivien Saleh: Fire and savannah go hand in hand because when a fire comes through, it burns the trees that cannot take fire and takes them out. The grass comes back after the fire, but the trees that are not fire tolerant will not come.

So what you get after fires is a lot of grass. But then you also get here and there, the longleaf or the shortleaf pines, which is why you would call that savannah, right?

Jim Neal: And longleafs grow in a number of different areas. They can grow in slightly wetter sites than shortleafs, although they will grow on sand hills as well. So they're a little more adaptable than shortleaf, and they're more common in the extreme eastern portions and especially the southeastern portions of the Pineywoods. Much north of Nacogdoches you don't have longleafs at all. So it's a much more restricted range. And for a long time, longleafs were not a favored commercial tree species.

So the total acreage of longleafs has really diminished over the years.

Nivien Saleh: Hmm. Tell me why, were longleaf pines not favored as a commercial timber species?

Jim Neal: It was slightly slower growing.

Nivien Saleh: That makes sense. Thank you for explaining. You know, I can tell you that I have never seen a longleaf pine for real, because they have needles that are 10 to 15 inches long. These are needles that are enormous. They are longer than a foot-long Subway sandwich. . And I would have remembered if I had seen a tree with needles that

Jim Neal: And the cones are the same way too. They're huge cones. The longleaf cones are spectacular in size - much, much larger than any of the other pines.

I grew up in a small East Texas town named Pineland. And one of my favorite memories was going to a small roadside park called Pine Park that had old-growth longleafs in it.

And just going there and marveling at the huge cones and these spectacular trees. The longleafs were the major pine tree species that had red-cockaded woodpeckers in them.

Nivien Saleh: Those are so rare now.

Jim Neal: Yes they are.

Nivien Saleh: The longleafs are cool for another reason. Because of the way they grow. As you pointed out, they are pyrophytes, they can take fire.

So the longleaf seeds that fall on leaf litter stay dormant. But when fire burns the leaf, the seeds hit bare ground, and that's when they sprout. And then here comes the thing. So the seedlings look like tufts of grass. So I guess they are a foot tall ...

Jim Neal: They do. Yeah.

Nivien Saleh: ... or maybe two feet tall.

Jim Neal: Yeah. Two to three feet, something like that. That's called the grass stage of the tree. And it's very slow growing up to that point. It's putting down a lot of root system and not devoting a whole lot of effort to the above-ground portion.

That grass stage gives them protection from fire.

Nivien Saleh: While they're in this grass stage, which takes 12 years, they grow tap roots, and these tap roots are up to 12 feet deep. So there we have this tuft of grass , but it's got this 12 foot tap root. And then once the tap root is there, they shoot up.

Maybe I'm a nerd, but I find that very cool.

The loblolly pine – a commercial species in bottomland wetlands

Jim Neal: Yeah. And I'll say a little bit about loblollies. In the dictionary, if you look up loblolly, it's a muddy flat. Loblollies extend into the highest portions of bottomland wetlands. Of the rivers. They'll be in the very highest portions of the bottomlands. That's where their place in the landscape was before we started mixing trees and putting them everywhere. You'll walk in the river bottoms and then come into these little hills - it's a tiny hill, just a small rise in the ground that will support these huge loblollies.

They're unique in their own right.

Nivien Saleh: Yeah. And just like the longleaf pine, it gets 80 to a hundred feet tall, but unlike the other two pine trees, it has a rounded crown, which to me looks more like a Christmas tree.

It's pointy at the top, and then it becomes wider towards lower levels. So it's a little bit triangular.

Jim Neal: Yeah.

Nivien Saleh: which the other ones aren't. And its needles are in between the shortleaf pine and the longleaf pine, five to nine inches long. The loblolly pine grows rapidly, which is why the, the timber industry likes it, but it is not able to withstand wildfires, which is why in the past, it used to be outcompeted in certain areas by the other two pine species, but now it no longer is.

And I think it also doesn't have a tap root, like the longleaf pine, right. I mean, if it grows near river bottoms, it doesn't have to have a tap root. So it's easier felled by wind.

Jim Neal: Yeah.

Squirrels could run from New York to the Pineywoods

Nivien Saleh: So there we have the three main pine species of the Pineywoods, understanding that there're also hardwoods that thrive in the area. In the book "The Natural History of Texas", I read that the Pineywoods represent the westernmost extension of the Eastern deciduous forest, a vast woodland once covering essentially all of the Eastern United States.

Tell me more about that Eastern deciduous forest and the role of the Pineywoods in it.

Jim Neal: Don't take this as gospel, but somebody wrote once that a squirrel could have run across the treetops all the way from the Atlantic coast to the plains of Texas with a continuous forest. That's not literally true, but it was an extensive, extensive forest, yeah, that extended all away from the east coast and areas in the Northeast all the way out to the Plains.

Very extensive. Mostly deciduous. There's spots within it. The Pineywoods are within it. So the Eastern deciduous forest was not completely composed of hardwoods, but very much hardwood-dominated through most of the area.

Nivien Saleh: I just imagine that squirrel running all the way from New York to Texas. That's very cool.

In your book, you state that the biological communities that we see in the Pineywoods today are the results of a long process.

And you say that to understand this process, it makes sense to start in the Pleistocene. Please explain the Pleistocene.

During the Pleistocene, lots of climatic change in the West Gulf Coastal Plain

Jim Neal: The Pleistocene began about 3 million years ago with a whole series of perturbations. It was associated with periods of glaciation, with ice buildup and then periods of warming beginning about 3 million years ago with the first glaciation period , and ending 13,000 years ago with the end of the huge glaciers that we had.

Nivien Saleh: So it's the period from 3 million years ago to about 13,000 years ago.

Jim Neal: Correct. And that nearly 3 million year period did a lot to shape the biota of the West Gulf Coastal Plane and the Pineywoods.

Most people probably know that the glaciers did not get down to Texas at all.

But even though the ice didn't get down to us, the climate was very different. It was much cooler for most of the Pleistocene.

That did have a huge impact. And not in Texas, but at the edge of the West Gulf Coastal Plain up in Arkansas, we had spruce trees growing. It was a very different period. It was much cooler. At times it was much wetter, and at other times it was much drier.

The climatic changes that were going on in the Pleistocene had huge impacts on our vegetation communities.

Nivien Saleh: So the Pleistocene was a very, very disruptive age with a lot of change, which typically is a little hard for plants and animals because they have to adapt so much.

Jim Neal: Yeah. We're dealing with a lot of climate change these days. One thing to keep in mind is, yeah, we did have periods in the past where it got very warm, in fact warmer than it is right now. But what's happened here as a result of man, is that the climate change today is occurring at a much faster pace than it ever has in the past.

Animals and plants are not able to adapt as easily with a more rapid change in climate.

Nivien Saleh: Back then climate change may have been more strong, but it happened over a much slower time period.

When the Pleistocene began 3 million years ago, dinosaurs had been extinct for over 60 million years.

The West Gulf Coastal Plain was home to some giant creatures

Jim Neal: Yes. We had our own set of giant creatures that disappeared right around the end of the Pleistocene. North America and our area had both huge herbivores and some pretty scary carnivores that are no longer present.

In fact, several authors pointed out that before that fauna was wiped out, we probably had a much more spectacular group of savannah animals than current Africa has. Wouldn't it have

been wonderful to have seen that?

Nivien Saleh: Yes. In your manuscript, you mentioned mammoths.

Jim Neal: Yes.

Nivien Saleh: You mentioned mastodons

Jim Neal: Yes.

Nivien Saleh: Camels,.

Jim Neal: Camels, sloths. Giant sloths. Yes.

Nivien Saleh: Tapirs.

Jim Neal: Yes.

Nivien Saleh: Saber tooth tigers. And I still wonder how saber tooth tigers can eat anything with fangs that are constantly in their ways. But that's what we had.

Jim Neal: Yeah.

Nivien Saleh: We had an American lion, according to your manuscript and 15 species of horses, like 15 species.

Jim Neal: One of the reasons that all those species went extinct is probably a combination of man and climate change.

Mega fauna being, some people say, over a hundred pounds, some people say over a thousand pounds. But of that whole group the only one that remains today is the American bison.

Nivien Saleh: Yeah. I, I mean, you would say, oh, well we have horses, right? But the horses that we have nowadays were brought in from some other continent.

Jim Neal: Yeah. By the Spaniards. Yes. Yeah.

Nivien Saleh: So different from what was there in the Pleistocene. You say, "Oh, it would've been nice to see all these animals." I'm not sure I would have liked to see one up close,

honestly. I enjoy being the keystone species, I gotta admit.

Jim Neal: Yeah.

The North-American ice sheet never made it to the Pineywoods

Nivien Saleh: Very interesting time period. And overall a lot colder than it is now.

There was this big ice sheet, which I think is called "Laurentide ice sheet" that covered a lot of North America

Jim Neal: And almost all of Canada.

Nivien Saleh: Canada, and some at some points New York was entirely in ice, Boston and St. Louis, right?

Jim Neal: Right.

Nivien Saleh: All these big cities. You said it didn't come to Texas.

I looked up how far south the Laurentide ice sheet came, and it came to the 37th is it called parallel?

And that is just north of the Texas panhandle. That is the farthest it ever came south. So never in Texas.

Jim Neal: No,

Nivien Saleh: Sea levels were low, correct?

Jim Neal: Exactly. A lot of our water was tied up in ice.

At the end of the Pleistocene the Gulf of Mexico expanded

Nivien Saleh: Hmm. When the Pleistocene ended about 12,000 years ago, what did that mean for Texas?

Jim Neal: There was much more water available. We got much more flooding of our river bottoms. After the melting of the last ice sheet, we had a lot more water coming down into the river valleys.

Nivien Saleh: And with the water come particles, right? Like sediments.
That, that means it changed the soil.

Jim Neal: Yeah. Yeah. We had a lot more erosion taking place as a result of the waters coming down through the valleys. Our rivers are builders, and they're destroyers too. They deposit sediments. But they also erode them.

So it's a very dynamic system. Unless man's gotten involved, rivers, they're not straight, they're meandering systems.

They meander to accommodate slope until they get right down on the coast, which is flat. And then the ends of the rivers have got a straight shot. But they're these meandering systems that are soil on one bank and eroding it on the next bank. So it's a constant building and destroying.

Why did the megafauna disappear?

Nivien Saleh: Yeah. Yeah.

Correct me if I'm wrong, but it seems that the most fascinating consequences of the Pleistocene for the Pineywoods are there was a tremendous impact on the soil because of the erosive power of all that melt water that came down, but also the building power.

And then there was probably an impact on the megafauna. In your manuscript you said that the megafauna disappeared at the end of the Pleistocene, but we don't know exactly what killed the megafauna off, if it was overhunting or if it was climate change or perhaps even a swarm of comets.

Jim Neal: Yeah, we do not know that. Looks like it disappeared fairly rapidly. We've all seen nature documentaries and watched how elephants feed. Mammoths and mastodons were our elephants. And you can imagine with these huge herds of mammoths, mastodons, camels, all these horses and stuff, what happened when you had 'em, and then you no longer have 'em. There was a huge spurt of forest growth. Of course the climate's warming now, too. Keep that in mind. We had a cooling climate, now we got a warming climate. There was at least some period, when it wasn't super dry, that we had a huge flush of forest

growth when those creatures were no longer here. If we could transport back to the end of the Pleistocene, it certainly wouldn't look exactly the way it looks today. But a lot of the tree species that we have now would be old friends. We would know them.

Nivien Saleh: So we, we just went through a number of possibilities of why the mega- fauna might have become extinct at the end of the Pleistocene. One of the possible candidates that we listed was killing by humans. Somebody who listened attentively might wonder what killing by humans. There were no humans in the Pleistocene, or at least it wasn't mentioned.

How did humans come into the West Gulf Coastal Plain?

Nivien Saleh: So how did the humans come into the equation?

Jim Neal: Humans showed up right at the end of the Pleistocene. At least that's what most archeologists and paleontologists figure these days. Although that is rapidly evolving. And who knows what the end result of that may be. But most of our area probably did not have humans until the end of the Pleistocene, beginning of the Holocene.

Nivien Saleh: The theory I, as I understand it, is that because of the ice sheet that existed in the Pleistocene, there was a land bridge, the Bering land bridge from Eastern Russia to Western Alaska. And humans traveled over this land bridge . And then little by little, they wandered south.

And about 13 years ago, they showed up in Texas, right?

Jim Neal: Yeah. 13,000 years ago.

Nivien Saleh: 13,000!

Jim Neal: I don't pretend to be an archeologist or a paleontologist. But there's a lot of controversy about that now. And some people are maintaining that perhaps there were native Americans that arrived via watercraft. And there's some indication that there may be older records of humans in North America than the timing regarding the land bridge.

I don't want to get into a whole lot of that cause it is changing. At this point in time, we know that humans came from Asia. But wherever they came from, they got into our area around 13,000 years ago.
Just at the end of the Pleistocene. Of course, the climate was warming, so it was much easier to travel then without all these big ice sheets around. So it facilitated travel. And at least for

a time there were a lot of game species out there.

Nivien Saleh: Hm. And the first humans, I think you called them paleo-Indians, right? Those were the first group of people.

Jim Neal: Yes.

How did the Paleo-Indians live?

Nivien Saleh: I think you say that the timeframe of the paleo-Indians was 13,000 years ago to 11,000 years ago.

Is it correct to say that they were largely hunter gatherers?

Jim Neal: Yes.

Nivien Saleh: The animals that they would eat are mostly familiar to us, right?

Like deer, squirrels,

Jim Neal: Yeah. Bear. All those things that humans now eat. We don't really have bear at this point in time. I think we will in the future. But most of those things are things that we now have. And people hunt them and eat them.

Nivien Saleh: Yeah. And they didn't just eat animals. They also ate plants.

Jim Neal: Yep. A big portion of their proteins came from concoctions of native walnuts, hickory nuts pecans. They'd put them in pots and extract the fats.

The humans that were here very quickly learned what they needed to successfully survive in the wild. From remnants of some of their early sites, it was pretty clear that walnuts and hickory nuts were very important in their diet.

A number of researchers have shown that at some point in time, the native Americans then began to cultivate orchards. They found these species like persimmons, like pawpaws that were delicious. They were nutritious. And they planted them in orchards.

So they derived sustenance from both animals and plants.

Nivien Saleh: What were the preferred sites that these paleo-Indians chose?

Jim Neal: A lot of the settlement both then and later were focused on the river bottoms. That's where some of the best soils were. Those were mostly hunter gatherers, so there were not any long-term settlements. But even when people started building longer term settlements, they weren't stupid like some people are today that want to build in flood prone areas. They didn't do that. But they built near the river bottoms. So they had access and farmed on these natural levies which ... Some of the best soils were there.

So they quickly learned where the best places to grow things were.

Nivien Saleh: So they wouldn't have chosen the river because it's water there. It's because the soil was good and that led to good hunting opportunities, good foraging opportunities.

Jim Neal: They certainly used the water in the rivers. But they became cognizant of the flooding capabilities and were appreciative of that.

The Paleo-Indians turned into the archaic people

Nivien Saleh: And then 11,000 years ago, what we call the paleo-Indians turned into the archaic people or the archaic age. And it was 11,000 years ago to 3,000 years ago. So it was quite a long period of time of let's see, 8,000 years. How is the archaic period different from the Paleo-Indian period?

Jim Neal: They started to become a little more settled. One of the things that archeologists used to determine which group of aboriginal people were around were the tools that they constructed.

So there was a change in the projectile points, and there were other changes that went on there. They became a little more settled in their lifestyle.

That were some of the major changes at that point.

Nivien Saleh: You write that they started using clay pottery. And the reason why clay pottery is important is it's not very mobile, right? If you have clay pottery, you can't just move around and take it with you easily.

Jim Neal: Right, exactly. And it was important in that when these people started to become more settled, more home bodies, if you will, that they have some type of pottery to eat out of. And then they became more ceremonial. They developed more of a culture with

chieftains, shamans and other figures like that.

Nivien Saleh: Hmm. And in terms of food, did they eat pretty much the same thing that the people that came before them ate, the same kind of fruits and nuts and animals or ...?

The archaic people of the West Gulf Coastal Plain coped with a wildly varying climate

Jim Neal: They did, they did to a certain extent. But then they started to become farmers and started farming a variety of either native plants or eventually some cultivated plants. The three sisters, they called them: corn squash, and what am I forgetting?

Nivien Saleh: Beans.

Jim Neal: And beans. Yes. Yeah, the three sisters. So eventually they became more settled and more agricultural, although that didn't take off until the next iteration of native Americans came into being.

Nivien Saleh: Hmm. And I think you're right that during the time of the archaic people, the climate changed, and it warmed. And there was a point where the temperatures were even hotter than the ones we have today. But again, I think I should say that the warming that they experienced progressed over a much longer time than what we are having right now.

Jim Neal: It did. It took much longer to get to those kind of temperatures. And within that, it was not continuous though. We would have warming periods. It was just like the Pleistocene, although we never got glaciers or anything like that, but we had these climatic maximums where it got quite warm.

And then we had what they call little ice ages that lasted for three or 400 years. This would've been from about 1300 to about 1700 present era that there were some uh years that really there was no summer.

There was a lot of fluctuation. It required a lot of ingenuity on the part of these people to be able to survive in these rapidly changing conditions.

Nivien Saleh: A time without summer. That's hard to imagine. That is hard to imagine.

The Caddo had large settlements

Jim Neal: Yeah. Yeah.

Nivien Saleh: Okay. So archaic people, 11,000 to 3,000 years ago, they had pottery. They started to be settled on rivers and streams. And then came the Caddo culture, about which we know a lot more. The Caddo culture started in the year 800 of the common era.

And that culture, I think, ended in 1680, right?

Jim Neal: Yeah. 1680 is a convenient cutoff point because that's when the European man came into our area. Europeans first got into North America in the late 1400s but made early incursions into the West Gulf Coastal Plain, into Texas and to the coast and then through the West Gulf Coastal Plain in the early 1500s. But we really didn't have a whole lot of European settlement until 1680. That's the reason for the cutoff there.

Nivien Saleh: That makes perfect sense. Tell me what are the Caddo? Did they immigrate into the area or did they grow out of the archaic people?

Jim Neal: That's a good question. There was a lot of movement of different populations into and out of the areas, and there was evolution of these people, too. As they got to know the environment, as they became more adept at surviving in the environment and became more technologically proficient, they evolved.

There's a lot of things going on. The Caddos were part of the Mississippian culture. There was a huge development of the Mississippian people that doesn't relate to the State of Mississippi, but to the Mississippi Alluvial Valley. And we were an adjunct of that.

There were these huge settlements like Cahokia up in Illinois and Missouri, where they maybe had cities of like 15,000 people. Yeah. The cultures extended way up into the Midwest. They were not strictly Southern. There was a lot of development in the South, but it was not strictly Southern.

A lot of it was Midwestern, a great Cahokia civilization in Southern Illinois and Northern Missouri. Maybe there were as many as 15,000 people in some of those cities.

Nivien Saleh: That is amazing.

Jim Neal: Yeah.

Nivien Saleh: In order to sustain a city of 15,000, you have to have pretty good logistics, you know, infrastructure to bring in food and stuff.

The Caddo traded with the Southwestern cultures

Jim Neal: Yep. Yep. And a lot of these people in the Mississippian cultures started growing corn. So corn began to support bigger population numbers. And they became adept at trading amongst themselves and then began expanding farther and trading with the Southwestern cultures - the Pueblos and others.

Yeah, and they were exploiting everything. They were still eating a lot of native plants. We see more migratory waterfowl showing up in their diets, fish, but corn was also a key.

Nivien Saleh: That indicates that there was a connection to the Mexican native Americans. Right?

Jim Neal: That's right. And you see a lot of indications of that. A lot of things from the Mayans or the Aztec cultures of Mexico coming into this area. You get some influences from the Southwest. You get different kinds of minerals and metals coming in.

They're much more adept at trading.

Nivien Saleh: There were a whole bunch of Caddo groups. Did they all speak the same language or similar languages?

Jim Neal: I believe there are some that are considered to be Caddoan that really spoke quite different languages than the main group. Most of the West Gulf Coastal Plain was dominated by Caddoan peoples.

Now, as you get down to the coast, that changed. The Caddos did not go very far down on the coast. The tribes that were more important down there were the Atakapans and then farther down on the coast below Houston, the Karankawans.

Now we don't know as much about some of those people. But they were closer to the coast. And so they had more access to coastal resources than than the people farther in the Pineywoods did.

The Caddo produced exquisite pottery

Nivien Saleh: The Caddo in the Pineywoods and in the West Gulf Coastal Plain, you write, were creators of exquisite pottery. So I googled, you know, "pottery Caddo" cause I was curious, and wow, it really was beautiful. I mean, it's, it's a kind of beautiful where I think, "hmm. I would love to have this in my living room." So it's not just museum level interesting because it was advanced, but I find it aesthetically very pleasing.

Jim Neal: Oh yeah. Very much so. There's a number of present day Caddoan potters that have produced exquisite pots and sculptures. I'm just always wowed. I went to an exhibit a while back at the opera house here in Nacogdoches where a lot of the present-day traditional Caddo pottery was displayed, and it's just stunning.

Nivien Saleh: So I encourage everybody to take a look at Caddo pottery. You mentioned also that they adopted burial mounds , and I wonder what's so special about burial mounds. I mean, is it like interesting structures? Or are they just piles of dirt? Why are archeologists so fascinated by burial mounds?

Jim Neal: There's a lot of things going on. The more elaborate mound structures haven't been found in our area, but just slightly outside of our area.

If you go into Louisiana, just outside the West Gulf Coastal Plain at Poverty Point, they have these elaborate mound structures in the shape of serpents, and it's amazing some of the stuff that they have done. And there were a variety of things that they were used for. Some of it was ceremonial, religious. There's some indication that they would burn down a portion of a village and cover it in dirt - a ritualistic kind of situation. Why that was done, I don't know. I'm not aware of that. But there were a number of different things that occurred with that mound building.

Where in the West Gulf Coastal Plain can you find traces of the Caddo?

Nivien Saleh: I imagine that it has a special significance to you because you live in Nacogdoches, and there were what three mounds and a plaza found in Nacogdoches?

Jim Neal: Yes. And one of the Caddoan groups was called the "Nacogdoche". There was also a Natchitoches Caddoan tribe, which was centered in the Louisiana city of Natchitoches. So yeah, there was quite a group of Caddoan Indians in the Nacogdoches area.

Nivien Saleh: Hm. In human terms, we've covered quite a time span. We started out 13,000 years ago when the paleo-Indians arrived in Texas, then 11,000 years ago to 3,000 years ago, we looked at the archaic people.

And then from 800 years ago to 1680 of the common era was the Caddo culture. So we are talking about thousands of years in which humans were the keystone species in the Pineywoods.

Jim Neal: Yeah.

How did the Caddo shape the ecology of the Pineywoods?

Nivien Saleh: Keystone species means that they exerted a disproportional impact on the ecology relative to their number.

How have these native peoples shaped the land compared to what was there in the Pleistocene?

Jim Neal: It all started with them beginning to use fire - to drive game, to open up the habitat, to promote species that were useful to them.

Nivien Saleh: Hm. The megafauna did not discriminate between fire loving species and fire hating species. And that would allow oaks, for example, to thrive. But the native peoples would use fire, which privileged a vegetation that could adapt to fire. That tended to rule out oaks, but shortleaf and longleaf pines would thrive. And in the river bottoms where it's wet all the time, other plant species would also thrive. Correct?

Jim Neal: Yeah. And I want to be clear, there are a number of hardwood species that are adapted to fire, too.

Nivien Saleh: Oh,

Jim Neal: Some of the oaks - not all of them. But some of the oaks are more thicker barked. And a few of the hickories are more thicker barked and are more adapted to fire. Most of those are upland species. Sometimes the river bottoms would burn, but not commonly.

Nivien Saleh: Can you get into what the impact especially of the Caddo has been on the ecology of the Pineywoods area and the rest of the West Gulf Coastal Plain?

Jim Neal: They certainly manipulated the habitat. And sometimes besides using fire to open up the habitat they did take trees. But it was much more difficult to harvest some of these trees with the implements that were available.

They used them in construction of houses for themselves. So it was used, but yeah, there wasn't a whole bunch of clearing of the Eastern Deciduous Forest. There was some, but it was on a much smaller scale than what happened after European man came.

The Caddos and pretty much all of the native American peoples certainly modified the environment to fit their needs.

They didn't have iron plows or animals of burden. Fire was one of the best tools they had for opening up the forest for places of agriculture. They had orchards of wild bearing plants, fruit bearing plants that they intensely cultivated. And then they did cultivate the three sisters: squash, beans and corn. Of course they also used a lot of the game species. So there were all those kinds of things that native Americans did that impacted the local environment.

Nivien Saleh: And I think you also say that they girdled trees.

Jim Neal: They did.

Nivien Saleh: Girdling a tree is when you cut a band around the tree because the fluid supply of the tree occurs immediately under the bark. Right. So when you

Jim Neal: Yeah. The.

Nivien Saleh: that ring, then you essentially kill a tree. Correct?

Jim Neal: Yeah. When you disrupt the flow of nutrients and water, it kills trees. So yes, they did use girdling extensively.

Nivien Saleh: Hmm. And what about water management? Did they do that?

Jim Neal: They did. It's not as clear as the things that we knew about the Aztecs and Mayans and their use of water management. So it's not as clear what happened here, but there are indications that they did do a number of things to manage water and utilize water.

Nivien Saleh: What are some simple techniques that they might have used in the way of managing water? Would they have maybe built dams?

Jim Neal: Yeah. Build small dams, that certainly would've been one of the things that they did. They probably were able to modify some of the creeks and small streams to divert them to a certain degree.

Those are some of the things that they most certainly could have done.

Nivien Saleh: But in the end, I think you would say that while the Caddo had impact on the ecology, they did not completely disrupt it. Right?

Jim Neal: Yeah. First of all, their numbers were not astronomical. Timothy Perttula, an archeologist who's done a lot of work on the Caddos, one of his publications estimated that maybe within the realm of the Caddo, which pretty closely approximates the West Gulf Coastal Plain, there were maybe 200,000 people at the peak, by the 1500s to 1520s.

So there were not a whole lot of native Americans compared to what the populations are like today of all humans.

At least from what I know, they lived fairly lightly on the land. They didn't have massive machinery to make major modifications of the environment the way things happened after the Europeans came and got mechanized machinery.

Nivien Saleh: All right, dear listeners, we have arrived at the end of today's episode. In the next episode, we'll continue with our natural history of the Pineywoods as Jim Neal tells us how the Spaniards and Anglos entered the scene. Be sure to tune in!

If you're interested in the transcript and other episode resources, visit the episode web page at https://HoustonNature.com/24. That's HoustonNature.com, a slash, the number 24, for episode 24.

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For Houston and Nature, I'm Nivien Saleh.