

Interview with Laura Miller

Zoom Recording:

<https://www.dropbox.com/s/ukqfxw4i9yc4txv/Environmental%20Leaders%20Timesheet%20Andrew%20Lebowitz.xlsx%20-%20March%20%283%29.pdf?dl=0>

Transcript:

Kim: (00:10)

Hi.

Laura: (00:11)

Hi.

Kim: (00:12)

I'm Kim Goddu, from Bethesda Green. Good to see you again.

Laura: (00:17)

Good to see you again.

Kim: (00:20)

All right. So we have Andrew and Alex here today, who are doing a spring conservation project, and we're recording the meeting so they can create a transcript of it for their project. Hope you're okay with that.

Laura: (00:36)

I am okay with that.

Kim: (00:37)

Okay. Andrew and Alex, do you guys wanna introduce yourselves?

Alex: (00:41)

Yep. I'm Alex, I'm a senior at BCC. This is my project partner, Andrew, who's also a senior at BCC. So we've been working on this project for the past few months. And I can give you a little recap of the project. I know it's been a while. Essentially we're trying to make a display of how carbon sequestration works through the form of a garden. So we're trying to find an area about 1000 to 2000 square feet, and we're gonna have a mix of shrubs, grasses, and trees in order to accomplish this. We'll also be implementing different strategies such as no till farming and

mulching, and we will be focusing on developing mycorrhizal fungi networks. So we're doing a bunch of things to try and increase the rate of carbon sequestration

Kim: ([01:47](#))

Wait, Laura can you introduce yourself and give your full title and everything.

Laura: ([01:55](#))

I'm Laura Miller, I'm the forest conservation coordinator and also the county arborist for Montgomery county. I work for the department of environmental protection. I'm a Forester by training and I worked a lot looking at the urban forest as well as the old fashioned, traditional forest. Also, I look at individual trees and trees in gardens and backyards here in Montgomery county. So I hope I have some information that will be helpful to share with you.

Alex: ([02:33](#))

Awesome. We're also looking to kind of try and make our garden similar to old forests in a way, or kind of take some of the techniques that have worked for years, or hundreds of thousands of years. We'll start off with some questions first, I guess. So firstly, I've been researching if there's actually like a certain technique for finding how much carbon trees will actually take in during their life cycle. I was wondering if you could touch on that, if you know anything about it.

Laura: ([03:14](#))

I would look at two sources, the eye tree suite that's put out by the US forest service. The eye trees is a free program that is backed up by all of the research that the US forest service has done over decades and decades. It's very well vetted through the research community. So it's widely accepted, and they have some great tools in that program to look at individual trees as well as collections of trees. So you could perhaps put in a number of trees that are in a small garden.

Alex: ([03:51](#))

Okay.

Laura: ([03:52](#))

Another tool, another tool is the tree calculator. Let me quickly look it up, I think it's called the tree calculator. Yes, the national tree benefit calculator@treebenefits.com. And that's another US forest service project. That's all been supported by Casey trees and Davey trees, and it might have even been initiated by Davey trees. You enter a tree species and its size, and it gives you lots of benefits and the value plus the amounts of those benefits per tree. One of the things that I always caution folks about when they ask for calculators to look at the benefits of trees, is that when you look at an individual tree, even if it's a large tree, old tree, or a very impressive species of a tree, the individual benefits are pretty small, especially the dollars attached to those pretty small benefits. Especially if you live in an area of the country that's as affluent as the Bethesda- Chevy Chase neighborhoods.

Laura: ([05:14](#))

So the tree wouldn't mean anything to a developer based on its individual tree calculation. So I would encourage you to look at it, not only at the individual tree level, but at a garden level that you're going to put in because at 2000 square feet, you could support a few trees. If everyone had a garden in a neighborhood, then what would the collection of trees in those gardens mean? And then you start getting to some values that mean something to the decision makers and the policy makers.

Andrew: ([05:55](#))

So if the trees are able to sequester or take more carbon in through photosynthesis, that will then also enhance the stored carbon in the soil. So that'll go all around in helping our garden, and a follow up question to what Alex asked: What characteristics in a tree such as the size of the canopy, the length of the roots, or any other factors, increase the total storage of carbon? Are there like sizes or characteristics that will allow for more carbon storage?

Laura: ([06:47](#))

So again, I think if you were to look at it, individual tree bases that you would have to pick are moderate growers or the very long lived tree, right? You don't want a slow grower and you don't want a short lived tree. And most of the very long lived trees are slower growers. So the fastest you'd get is a moderately growing long lived tree if you could only pick one tree. However, we know that the very young trees and the fast growing trees sequester a higher volume of carbon than the old slow growing trees. However, the older, big trees that are slower growing, actually store a lot more carbon. So if you could talk about and move towards a collection of trees, then you do want some really old ones that have slowed down in their life because they're storing the carbon. You want some young, fast growing ones as well.

Kim: ([07:44](#))

Can I ask a follow up to that? So Alex and Andrew are gonna be focused on natives for their planting. Do you have the specific natives in mind that you could maybe site as an example?

Laura: ([07:57](#))

Well, I think very common examples would be the Oak for the older, slower growing one. It has a medium growth rate, medium to slow growth rate. It has a potential of living 6-7 hundred years, but once it gets to be really big, it does slow down in its growth, but it'll live forever. I mean like forever. And it'll continue to add a layer of new growth every year, which then stores a little bit more carbon every year. So it would be great to always have one of those trees in your garden. Whether that tree happens to be brand new because you're just starting your garden now, or fitting your garden around an existing White Oak tree. That would be awesome. And then examples of faster growing trees. There's a lot more examples of both ends of it.

Laura: ([08:47](#))

But one that would be very popular in backyards might be a red maple or an American Sycamore, London plane tree. They tend to be very fast growing trees. Let's go with the London. The American Sycamore tends to be a very fast growing tree. It gets to be rather large, but it's not likely to survive in backyards and so given that it's growing so quickly, it might be

something that's replaced in 50-75 years rather than having it around all the time. And I would further comment that I was gonna ask that your garden is between 1,000-2,000 square feet. Well, you have a thousand square feet. You could probably get two large trees and a small tree species. With 2,000 square feet, you could probably put as many as five large tree species: large trees being the ones that are the tall canopy trees, and the smaller trees being the ones we typically think of as ornamental trees. So if you have a 2000 square foot garden and you can have five trees, then you can have ones of all different scales and young and old growing in it all the time. And that's kind of the long term sustainable condition that you would want. In the short term, if you had to plant them all right away, then they would all be starting out at the same time and you would definitely want to get some of those fast growing trees in there to be big and shady along with some slower growing ones that would be very old to come along behind it.

Laura: ([10:34](#))

I think two other species for an old one would be the black gum or black tupelo- for the slower growing one, that long term kind of tree. And for the faster, another example of the fast growing one would be a sweet gum. Those would be good choices. They're all native. And just one more thought on that. The benefits of the small trees, like an ornamental, such as a dog wood, compared to an Oak. It isn't a linear increase in the benefits from the small trees to the big trees, it's exponential. So you think about linear as very straight and angular, but exponential just goes along. And once the big tree starts getting really big, then it's gonna shoot way up compared to the small tree. So just keep that in mind as well. When you talk to folks, it's great to have an ornamental tree, but it doesn't provide the exponential increase in benefits as the tree gets bigger.

Alex: ([11:40](#))

Okay, to follow up, how can we ensure that our trees will have high survival rates?

Laura: ([11:51](#))

That's a really great question. So there's a concept out there called the right tree, right place, or concept where you really pay attention to where you're putting the tree and then what species is going there given the site conditions. I feel very strongly that in urban communities where you place the tree is remarkably important because if the tree gets in people's way, it's gonna come down, right. If it's a nuisance to people it's gonna come down. And so if it's in the wrong place, every time you open the back door and you can or can't see a neighbors driveway, or if you are backing up the driveway and the tree's in the way, you open the car door and it gets slammed into the tree, any of those kinds of physical issues that happen on properties that make the tree annoying, means the tree's gonna come down.

Laura: ([12:45](#))

And likewise, anything that drops off the tree that's annoying or causes the owners to really be bothered by the tree will mean the tree comes down. I think that happens more often in urban communities than we give it credit for. So you wanna make sure that you're picking a great location for the tree and then picking the right species, not only for the site conditions, but for the use of that yard and how people are going to tolerate that yard. And then I think once the tree

gets up and grows and gets to maybe a 10 inch size, there's not a lot of reasons other than construction for the tree to come down. So it's those early years where it's still really easy for the homeowners themselves to remove it. If it's a problem, it's gone. So make sure it's not a problem. That I think is the number one thing I can recommend, it's not as easy as it sounds either.

Andrew: ([13:47](#))

And then how would we go about inoculating the trees along with the other plants that we're gonna have?

Laura: ([13:55](#))

Organic matter, can't have enough, can't overstate it enough. So really nicely composted mulch, hardwood, shredded mulch, that's composted. You need to compost it because you need to get rid of all the bad bacteria, but it will in itself generate a lot of the good bacteria and support the good things like the Mycorrhizae that are already in the soil. Rather than have a ground cover of grass or, you know, pebbles, or even colored mulch, stained mulch, make sure it's a good natural hardwood, organic matter type mulch, and it'll do it. And yeah, it'll actually even add a lot of porosity to the soil. So the water carries everything down. If the water can't penetrate, then all those nutrients and stuff will sit on the top of that soil as well. It has to really be able to filter down through. The organic matter will add some porosity to the soil conditions and all the nutrients as it's decaying. And that's probably one of the biggest things our yard is missing compared to the woods, you know. The woods are more natural, leaf litter, everything there, all the leaves and all the broken branches and twigs and everything that comes down off the tree is decomposing. And that's what our mulch becomes then.

Laura: ([15:32](#))

Yeah, I actually don't take any leaves off my yard. They're all around my trees. Even in my garden, I'll put a good two feet of leaves for the winter and then I'll turn that into the garden, which I never fertilize.

Andrew: ([15:48](#))

Oh, wow.

Laura: ([15:50](#))

My vegetable garden. Right, I keep a thick layer everywhere and it gets rid of the weeds too.

Laura: ([16:03](#))

You can't have too much mulch. So, we're finding that after three inches or so of mulch, then not only do you get those volcanoes, which everybody ran and raises about, but the mulch itself matts down and you get those slimy molds across the top of 'em. I'm sure if you guys think about it, you can picture what I'm talking about when it's matted and you get those weird molds and sheens across the top of the mulch, then the moisture isn't going down through. The rain is hitting that layer on the top and sliding right off and not actually getting through it. So it's too

deep now. So not only do we worry about those volcanoes, but even much more than three inches in this part of the world is too much.

Andrew: ([16:45](#))

Got it. And so are there any other types of things like compost or mulch that you would apply around the trees to increase growth and keep the soil well nourished?

Laura: ([17:06](#))

Well, so I think all of my answers should be connotated with categories, right? So if the category is like, for example, my backyard: my house is 35 years old and there's been no soil disturbance for 35 years. I don't need to add a lot more than mulch. But if I'm in a backyard that is in a new development or a new structure I have sub soil instead of the nice top soil layers that are only a couple of years old since it's been disturbed. Then it's very different. I would recommend getting the soil tested to see what is needed to make sure the pH balances where it should be for this part of the world and that the other nutrients are there for what it should be. And so test the soil at that. But if it's an older soil, well, I think actually my friends in lawn care would tell us to test the soil no matter what, right. But if what you're growing is trees, I think the new soils would be worth testing and figuring out if there's some amendments that would be helpful. With old soils, the mulch should be more than enough.

Andrew: ([18:27](#))

Sounds good. Yeah.

Laura: ([18:28](#))

That's good.

Alex: ([18:32](#))

How would nutrient competition affect the whole thing and would that decrease the survival rate of some of the smaller shrubs and grasses?

Laura: ([18:43](#))

Yeah. It certainly goes to supporting your idea of a garden rather than trees over lawn. Right. We know that there's some things that are very good competitors. Grass has been one of them. Grass really competes for nitrogen as well as water and all of the micro and macro nutrients in the water. So again, I think if the plants above ground are not so much that they consume all of the water on the site and the water does trickle down through, then it will carry nutrients down through as well. But we know, for example, the grass layers and some of the other real thick types of groundcovers don't let any water through in their root systems. Right, they just soak up all the water. And so then they're taking up their share of nutrients as well.

Alex: ([19:40](#))

Okay.

Laura: ([19:41](#))

But if we look at things like ferns and woody plants like all those shrubs, those layers generally aren't so thick that water isn't going through. So after a nice rain, when you would expect the soils to be wet, the soils are wet. Then I think that's pretty good, especially if you have that nice mulch layer too, to provide the nutrients with.

Andrew: ([20:12](#))

So shifting to the garden, is there any specific, you know, rhyme or rhythm that we can incorporate when placing each plant species or tree species. Like to increase specific growth in certain areas. And then I don't know if you're familiar with multi-story cropping, but is there any kind of development that we could implement to make the garden structured in a 1000 to 2000 square foot area.

Laura: ([20:58](#))

So that's a really interesting question. I think that it depends on the resources there. If it's a pretty dry site with shallow soils to begin with. Like we can't just assume that all garden soils or sites are going to be the same. But if it's a pretty dry site with shallow soils, then it would support fewer plants and less biomass than deeper soils that are more moist and rich, right? So there's this continuum that goes along. You kind of have to figure out that first. Then I would also look to place the trees, especially the large trees first and where will they fit best on site and where would they most likely survive for the longest period of time. Because they're going to be the most dominant in terms of how long they're there and how many resources they use. Once those are cited correctly or are in the best locations for long term survival, then put the next largest size, the next size down of plant material.

Laura: ([22:12](#))

So if it might be a small tree or a fruit tree classified as small trees, then place those trees around the very large ones and then the large shrubs and the small shrubs and then the herbaceous plants. That's how you would place the materials so that you have the most sustainable garden and each one of those gets the resources that they need. I would also almost not hesitate to recommend that you pack the stuff in there. We know the woods can support really high densities of trees. They really can. And a lot of understory growth and lush, lush vegetation from the very top of 120 feet, all the way down to the ground level. So pack it in there because the garden is going to have open space around it or maybe buildings or structures around it. But I would lean on the side of more plants than less.

Alex: ([23:16](#))

Okay. How else should we mimic an old growth force as you described?

Laura: ([23:23](#))

Yeah. Again, old growth forests are just chalk pools. Every square inch is being utilized. Right. And so again, I would go with more rather than less, and I would start with the large trees, get them pretty evenly spaced in places that they're going to survive and then fill it in all the way down to the very ground level because that's, what's in the old growth, every level is taken up right. And all of the age classes are represented. So if you're lucky enough to have existing

trees to work around, then that's really great because you can start several new age classes, and the plan should also have the ability to add trees as needed every couple decades so that you always have those young, fast growing trees that are working for you. And those could be some fruit trees. They could be medium sized trees as well. It could be really gorgeous flowering trees that are fast growing. We don't always have to have tree-trees, you know, big trees.

Alex: ([24:37](#))

Okay.

Laura: ([24:38](#))

Is that helpful? I'm not sure I answered that question.

Alex: ([24:41](#))

That definitely helps.

Laura: ([24:43](#))

Okay.

Kim: ([24:44](#))

Sorry, just a quick follow up. So can you define fooding trees a little bit more?

Laura: ([24:50](#))

Well, the food trees, so there's nuts. And then there's fruits, you know. The nut trees are the big ones, like put in a Walnut tree that would be an old growth species and put in a pecan. We do have some pecans in the community as well as some of the hickories. But then there are the fruit trees, like the apples, pears, and cherries. Most of the flowering cherries that we see aren't really edible. Well, they're not poisonous, but we don't wanna eat them. But these trees that support food items like apples, peaches, and pears, they're not native, but they are part of sustainable landscaping. If you think about it in a broader sense, most of the apples I think probably, well, they're not really considered native. Although we do have apple species, you know, in the same family, as apples in the woods, same with cherries. We have the same family of cherries in the woods. We even have plums in the woods, but they're not really edible ones. So the ones that you would plant would not fall into your category of native, but I think they are part of sustainable gardens in urban communities.

Kim: ([26:17](#))

Where would a paupau fit in?

Laura: ([26:20](#))

Paupau? Well, that's definitely one that is native and is edible, but not commonly an admired fruit, perhaps we could change that? But Paupaus are great, and they're ones that are pretty resistant to deer brows too.

Kim: ([26:42](#))

Andrew and Alex, have you guys ever heard of paupaus

Alex: [\(26:45\)](#)

Yeah, I've done some research on them.

Laura: [\(26:49\)](#)

Yeah. They are a common species here in the county, so they would be very beneficial.

Alex: [\(27:01\)](#)

Okay. Are there any other characteristics other than the growth rate that you think we should take into account when planting our trees or choosing which trees will be planting?

Laura: [\(27:14\)](#)

Well, we can't ignore the fact that the climate is changing. And so I would choose species that have a very broad range of natural conditions that they're adapted to manage. For example, some species have huge ranges expanding almost the entire east coast. So they're very likely to have the adaptations needed to withstand climate change. If you had to lean towards a group of species, maybe lean towards the ones that are adapted to more southern climates than more northern climates. But the truth of the matter is we don't actually know it's going to happen. We can just kind of predict where these adaptations are, but I would look for ones that have more wide ranges, native ranges that span a whole bunch of conditions. I think climate change is going to bring periods of winters that are very, very cold as well as times that are very dry and times that are very wet. Not a consistent pattern of, "well, it's going to be one like the Louisiana swamps". It's not gonna be like that. It's gonna be a lot more variable.

Andrew: [\(28:32\)](#)

Yeah. So that makes a lot of sense. Then how would we go about maintaining the garden? As you said, if the climate's going to keep changing, we have to be prepared if there's drought, or if there's even too much rain. So how do we go about maintaining the garden in the future?

Laura: [\(29:00\)](#)

That's a really good question. I think I would not only look at healthy plant material, but healthy soils too.

Laura: [\(29:20\)](#)

Make sure that the soil can drain really well. And I, I don't mean so that the water can drain down the hill to somewhere else, but that the water percolates down through the soils pretty well. Within a matter of just a couple of days after a pretty substantial rain event, the soils then are well drained and the water has gone down into the aquifers rather than downhill to somebody else's problem. Right. Cause it's pulling all those nutrients down with it, to where the roots can get it. It's watering the tree and it's replenishing our aquifers that way. I think that probably would be one of the most important things to keep healthy, which means that you're not letting the soils get compacted. You're making sure there's plenty of organic matter there in

those soils. And you're making sure that there is that steady stream of biodegrading stuff from the top that's entering it.

Andrew: ([30:29](#))

Got it. Got it. So would you go about trying to maybe change the soil that's already there? Would you, if say we're starting from scratch and it's kind of a blank slate of soil and there's not been much plant life. Would you go about trying to add nutrients to the soil or put in your own soil that already has a ton of nutrients and is fertile?

Laura: ([31:11](#))

Well, you know, that's a really nice question. I have to think about this one a little bit, because, you know, there's something to be said for regenerating or rejuvenating disturbed soils, you're moving them towards a better condition. And just by plunking quality soils in from somewhere else means you're depleting soils from somewhere else. And, you know, I certainly don't think that bio engineered soils are necessarily good things for long term sustainable tree life. It's very important to use tree boxes in cities. Do you know what a tree box is like underneath the sidewalks in downtown Bethesda? There are these giant kinds of crate-like things that hold very engineered soils and the tree roots are growing down in there under the sidewalk, right? So that's an artificial system from top to bottom and those engineered soils are awesome and really doing something great there, but in a natural type of garden, they're not helpful.

Laura: ([32:19](#))

I think it's better to start moving the native soils in the right direction. And if that means those native soils are already in pretty good shape, then you're long ways away. And as I said before, just make sure that the water's percolating down instead of across and taking with it all types of organic matter and nutrients from what's on the surface. If you are starting out with sub soil, because the top layers of soil have been removed well, I think then you have to look at the pros and cons of moving soil, in how far is it being trucked from? Where is it being depleted from? You know, as well as how much benefit would you get from it and how long would it take you then to start to build some of those soil layers and those nutrients and organic matter back into the existing soil. So I don't think I know enough about soils to provide a better answer, other than those are some of the things I would think about.

Andrew: ([33:21](#))

That was really helpful. So thank you for that.

Laura: ([33:25](#))

Good.

Kim: ([33:27](#))

Is there somebody that does soils at the county level?

Laura: ([33:30](#))

I'm sorry, Kim, say that again?

Kim: [\(33:32\)](#)

Is there somebody at the county level that does soils? I haven't seen anybody. That's why I am asking.

Laura: [\(33:42\)](#)

Well, so I don't know, actually, because there's the turf guys, the people who do stuff on like golf courses and lawns, and then there's the sediment control guys who don't want the soil to go anywhere. Right? Their job is to make sure it doesn't move off the site. Then there's agriculture, which wants to grow things a little more artificially than these gardens you're talking about. I would start by asking Mary Travellini who she might look to. There's certainly somebody over in Glenstone that is looking into soil amendments and natural things, but their recommendations are on a scale that's not usually accessible to the average person in the county.

Kim: [\(34:48\)](#)

Yeah. I could follow up with Paul on that. Thanks.

Laura: [\(34:51\)](#)

So it looks like we only have a few more minutes. I'm happy to get back on another session or reschedule another time or however you guys wanna deal with it.

Alex: [\(35:04\)](#)

Yeah, we can definitely follow up. I mean, everything you've said is very helpful for us, so we'll definitely be able to apply a lot of this into our garden.

Kim: [\(35:14\)](#)

Are there any questions that Laura has not been able to answer that she could follow up via email?

Alex: [\(35:23\)](#)

I think those are our main questions. I think the one question we didn't get to is just some tips for continuing to protect the trees while they're growing or protect in the early stage.

Laura: [\(35:36\)](#)

Oh, protect them. Well, you have to protect 'em from deer and you have to protect them from vines. If you've got vines in a tree, they'll always stay in the tree and then deer can do a tremendous amount of damage to your whole garden. I think you have to protect both of them. So I would say protect it from the invasive species, whether they're native or not. Because there's grapes that are native, that could really overrun a garden and there are native deer and they can really overrun a garden. So it's not really native or non-native, it's invasive or not invasive. And you have to manage what's invasive there. And then some physical protections from things like deer and vandals depending on where the garden is. And then compaction for the soil. Usually it needs more than foot traffic, but you wouldn't want the garden to be in a place

where there is only access for a vehicle like a truck coming into a backyard to deliver supplies for a deck or something like that, you know?

Alex: [\(36:50\)](#)

I think those are all the questions we have for now. Again, thank you for taking time to set up this meeting. We really appreciate it all, and we'll stay in touch with any updates on the project.

Laura: [\(37:01\)](#)

I'm happy to talk, even if it's just a quick phone call, it might be easier than online questions. So don't hesitate to reach out. I'm happy to do this.

Alex: [\(37:11\)](#)

Well, thank you.

Laura: [\(37:12\)](#)

Yeah. Good luck. Don't hesitate to really knock me on the head if you need me. Okay?

Kim: [\(37:27\)](#)

Yep. Have a good rest of your day. Thank you.

Laura: [\(37:29\)](#)

Well, you guys too. Thank you so much, guys. All right.