Episode 65: Watershed Interconnectedness

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# [00:00:00] Introduction to In the Woods Podcast

**Lauren Grand:** From the Oregon State University's Extension Service, you are listening to In the Woods with the Forestry and Natural Resources Program. This podcast brings the forest to listeners by sharing the stories and voices of forest scientists, land managers, and enthusiastic members of the public. Each episode, we will bring you research and science-based information that aims to offer some insight into what we know and are still learning about forest science and management.

Stick around to discover a new topic related to forests on each episode.

**Jake Barker:** Thank you for joining us for another episode of In The Woods Podcast.

# [00:00:36] Meet Your Host and Today's Topic: Watersheds

Jake Barker: My name is Jake Barker. I'm the extension forester for the North Willamette Valley, and I will be your host for today's episode. Today we are going to be talking about watersheds.

# [00:00:48] Defining Watersheds and Their Importance

**Jake Barker:** What are watersheds?

We are going to define some of the key terms in watershed science. We're gonna explore why watersheds matter, and we're also gonna learn more about our guest's specific research, and then how people and landslides connect.

# [00:01:03] Introducing Annette Patton: Watershed Science Specialist

**Jake Barker:** So today I am excited to welcome Annette Patton to the podcast. So, Annette, thank you so much for joining.

So, who are you?

**Annette Patton:** Well, thanks so much, Jake. It's really, really fun to be here. My name is Annette, and I am a rock and dirt and water nerd. I grew up here in Corvallis, Oregon before wandering all across the western US to study the field of geomorphology, which is essentially, the reasons and the processes that make the earth surface look the way it does. I got my graduate degrees at Colorado State University in Fort Collins, Colorado, and then I've worked a little bit for a couple nonprofits up in Southeast Alaska before I started this position at Oregon State about 10 months ago. So, I'm still fairly new to the Oregon State Extension Program and really enjoying getting to know the forestry and Natural Resources extension program.

**Jake Barker:** Very cool. Where are you based?

**Annette Patton:** Right now, I am based on the main OSU campus in Corvallis.

**Jake Barker:** Okay. And you cover the whole state, right?

**Annette Patton:** Yes. My official title is Statewide Watershed Science Extension Specialist, which is a mouthful, but it essentially means that I serve the whole state to talk about water and waterways and the natural sort of physical template that our forests are all a part of.

**Jake Barker:** Great.

[00:02:32] Understanding Watersheds: Key Concepts and Classifications

**Jake Barker:** So, I think, I think the first thing that I want to explore is just defining in general what is a watershed. So in from your perspective, what is a watershed, and can you define that for our listeners?

**Annette Patton:** That's a great place to start. A watershed is by definition any land area that drains water to a single point, and that means that a watershed can exist at a lot of different scales.

You can talk about a really tiny watershed of just the little creek that maybe runs through your backyard, and what portion of the land in your backyard delivers water to that creek. That's a really small watershed. Or you can talk about really big watersheds like the Columbia River or the Mississippi River that drain large portions of the continent and all connect to bring water from a big area to one single point.

So, it's essentially just any part of land area that is connected by water and sort of defined by the topography that influences where water is gonna end up.

**Jake Barker:** Okay, so that seems like there's a, a very wide range. What, what are some of the like different classifications of watersheds?

**Annette Patton:** It is a really wide range.

You can talk about the different sizes of watersheds. Some of them are really, really tiny. Some of them are half the continent. And there's not a whole lot of really strict classifications of a watershed. You can start to classify different stream types based on do they have water in them all year round or are they a more seasonal stream?

But watershed is really a large umbrella term. And what's fun about a watershed is that it's defined by what the water does, but it encompasses everything beyond the water. So, the rivers and the water are part of the watershed, but every single piece of that land area is also part of the watershed.

So, the mountains that dictate where water goes and the plants and the people and our human infrastructure, these are all parts of a watershed that influence how water is moving through a landscape.

# [00:04:46] Watershed Processes: Water, Sediment, and Nutrient Movement

**Jake Barker:** So, it sounds like watershed science is obviously intricately related to watershed water processes in general.

Can you remind us what those main processes are?

**Annette Patton:** I think, you're probably describing how water follows gravity, water goes downhill. And that's probably the most fundamental concept of a watershed, is that if you have water up on the top of a mountain, it's gonna end up moving down the mountain towards, say, a river channel.

So, the processes that dictate exactly how that happens include things like the rainfall, and then if water ends up infiltrating or soaking into the soil. How water moves through the soil, or if water is moving along the surface, it might be in a little stream channel or a goalie or just flowing as like a sheet of water across the surface.

So, all of those processes are indicating or dictating how water is moving down slope because of gravity. Gravity is king. Eventually most water-- not all, but a lot of water that we care about ends up in surface water features. So, rivers and streams, and lakes. And those are all the resources that we interact with regularly if we're taking water out of a river for irrigation, using water to power our hydroelectric dams, or recreating on rivers and lakes and things like that. Now, in addition to all of the water processes that are dictated by gravity, there's also some other really important processes that are really tied up in this watershed scale... thinking about the world which include not only the water and how water is moving, but also how sediment or soil or rock is moving through the landscape. Water is really good at moving sand and gravel, and things like that from the top of the mountain down to the bottom of the river valley. So, water's a really effective transport mechanism.

And then with all of that water and that sediment, you also have a lot of nutrient movement throughout the landscape. So, the watershed and the gravity and the water are also moving our carbon and our nitrogen and all of these other nutrients that are really critical for our ecosystems. They're also moving through watersheds in, in a lot of the ways that are dictated by how the water itself is moving to

**Jake Barker:** Wow.

Watershed science also seems like if it's about, even though it's about water, it's, it's shaping and shifting these other factors like soil and rocks and nutrients. So, in watershed science, generally, what, what temporal scale are you working on? Does it vary? Does it depend on the type of project or what do you normally think about?

**Annette Patton:** I mean, you're exactly right. And that's what makes it so fun because watershed science includes literally everything because everything in our terrestrial systems are part of a watershed. The river is part of the watershed, but so is that tree over there, so is the road. So are you and I, you and I are part of the watershed, interacting with all of these processes and exactly like you said, the scale at which you can think about it varies a lot. So, what I find really fun about thinking about watershed science is that I'm looking at a lot of different spatial scales. I'm looking really closely at one tiny section of one tiny stream. I'm also thinking about, how the Columbia River is moving through time. And the temporal scales are also really variable.

And this is, the classic geologist in me. You can think about instantaneous processes that happen in seconds or minutes, or you can think about big changes in the landscape and watershed and river movement over. Thousands to millions of years because that's the timescale over which our rivers and our landscapes really change a lot, is that more geologic timescale.

So, it's really fun to be able to zoom in and zoom back out and zoom in and zoom back out, and it's a very dynamic way to think about the world, part of why it's so much fun.

**Jake Barker:** Cool. So, now that we've talked about some of these bigger concepts.

# [00:09:17] Exploring Oregon's Diverse Watersheds

**Jake Barker:** Can you help us zoom in to Oregon specifically? And can you talk about the different watersheds in Oregon, maybe the larger ones?

Mm-hmm. Where are they, their size mm-hmm. And how they influence Oregon's climate and forests and other natural resources.

**Annette Patton:** Yeah. Oregon is a really fun place to think about watersheds because Oregon has a very diverse landscape. Maybe I'm a little biased because I grew up here, but there's just so much diversity in what the watersheds look like, how the rivers behave.

We've got everything from our small coastal rivers that drain from the Oregon coast range out to the ocean. Those tend to be fairly short. Lush green watersheds with a lot of water. They get all of that rain coming in off of the Pacific Ocean. And so, you've got these cute little coastal rivers that just go from the mountains straight out to the coast.

We also have our big desert rivers. So, if you go out to the dry side of Oregon that's where you're gonna see some of those arid rivers in drier landscapes like the Oay or the John Day, or even the Deschutes River. And they're moving through maybe gentler topography overall, but they're. Carving through some of that big volcanic rock.

And they of course have a very different climate. And of course, our biggest rivers are maybe the Willamette and the Columbia River, which collect water from across large portions of the state. From, and the snake up into the Columbia, and then all of the rivers in the Cascades that feed into the Columbia.

And that's of course one of the biggest rivers that, that we have here in the North, north America. And then, what's also really fun is that we have an Oregon, a few closed basins, so there are a handful of rivers that drain into lakes that actually never make it to the ocean. So particularly in central and southern Oregon, lake Abert and some of the Maher Lake area, there's a couple of basins that just are their own little.

Isolated units and they drain into lakes that then eventually evaporate or infiltrate into the ground, and that water never makes it to the ocean. So, we've got a lot of diversity in terms of where our water is going and what climates and landscapes sits moving through.

**Jake Barker:** Wow, that's amazing. What a, what a diversity of, of watersheds we have here.

**Annette Patton:** So, it's really amazing

**Jake Barker:** to kind of continue on here. I think you've mentioned. A little bit about the interconnectedness already.

# [00:11:50] The Importance of Watershed Science

**Jake Barker:** Can we dive a little bit deeper into why, why does watershed science matter?

**Annette Patton:** Yeah. So many reasons. You might have started thinking about some of the reasons that watersheds matter based on just learning about what they are.

Of course, watersheds are the.

Watersheds deliver our water resources. Water is the blood of life. We need to drink it. We, our crops need water, our livestock needs water, our ecosystems and our forests, and all of those habitats need water. So. Any watershed process that dictates how and where and how much water there is, is a really critical process for these really fundamental water resources.

And without water, without enough water we wouldn't survive. Right. We can't live without water. Conversely, if there's too much water, then you can start to see issues like flooding. So, all of those water resources are a really important part of understanding watersheds and why it's really important to know. What the water's doing, where it's coming from, how it changes through time. But like we maybe already talked about, the watershed is also a really important lens for thinking about other resources and natural processes that really matter too.

So, things like sediment transport. Where do rocks come from? How do rocks get from the mountains down into our river channels to make the really nice fish habitat that we care so much? Where does it go? Is it gonna fill up our drinking water reservoirs? Is it gonna go out to the ocean? And with all of that sediment and all of that water, again, those nutrients and the organic material, the carbon, the phosphorus, all of those nutrients are also really important pieces to understand how they're moving, where they end up where what parts of the landscape have access to those nutrients and resources and what parts of the landscape don't. So, it's a really valuable lens for thinking about how water and sediment and nutrients are.

Where they exist spatially and also how they move throughout the landscape over time.

**Jake Barker:** And how are those processes influenced by disturbance.

# [00:14:15] Disturbances in Watersheds: Landslides, Fires, and More

**Jake Barker:** And can you describe some of the main types of disturbance in watershed science?

**Annette Patton:** Yeah. Disturbance is the name of the game, particularly out here in the Western United States.

Our landscape is shaped by disturbance, and when I say disturbance, I am thinking about a lot of different processes that include things like landslides and fire and flooding. Those really dynamic sudden processes that can make a big change really quickly. As a geologist, we often think about changes through time being sort of, steady and slow, punctuated by really rapid change.

And that's a really common way to think about how a lot of earth processes function. You'll have a lot of very slow, gradual change through time. Maybe the, the mountain is eroding one grain of sand at a time, bit by bit by bit, and then you have a really big flood or a really big storm. A landslide happens and suddenly instead of being one piece of sand, bit by bit grain at a time, you have a huge volume of sediment just suddenly moved to a very different location.

So that dynamic nature of change is. Why the world that we live in here in Oregon looks the way that it does. It's the reason we have mountains. It's the reason our mountains change. It's the reason we have coarse gravel in our rivers. All sorts of good things.

**Jake Barker:** Amazing. That's, that's very helpful context.

# [00:15:54] Annette Patton's Research Focus: Landslides

**Jake Barker:** But now I think as we get further into this, I'm interested to learn more about your specific interests. And you, your research focus. Can you talk a little bit about that?

**Annette Patton:** Yeah. I've mentioned landslides a couple times already, and that's partly because I have a particular interest in studying landslides.

I have spent most of my research career up to this point thinking about when and where landslides tend to happen. And when I say landslide, that's also kind of like watered a, a fairly large umbrella term. When I talk about landslides, I'm talking about any rapid movement of soil or rock or other material.

Moving down a hill slope very quickly very quickly can also be a variable term that might be seconds, that might be years. But years is pretty quick for a geologist. And so, a lot of my research in my graduate programs, in my positions after my graduate work have all focused on understanding how landslides happen, where they're likely to happen, and then some of the ways that we as people interact with them.

For example, by reducing risk to human safety. Mm-hmm.

**Jake Barker:** So, can you describe a little bit about your work in Alaska?

**Annette Patton:** Yes. Before I started this position at Oregon State, I was working as a landslide researcher for a nonprofit in Southeast Alaska and I was collaborating with a really talented team of other researchers and community partners to understand landslides and use that knowledge to reduce risk to human communities, risk of human safety and also risk to infrastructure like roads. And in that project, I was responsible for a couple of different pieces of different research projects. Notably, one of the big takeaways from some of that work was developing some tools to predict small landslides that are triggered by really intense rainfall. So, with my team, I helped develop a model that would take rainfall forecasts and use them to predict some of these small shallow landslides that then have a lot of water in them. They can be very hazardous because they travel really fast and really far.

And then using that model, we as a team developed a public facing web dashboard that provides landslide risk information in real time based on rainfall forecasts and the current rainfall totals.

**Jake Barker:** Wow, that's amazing and quite robust. How, how does that apply to Oregon? How are you using that to influence your inquiries here in this state?

**Annette Patton:** There's a lot of connection actually. Southeast Alaska is of course a very mountainous deep landscape with a lot of rain, and that means that Southeast Alaska has a really high frequency of landslides. And that's also true here in Oregon. Maybe not every part of the state, but our western portions of the state are also, we have really rainy winters, really big storms, and our, our mountains are pretty steep too.

So, any place where you have steep topography and a trigger like a big rainstorm, you still have that potential for landslides. And those risks are the same here in Oregon in terms of if you're stuck in the path of a landslide that can be really damaging and tragic to human lives and human safety and also infrastructure.

So, the perspectives of thinking about how to predict landslides and communicate information that helps keep people safe is really relevant here in Oregon too. And I'm really excited to share that perspective with the state and with some of the other geologists who are thinking about landslides here in Oregon already.

**Jake Barker:** Given how variable Oregon's climate is, I'm thinking really dry eastern part of the state to the really wet parts of the west.

# [00:20:07] Predicting Landslides: Tools and Applications

**Jake Barker:** How does predicting landslides change depending on where you are?

**Annette Patton:** That's a really good question and one that a lot of folks are thinking about all the time. So, we don't all have all the answers to that question, but what's important is that it is really variable and you've identified some of the key factors that are really important to think about. So, the western part of the state where you have a lot more rain, maybe steeper mountains some loose soil and rock from the mountains as they erode.

Those are gonna have a really different set of conditions under which landslides happen. So, it might be a certain amount of rainfall. Rain is also not the only trigger of landslides. Having water in the soil is of course gonna increase your likelihood of landslides. But things like earthquakes and human modification can also trigger landslides.

So those are all really important processes to think about. And then if you compare to the dry side, maybe the thresholds for some of those triggering processes, they might be a little bit different. And there's a lot of open research about exactly what it takes to trigger a landslide depending on where you are and the climate.

And these are some questions that I'm really excited to continue researching here at Oregon State and find more answers. Now there's another factor here in Oregon that's really important to mention. If you wanna talk about landslide triggering and landslide susceptibility, which would be what happens after a wildfire.

And there's a lot of really interesting research that focuses specifically on how and under what conditions landslides are likely to occur after a fire. And that's also gonna possibly vary a little bit depending on where you are in the state. Because some of that post-fire response reflects the, the soil characteristics and the water repellent layer that happens in a soil after fire.

Some of the topographic smoothing that happens after a fire. And that is not necessarily gonna be super consistent all across the state of Oregon. It might depend a little bit on vegetation and topography and things like that, but there's a lot we actually don't know about those processes. So, there's a lot to learn.

**Jake Barker:** So, as we kind of pivot to think about how people and landslides connect, I, I live and work in northwest Oregon and often when I'm out visiting landowners or heading out to recreate for the weekend, I'm driving on highways that are rather bumpy and. I noticed that there are a couple sections of a few highways that always seem to be under construction because of ongoing landslide issues. It seems like it's within this context of past infrastructure that has been built and invested in by a county or municipality that continues to pose a problem because it's built on an inherently unstable soil or in an area that's prone to sliding or slippage.

My question is, when you're thinking about predicting landslides, which is obviously really important, How do we as natural resource scientists and managers think about addressing the problems specifically? or just putting a band aid on it?

**Annette Patton:** Yeah, that's a, that's a big question. What you, what you mentioned about the roads is I think a really critical piece of the story here.

Our transportation corridors are really vulnerable to things like landslides, whether that's a really quick landslide that just blocks the road or washes out the road all at once. Or we have some, relatively slow-moving landslides on some of our major highways here in Oregon where there's just constant slow movement or repeated movement that really can be a chronic issue, and that's really hard for roads.

Managers, whether that's the state highways or county roads, it's really hard to think about investing in those roads over and over and over and over again. That gets really expensive and there are some, certainly very expensive transportation corridors here in the state of Oregon. What's tough is that there aren't that many places in a lot of our mountain range where.

You're not gonna run into that issue. We have a lot of mountains here in Oregon. It's part of why we love it so much. And that means there's a lot of steep places that are possibly susceptible to landsliding. So, there's always a balance of, what can we do to stabilize a hill slope right now?

How long is that fix gonna be? Viable. What sort of maintenance is it gonna take over the long term? And if that's not cost that we as a society are willing to pay, then we have to find an alternative route or just close the road entirely And often the, there aren't really good options there. These roads are really critical for.

Our day-to-day movement throughout the landscape. They help us transport goods. They get people from place to place if there's an emergency. Having roads accessible to emergency vehicles or first responders, like that's all super critical. This is how we access hospitals and work. So that infrastructure is really important and it's worth investing in.

And there's a lot of really talented geotechnical engineers across the state of org Oregon who are always scratching their heads trying to think about how do we. Best use our resources to make these roads open and viable. Do we keep fixing up this one spot? Is there a different, engineering solution we could apply that would work better?

Or is there a different route we could take and, and changing routes is tough, but sometimes that's necessary. Now the other piece of landslide risk, the infrastructure and those transportation core corridors are really critical, but there's also in a lot of places, really direct risk to human safety.

Maybe landslide prone areas in residential housing areas, or if you're driving on the road, are you likely to be actually hurt by a landslide? And that's harder to think about sometimes because that's not like a, oh, okay, where do we wanna invest our resources? I think most folks tend to agree that human life is really valuable and we want to protect it, even if it's costly.

So those are also really important questions to think about. Where do we build our homes? How do we keep people out of harm's way when say there's a really big rainstorm? And what can we do to keep our people and our residents of the state safe at all times. And that can be really hard to do, but it's of course really important.

**Jake Barker:** So, is your vision for a way to predict landslides? It seems, it seems like there's a clear connection to say land use planning. Mm-hmm. Or. For someone who's recently purchased a property and wants to build a home, that they would want to know where a good place is to build or where is a place that is more risky in terms of landslides but are you also hoping that predicting could be used more real time that would say, Hey, we have a really big storm coming up.

Precipitation is predicted to be quite large.

**Annette Patton:** Mm-hmm.

**Jake Barker:** Close down roads ahead of time? Or is it mostly a reactive kind of thing?

**Annette Patton:** Yeah, I mean, you've totally nailed it. Ideally, our risk reduction strategies are gonna hit all of those pieces. If we can plan our cities and our roads and our residential areas to keep people out of the most dangerous places, that's a really good place to start.

But even once we have, the current. Distribution of homes and people and roads. There's also a lot we can do just if we know a big storm is coming. So, if we can look at the weather forecast and see, like you said, that there's a really big precipitation event coming our way. Maybe we can't move the road before the storm hits, but we can certainly move the people.

And evacuating during potential triggering rainstorms is a really, really important part of. Being part of a landscape where you can't always avoid all risks. So, if you're gonna live in a place where you might have some exposure to landslides, knowing that a big storm is coming and that it might trigger landslides can be a really, really powerful tool for getting people out of harm's way before a landslide happens.

The third piece, of course, is the response. If worst case scenario happens and a landslide occurs and it impacts our, our towns or our homes. Making sure that we have really clear plans and first responders who are able to get out on site and safely provide any assistance needed. That takes a lot of coordination and there's a lot of really talented emergency managers around the state and around the country who think about that kind of response 100% of the time.

What could we, what can we plan in advance so that if the worst thing happens, we can respond efficiently?

**Jake Barker:** I have another question that's a little bit of a pivot, please. So, we, those are, those are more disturbance discussions. This is also about disturbance, but at a, in a slightly different context.

[00:29:57] Watersheds and Forest Dynamics

**Jake Barker:** In the upper parts of a watershed.

**Annette Patton:** Yeah.

**Jake Barker:** Often these areas are forested, they have trees on them, and there are small streams. Flow in that flow from the upper ridges into larger streams, which then flow into the larger bodies of water. In these upper parts of watersheds that are often forested. What are some of the things you would think about in terms of the dynamics of the way water interacts with the forested landscape? Mm-hmm. In the sense of precipitation comes from the sky, lands on the ground, or lands on trees.

Mm-hmm. And then flows into these small tributaries and streams. Mm-hmm. What are some of the key things that you think about in that context, and how does, how does the watershed science component connect to the forest?

**Annette Patton:** Yeah, it's a, a really important part of what I like to think about as a watershed science is what's happening in those upland areas, those higher parts of the watershed, and,

you're absolutely right that the forests in that part of the watershed, those they're often, wherever you are in the state, the higher parts of the watershed are. Maybe the more mountainous parts, maybe the higher elevation. So, you tend to see more forest in those places, and that forest or the vegetation, whatever it, whatever it looks like is a really, really important part of that watershed system as a whole.

And there are a couple of really key processes that vegetation and forests provide. And we'll start, we'll start as a raindrop, for example. Let's say we're falling as a raindrop, the first really critical piece of this. Forest and vegetation story is whether or not that raindrop is going to hit canopy or understory or the bare ground.

And if you hit canopy or vegetation as a water, drop first, then you sort of, I'm speaking as the water drop now, but essentially you slow the descent and you don't impact the ground quite as hard. So that we call that interception. Whereby hitting the vegetation first, you essentially reduce the impact onto the soil surface.

And that can reduce total erosion. It also can reduce the total amount of water that ever touches the ground because if it rains a little bit and then you have water on leaves of vegetation, not all of that is ever gonna hit the ground. Some of it's just gonna evaporate. So, the interception of Canopy.

Really regulates how much water ever hits the ground and the force with which it hits the ground. If it does, if it does touch down. So that's sort of step one. The vegetation really moderates and softens how water hits the ground when it comes down. And then you also have what happens once it hits the ground.

So, if water, once the water drop hits the ground. If you have a lot of low vegetation, say grasses or herbaceous plants, that, or even just organic duff, like the pine needles on the forest floor. You essentially capture the water a little bit better, you have a little bit more surface area, and you might slow how quickly it soaks into the ground.

That would be sort of the infiltration piece. How, how slowly and how stable is water gonna be as it soaks into the ground? Or is it just gonna run, run off, sort of trickle away on the surface? And if you have all of that, like if you just think about. Forest soil, you can sort of picture grabbing a piece of soil and squeezing it in your hand.

And if it's got that really organic rich material, it might feel really spongy. And that is exactly how it behaves. It'll sort of soak up that water and let it slowly enter the soil profile. And if you didn't have that vegetation, it might just hit the ground and trickle away. Might not have time to really soak into the ground if you don't have that really spongy organic material.

If you have bare rock, for example, that's gonna be a part of a watershed where you're gonna probably see a lot more water moving across the surface rather than soaking into the ground. And that's not necessarily good or bad depending on where you are. There's, not, not one thing that is right for a landscape.

It's very dependent on what, where you are and what the, the local. Area is sort of adapted to, but that's just a really important part of the process. Then once you have water in the ground, the vegetation is still really important. And trees and, and big shrubs in particular are really good pumps, right?

A tree is always transpiring water or is really good at transpiring water. From the ground, pumps it up through the, the stem of the tree, and then you have all of that evaporation and transpiration of water out of the tree. And the contribution or the, the amount of water that a tree or a forest can remove from the soil is actually quite significant.

So, the more trees you have, the more vegetation you have, the more you're gonna be pumping water out of the ground and you're gonna have less water in the ground. Again, depending on where you are, that might be a good thing or a bad thing for you as a human being in the landscape. If you have a lot of water, maybe you're on the west side of the coast range and you're worried about landslides, having that water pumped out of the ground, maybe that'll reduce the risk to your property.

If you're on the dry side of Oregon and you have those trees pumping a lot of water out of the ground, thinking about some of those juniper trees. Maybe having all of that water pumped out of the ground by the trees is gonna reduce the amount of water that eventually makes it into your stream or your lake.

So those forests, they have these really critical components in terms of. Intercepting water. Controlling the organic material might be controlling how water infiltrates into the soil. And then once it's in the soil, the vegetation is still really important in dictating where it's gonna go because eventually water in the soil that stays in the soil is gonna keep moving downhill.

Gravity wins. Gravity always wins. I guess if your water being transpired by a tree, then the tree, the tree beats gravity there. But otherwise, gravity typically wins and water that stays in the soil is gonna end up going down and down and down into a valley bottom where you might see a surface stream or a river.

**Jake Barker:** Wow. Super helpful. That's some great context for, for those of us who are thinking about forests and work in forests. So, thank you.

# [00:36:47] Lightning Round: Fun Facts and Resources

**Jake Barker:** Now we are up for our lightning round which we ask all of our participants.

**Jake Barker:** So first off, what is your favorite tree? Annette.

**Annette Patton:** Ooh, that's so hard 'cause there's so many good trees.

I think one of my first favorite trees was the western larch or the Tamarack, mostly because it's just weird and it breaks the rules, and I respect that.

**Jake Barker:** Love it. That's like, it's an amazing tree. One of my favorites as well. What is the most interesting tool that you bring with you in the field, either in your vest or in your vehicle?

**Annette Patton:** Mm-hmm. Oh, man. I've got some fun field toys. I think the most interesting or maybe the most unique. I have a very fancy compass called a brunt and compass that is used to track north and south, but I also use it to measure. The orientation of different rock features. So, if there's like a fracture in the rock or a bedding plane in the rock, I can measure the precise orientation with this fancy compass that also has a couple of little leveling bubbles.

So, it's a fun little compass with does it float fun? Oh, ooh. I wish it floated. I don't think it does. Gotta be careful with it when I'm on the water. Yeah.

**Jake Barker:** Okay. And then finally, do you have any resources that you would recommend for our listeners?

**Annette Patton:** I do. I think one of the first books that I would recommend is the Roadside Geology of Oregon by Marley b Miller.

It's an excellent technically accurate, but approachable guide to the geology that you might see around the state of Oregon.

**Jake Barker:** Great. I actually, I have that on my shelf in my office.

**Annette Patton:** It's such a good book.

**Jake Barker:** Great book. Yeah. Great. Okay.

# [00:38:45] Conclusion and Credits

**Jake Barker:** Well, thank you so much. That is gonna wrap it up for us.

We will share that resource as well as any other resources on the podcast website. But thank you so much for joining. We really appreciate your time, and we enjoyed learning a little bit more about watersheds in Oregon. Thank you, Annette.

**Annette Patton:** So much Jake. It was really fun.

**Lauren Grand:** The In The Woods Podcast is produced by Lauren Grand, Jacob Putney, and Scott Leavengood, who are all members of the Oregon State University Forestry and Natural Resources Extension team. Other members of the team who've been involved in the podcast include Carrie Berger. Jason O'Brien and Steven Fitzgerald. Episodes are edited and produced by Carrie Cantrell.

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Until then, what's in your woods?