30 Brave Minutes Podcast
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Dr. Richard Gay

Welcome to *30 Brave Minutes*, a podcast of the College of Arts and Sciences at the University of North Carolina at Pembroke. In *30 Brave Minutes*, we'll give you something interesting to think about. I'm Richard Gay, Dean of the College of Arts and Sciences, and with me are Associate Deans Ashley Allen and Joanna Hersey. Today we have with us Dr. Jerry Griffith, who is an Associate Professor in the Department of Geology and Geography. He is an expert in environmental geography and remote sensing. Now get ready for *30 Brave Minutes!*

Hey Jerry, tell us a bit about yourself.

Dr. Jerry Griffith

Hi, thanks, it's good to be here, so I started at UNCP last year, I teach Principles of Geography, World Regional Geography, Weather and Climate, Geographic Information Systems, Remote Sensing, and BioGeography.

Dr. Richard Gay

You've got quite a lot of skillset going there, something that I'm really hoping that we'll be able to promote more of in the future is our GIS offerings in the College.

Dr. Jerry Griffith

Yeah, it's a growing technology, you can think of it as digital mapping, a little bit more sophisticated than that, but a skillset very much in demand.

Dr. Richard Gay

And, it's in demand outside of the sciences as well, often we think about it as just being something for scientists like yourself, but in fact lots of digital humanities and other folks use GIS.

Dr. Jerry Griffith

Absolutely, geographers map patterns of anything and everything on the surface of the earth, so that includes natural patterns and that includes social patterns, patterns that humans make as well.

I got my Bachelor's Degree at Penn State, that was in Earth Sciences, although that's a geography focus within that program. I worked a little bit after I got my degree, I worked for an environmental consulting company doing water quality sampling, sampling from water at landfills, which is something a colleague of mine, Madan Maharjan, does. I went and got a Master's Degree at Oregon State University, where I specialized in Environmental Geography, and for my research there I studied an urban wetland system and assessed it's functionality, that was an urban wetland in Corvallis, Oregon. After that, I worked for another environmental consulting company, performing wetland delineations. Believe it or not, wetlands are protected ecosystems, federally protected, so whenever you develop land, build a new housing subdivision, extend an airport facilities, you have to check the land to see if there are wetlands on it, and you have to delineate the boundary of that to see if you are impinging on that.

I worked at Oakridge National Laboratory doing a lot of environmental impact statements, employing Geographic Information Systems, or GIS, to do that, and then I went for a PhD at the University of Kansas, specializing in Environmental Geography and Remote Sensing, and for my dissertation research there, I used satellite imagery to look at the landscape of Nebraska, Missouri, and Kansas, and I related those satellite measurements to water quality measures, and it was able to actually find some relationships, strong relationships, between some of these satellite drive measures, and the water quality in some of the streams and rivers of the Midwest.

After that I did a postdoctoral appointment with the U.S. Geological Survey performing analyses of land cover change across the United States, and this uses satellite imagery to do that. From there, I've bounced around a bit. I worked at the University of Southern Mississippi for a while. I was out of academia while caretaking for my dying father. After he passed, I've gotten back into academia, and after a few adjunct and temporary positions, here I am at UNCP.

Dr. Joanna Hersey

We're so glad to have you at UNCP.

Dr. Richard Gay

One of the wonderful things about your story, shows that, the progression, right? You started out as an undergraduate just like our students, and then life took you on this wonderful journey, and I think one of the valuable things that our students will get from having you in the classroom, is that you have all that life experience. You worked in the industry, you worked for the federal government, and those are experiences that a pure academic, so to speak, might not be able to share with our students.

Dr. Jerry Griffith

Right, agree, and I think I can share some of those things, what life is like working for a private company. I've had internships with several government agencies, from county planning agencies, to working summers at NASA facility in Mississippi, the U.S. Geological Survey, I volunteered with the National Park Service, and the U.S. Forest Service, Pennsylvania State Parks, and of course, now with my academic experience.

Dr. Joanna Hersey

Is Pennsylvania your home?

Dr. Jerry Griffith

Yeah, I grew up outside of Reading, Pennsylvania, which is about an hour, hour and a half northwest of Philadelphia, the so-called Pennsylvania Dutch country.

Dr. Joanna Hersey

Right, right, and was there a moment that you can point to where you realized this was what you wanted to do?

Dr. Jerry Griffith

My favorite class in high school was biology, but of course you have cells and tissues and organs and anatomy, but in many biology textbooks and courses, at the end of the semester you get into population biology, seeing how deer and coyote populations fluctuate. Then you talk about ecosystems, and biomes, that was the part I really liked, when I saw those maps and discussions of soil regions and soil types, ecosystem types, climate types. That's a little bit really of physical or environmental geography. I started out as a freshman at the University of Vermont, I got homesick, things weren't going great, I went back home to Penn State. But, I took a class at University of Vermont, called Physical Geography, and everything in that class just clicked with me. And so, that's pretty common for geography majors, you don't get a lot of high school students coming in as a geography major, but they take a class and it kind of resonates with them.

I wanted to learn more, I went back for my Masters, worked a little bit, and I thought I'd be more of a researcher. When I started my PhD, I don't think teaching and working as a professor was on my mind. I was pretty shy, and I had a hard time speaking in front of people. I remember as an undergrad, it was the most nerve-wracking thing for me to have to give a twenty minute presentation. I almost thought about not doing it, that's how much of a phobia I had, but I got through it, and now, I think students sometimes think I talk too much [laughter], it's funny how things progress. But, when I was a PhD

student, I was a teaching assistant, and I enjoyed it, I found out I really liked teaching to other students, and I got good feedback. So that changed my feelings, and at the end of my PhD I thought, I think I am going to try to see if I can land an academic professor position.

Dr. Richard Gay

Well, we're thrilled to have you with us today, and I know our students are really benefiting from having you in the classroom, and I understand you're doing some research on timber tracking, and you're involved with some citizen science programs?

Dr. Jerry Griffith

Yeah, so let me first just tell you what citizen science is. It's when regular people, who aren't necessarily professional scientists, help out with the scientific research. They can contribute their time, observations, and even collect data to assist the scientists in gathering information about lots of things, like tracking wildlife, Monarch butterflies, monitoring weather and putting that into their phone, or collecting some data. And everybody now has, and for your listeners I'm holding up my smart phone, this is a data collection tool, and smart phones, most of them have GPS functionality. So when you're a scientist collecting data on something, you can go out in the field and record this, and it can also be geo-located. It can be uploaded into a digital map, and you can type in your observations of whatever it is you're collecting.

I am involved, kind of as a volunteer, in helping this group Adventure Scientists. I got into this because, my career of late has been more at teaching universities, and with a heavy teaching load, there's not a whole lot of time to do your own research. Helping out with this project with this group called Adventure Scientists, allows me to participate in some research. I learn new things actually, myself, I get to go out in the field and hone my skills, for example, identification of trees. It also inspires me, I can take offshoots of this data and present it at conferences, I can involve some students with it.

I'll tell you a little bit about Adventure Scientists, they are a nonprofit group based in Bozeman, Montana, and they organize these citizen scientists to collect data for groups. In this particular case, the U.S. Forest Service, and the U.S. Forest Service is interested in collecting leaf samples, twig samples, and sometimes a little tree core, that you can drill into a tree. We collect these data for them, ship them back to Adventure Scientists, and they forward them to a U.S. Forest Service lab. Now, what are they doing this for?

Believe it or not, certain tree species are being poached from public lands. Now, we often when we think of poaching, we think about rhinoceros horns or elephant tusks,

and animal, but believe it or not, some tree species are valuable enough that people illegally harvest them from public lands, national forests. And this is becoming a problem, some tree species like Black Walnut, they are very prized, they make beautiful furniture, they have beautiful grain on the wood. They are sometimes used to make very high-end acoustic guitars. So for all of these reasons, there's enough of an incentive to take some of these trees illegally from our public lands. And if not the whole tree, sometimes slivers of them, there are these growths on trees called burls, they kind of grow in response to maybe an injury, an insect or fungal infection, and so are these kind of semi-circular mounds on the sides of trees, but they have very intricate designs, and sometimes these poachers will slice them off, and they will make a nice coffee table, or some type of piece of furniture.

So that's why they want this data. They are budget-limited, you might think, why can't they just get the Forest Service employees to do these, get this data? We have forests all over, Croatan National Forest here two hours to the east of us, Uwharrie National Forest an hour and a half to the northwest. The genetics lab that is focusing on this is separate, and they don't have the time and money. They need the volunteers, and this group Adventure Scientists also gets some pretty big donations that they can leverage. So they are the ones who organize, they are the ones who train and select volunteers, and get them to follow the protocols and they make videos to train them, they supply the citizen scientist volunteers with the equipment and the data.

So then, the Forest Service, believe it or not, has a genetics lab and a chemistry lab, and they take genetic profiles from these leaves and twigs and tree cores. They can hone down to a specific location where an illegally harvested wood product might be, and they can begin to match this. So this is forensic analysis, just like everybody knows about with all the podcasts on unsolved murders, they can find a piece of illegal wood product, and match it to an area that it came from. It has been used to prosecute some people who have illegally harvested or poached these trees.

Dr. Richard Gay

This is absolutely fascinating to me, the application of multiple scientific processes, the different disciplines that are involved in this, and I was wondering if you could tell us a bit more about the various species that we can be on the lookout for? Maybe I have some in my backyard and I can make some money!

Dr. Jerry Griffith

Sure, a lot of these were in the West Coast where they started, Alaska yellow cedar, big leaf maple, and most people know about the beautiful trees, coast redwood and western red cedar. Here in the eastern U.S. they started to collect a few more species,

black walnut, eastern white oak, and although the species that I'm currently helping to collect on aren't being poached, they're pretty common, they are tulip poplar and ash, green ash and black ash. So that's what we've been collecting, I have collected from places near Raleigh, there's a nice state park right next to the airport, over to Uwharrie National Forest, down to Myrtle Beach and along the border of South Carolina, and all the way over east to Croatan National Forest, Cliffs of the Neuse State Forest.

So that's what I'm working on right now, and besides using this genetic information for forensic analysis, this also helps them manage these species. They are creating a library of these chemical signatures in the trees, genetic libraries, and it helps them manage trees in preparation for climate change. They can look at some of these areas and find, maybe, trees that are a little bit better adapted to climate change, so not only are they using these to combat poaching but also in management. Of course, the U.S. Forest Service, one of their primary goals is to manage our nation's public forests and grasslands.

Dr. Richard Gay

Do you think that they'll ever use this information to help genetically modify trees in light of climate change or something?

Dr. Jerry Griffith

I think that's a possibility. I know sometimes they will get seeds from certain areas, and when they do reforestation, they will maybe use seeds that might be better adapted to future conditions, and might be better adapted to grow in these changing climates that we're seeing.

Dr. Ashley Allen

So what first attracted you to this particular citizen science project?

Dr. Jerry Griffith

I must have stumbled upon it somewhere on the website, and again, when I was an adjunct professor and loaded with heavy teaching loads, this gave me a chance to get back out in the field. It's really fun driving around the state, and I've done this in Michigan, I've done this in Pennsylvania, I've done this in New Jersey, as a geographer I like seeing the landscapes. So when I saw this advertised, I thought, yeah, you know what I think I'll try this out. Because, I don't have a tool called an increment borer, this is something that you screw into a tree, I'd show it to you but since we don't have video here it doesn't make sense, and it gave me a chance to actually do this, and I can show students while I have this equipment, and my hope was maybe I could get

some students interested in tagging along with me, so maybe they could do it and get some experience with field data collection.

They also had another project where they were collecting data on national and wild scenic rivers, I think this was for the National Park Service, but collecting water quality, and so they would lend out water quality probes, and that's another area I'm interested in, water quality, and there are a lot of citizen science groups that go out there and monitor local streams and rivers.

Chancellor Cummings

This is Chancellor Robin Cummings and I want to thank you for listening to 30 Brave Minutes. Our faculty and students provide expertise, energy, and passion driving our region forward. Our commitment to southeastern North Carolina has never been stronger through our teaching, our research, and our community outreach. I want to encourage you to consider making a tax-deductible contribution to the College of Arts and Sciences at the University of North Carolina at Pembroke. With your help, we will continue our impact for generations to come. You can donate online at www.uncp.edu/give. Thanks again for listening. Now back for more 30 Brave Minutes.

Dr. Richard Gay

Have you used your satellite knowledge to locate any trees that you might be investigating, can you identify them from space?

Dr. Jerry Griffith

Well, not individuals like this, but with satellite some of these are to the point where they have fine enough resolutions that they can detect over an area, that this is an area of a certain type of tree, because they reflect sunlight in a certain way. That's what the satellites really collect, how light is reflected off of things on the surface of the earth, and the differences allow us to detect different changes, as broad as just crop land from a natural forest. But sometimes, if the technology is good enough, we can identify specific crop types and broad forest types. It really helps me keep up to date with the technology, because, it integrates, we've talked about biology, but it integrates geography, because all this is managed with a Geographic Information System. These folks set up a little digital mapping website, where you can pick the area that a volunteer is going to go to, and how many samples you're going to collect, so somebody else doesn't go to the same site.

The Forest Service generally only allows a certain number of trees to be sampled, and you have to get the permit, and when you go out to your field site, you bring up a GIS app on your phone that tells you, your name, and you plug in your location, you tell us

what species you're looking at, you take pictures of the tree and your leaf samples, and you write notes about any special circumstances. So these are all things that a geographer and a GIS specialist would set up and have to learn about, and when I go onto web, or Zoom meetings of all the volunteers, I see plant pathologists on there, I see other scientists as well as just people who like being outdoors.

Dr. Ashley Allen

So if somebody wanted to get involved in participating in citizen science, what would be their first step?

Dr. Jerry Griffith

Find a group, locating a website, googling, looking for community watershed monitoring, they're all over the place. Or if you just google adventure scientist they have a number of projects right now. In addition to this timber tracking project they're calling it, they also want volunteers to collect data on coral reefs, and they are looking for trained scuba divers who want to go out and help collect data. And like I said before, they wanted water quality data, so some of these rivers in the natural scenic river program are actually quite remote, so you need to kayak through them.

So, that's the adventure part of Adventure Scientists, but just a little bit of searching on the web will help you, contacting local groups, there are many local conservation organizations. Of course, national organizations like the Nature Conservancy or Sierra Club, probably could get you a link to some of these groups where they want volunteers to collect data. And then you know, even a lot of elementary schools, they do this Monarch tracking, where you're putting a little tag on it, so they can see if they wind up in Mexico where they winter.

A big project is understanding the phenology of vegetation, that is the timing of plants, when they bud-burst, when a crop or a tree begins full leaf-out, when they begin to change colors, and with everybody having a smartphone that they can track a location, they can get all this data on when a certain tree species, or vegetation in general, the buds are bursting. And as we get climate change, these timing events are changing.

Dr. Richard Gay

I'm curious if a poacher could use access to the maps that you mentioned online to find out where the choice trees are.

Dr. Jerry Griffith

Well, that's a good question. At least with this project, you have to have a user ID and password to access our maps. However, there is an app out there called iNaturalist, it's

very useful. This is another app where people, whether you are a professional botanist or a professional forester, or anybody, can identify a tree and upload it to this iNaturalist. Anybody can access that.

I've read a book about tree poaching, a recent book has come out, *Tree Thieves*, it's not as clear cut as to these tree poachers being bad guys. With the restrictions, especially in the Pacific Northwest, put on national forests, reduced logging. These former logging communities, they are really struggling, and the people there, who may have lived there for generations, resent the federal government coming in and restricting the amount of trees that can be harvested. This has put a tremendous amount of strain on the social systems there, unemployment, all those things that go along with unemployment, alcoholism, addiction, this is part of the problem. So this book was very thought-provoking to me, it didn't paint these poachers as purely evil, bad people, and the U.S. Forest Service and the federal government has to work to ensure, you know, a transition, of many of these former logging towns, to a different kind of economy. There has to be some kind of safety net.

Dr. Ashley Allen

Well, I do appreciate that you have presented it as not a black and white situation, I mean there's a lot of gray and nuance in there.

Dr. Jerry Griffith

Absolutely.

Dr. Ashley Allen

In terms of your work with citizen science, and this project in particular, has there been anything really surprising that you've come across?

Dr. Jerry Griffith

In general, about citizen science, a lot of these people are very passionate and they want to learn, and I think that's great, and sometimes they do very good work. In a group back in Pennsylvania that I worked with on collecting water quality data, there was a semi-retired engineer who was doing basically, a lot of, I think, science. He was putting out reports, he's submitting these reports to state agencies to show how the water quality has changed over time. So although they might not be professional, a lot of these people collect quality data, and it's very, very useful, and I think more scientists will be taking advantage of this in the future.

Dr. Ashley Allen

So what do we do about the opposite? So if someone's not doing a great job? [laughs] How is that identified?

Dr. Jerry Griffith

I guess, any other type of quality assurance, quality control procedures, looking at your data, seeing if there's any unusual example, that goes into the training of these people and this group Adventure Scientists, they do a good job. They are young folks, I think in their 20s or early 30s, but they're very quite professional, and they make videos for training, you have little quizzes that you have to take, and you have to pass, in order to be accepted as a volunteer. They train their volunteers quite well, and for some of these other groups like the water quality monitoring, you have professionals train them, and usually there's a senior member who's done this for a while and they train the new people, so that's how they ensure data quality.

Dr. Ashley Allen

Are there age restrictions? I know, because you talked about elementary school students can even get involved in this at a lower level, but if you have a seventeen year old who's like, I'm really committed to this...

Dr. Jerry Griffith

That would be a prime person, because you know, you do have to, you go through safety training as well. This group encourages people to go out in pairs of two, just to ensure safety, and of course you have to worry about poison oak and poison ivy. I got a bad case on Labor Day...

Dr. Joanna Hersey

Oh no!

Dr. Jerry Griffith

I'm still itching right now. So I'm not good, I wear shorts, but then every once in a while my lackadaisical attitude gets the best of me, but teenagers for sure, if they can commit and be reliable, they would be good examples. But you know, if you're collecting water quality you have to sometimes go up and down the riverbank, so that can be an issue, and just the things you have to be aware of when you're hiking in remote areas.

Dr. Ashley Allen

So, what's next for your research, or what you're going to do with Adventure Scientists?

Dr. Jerry Griffith

Well, like I said, right now, we're still in the collection phase for tulip poplar and green ash and black ash, so I might do a little bit more of that. I have gone to a conference and made a poster about my experience with Adventure Scientists, and that was really of interest to the other people who were at that session, they were very interested in this, and I'm trying to spread the word so this group gets more volunteers. And this is over the whole U.S. remember, so the ranges of these trees, black walnut or eastern white oak, ranges from the Mississippi River to the each coast, from almost the Gulf Coast to the Northern U.S. and they want these samples from all over, so they need a lot of people.

Dr. Richard Gay

I've got to brush up my hiking boots and get out there and do my part!

Dr. Jerry Griffith

Absolutely, and I want to get students involved, I've tried, I haven't had any takers yet. Although this semester, believe it or not I had a Nursing major who was interested in going out with me to get some samples. The timing didn't work out, but I was impressed by that person wanting to do that, and so I hope I can get more students involved because I think it could have offshoots and help them develop some research questions.

Dr. Joanna Hersey

And it shows them this lifelong giving back to the environment, and the discussions we have over sustainability and actions that we can take to change, and this is, I'm so glad to see that you're promoting this in the classroom. Our students are all ages here at UNCP, but especially the ones that are younger, to take that eye to the land with them after they leave here.

Dr. Jerry Griffith

Absolutely, and this is experience. You do something like this, you learn. You learn whether you want to be more of a field person, if you're in the natural sciences, or if you want to work at a computer and in the office and kind of work behind the scenes. You hone your vegetation identification skills, you learn apps, you learn about GIS. So you could put this on your resume as experience, and that's very helpful.

Dr. Richard Gay

Don't forget our lifelong learners as well, I think this would be great for retired folks who want to stay active and get some exercise and develop a new skill of plant identification, or whatever the project might happen to be.

Dr. Jerry Griffith

Absolutely. I'm working with a group at Hawk Mountain, it's a raptor reserve in eastern Pennsylvania, hawks, falcons, eagles, ospreys, vultures, those sorts of things. I am working on a species called American kestrel. It's about a blue jay sized bird, it's the smallest of the falcon species, and it's declining rapidly in the Eastern U.S. primarily because of land use changes, or that could be one factor. So in much of the east, and in Pennsylvania, there is less hayfields and more of industrial agriculture, meaning corn and soybeans. Kestrels maybe eat some of those critters that are more active in grasslands, so when we have more intensive agriculture, less dairy cows, as milk is being less popular, as dairy farms and pastures get plowed into corn and soybean fields. This could be impacting kestrels, and I'm using digital mapping, land cover, which is derived from satellite data, to see how landcover has been changing, and to see the relationship between that and their kestrel boxes, that they monitor and have set up.

So, some of these databases again, remote sensing can be used to actually delineate crops. So for every thirty square meters on the ground, it can tell you whether this was a cornfield, a soybean field, potato field, a cotton field. We have this tremendous database, and I am making little circular buffers in a GIS around their kestrel boxes, and we are looking at a twenty-year period to see whether a kestrel established themselves there, and you look in, you see if they had eggs. You can see how many offspring they had, and we are seeing the transition of populations of kestrel with these changing land covers. So that could be one thing and that's what I'm working on right now, hopefully will be part of a peer-reviewed publication coming out there in the next year.

Dr. Richard Gay

Do you have any results that show they they're, the birds are moving, or they're...

Dr. Jerry Griffith

Oh, yes, so they have data to show that kestrels are declining in numbers in the East Coast. So, you know, the first thing is, is it the land cover, because there could be a number of things. It could be not just the fact that you have more corn and soybeans, so it could be the pesticides that are getting into the rodents which the kestrels eat,

and could be getting into the bloodstreams of these kestrels. That could be impacting their physiology, their reproductive success, the success of the fledgelings, so that's something else it could be. It could be weather, climate could be changing, or you could have weather variations, storms that might be impacting populations of kestrels. So all of these things you've got to tease out in science, and it's a very laborious process, which is why publishing research takes a long time.

Dr. Richard Gay

And a lot of expertise in a lot of different areas.

Dr. Jerry Griffith

Yes.

Dr. Richard Gay

The examples you've been giving us are so interdisciplinary in approach. As you were running through the list of possibilities, I was thinking, could it be light pollution, could it be noise pollution, there are so many things, so many factors that could be in there.

Dr. Jerry Griffith

Those could be as well, and urbanizations, these birds are a little bit sensitive to tractors being run around them. So we have to, for the location of these kestrel boxes, is it near, right near a barn, where you have tractors coming in and out, where you might have dogs and cats disturbing these birds, or humans running around with their four-wheelers. As you get urban, even subdivisions going out in the countryside in Pennsylvania and Virginia, this could be a factor as well.

Dr. Richard Gay

Do you think that you'll be able to take the skillset that you're using in other locations and apply it to rural North Carolina?

Dr. Jerry Griffith

For sure, applying that same kind of analysis. If there's a bird biologist, an ornithologist who studies kestrels and there's a data set for kestrel boxes here, that could be done. I know they're doing that in New Jersey and in Virginia on a statewide level, so for sure could be applied elsewhere.

Dr. Richard Gay

And to another species as well.

Dr. Jerry Griffith

And to another, other species as well, yup.

Dr. Richard Gay

Well I've really enjoyed our conversation today, I've learned a lot, and I can't wait to learn more about it as you have other opportunities to share your work with the university as a whole and with our students. Thank you so much for joining us on *30 Brave Minutes!*

Dr. Jerry Griffith

Thank you, I enjoyed being here, and if there are any students listening to this and want to take geography courses, we're here for you!

Thanks for listening and Go Braves!