Ruth Candler 00:14
Welcome to W&L After Class, the lifelong learning podcast. I’m your host, Ruth Candler, and every episode we'll have engaging conversations with W&L’s expert faculty, bringing you again to the Colonnade even if you’re hundreds of miles away, just like the conversations that happen every day after class here at W&L. You'll hear from your favorite faculty on fascinating topics and meet professors who can introduce you to new worlds and continue your journey of lifelong learning.

Our guest today is Elizabeth Knapp, director of the Johnson Program in Leadership and Integrity and professor of geology. Elizabeth joined W&L’s faculty in 1997, but her association with the school goes back much farther. Raised in Lexington, she is a member of the W&L Class of 1990, graduating with honors — no surprise here — in geology. Her research in geochemistry, water quality and contaminant transport, rock weathering processes and paleoclimate has taken her to locations as far-flung as Hawaii and the Pyrenees, and she has served on more than 30 university committees. Elizabeth, thanks so much for joining us today.

Elizabeth Knapp 01:27
Ruth, thank you so much for having me. I'm excited.

Ruth Candler 01:30
That 30 university committees... busy, aren't you?

Elizabeth Knapp 01:33
Busy, yeah. [laughter] Not all at the same time, though!

Ruth Candler 01:38
That's fair. So let's begin with geology. How and when did you discover your love of rocks? And what set you on the path to becoming a geologist?

Elizabeth Knapp 01:50
That is a great question, Ruth. You know, since a young age, I have always been interested in nature and in science. My dad, an environmental engineer and hydrologist, used to take me on many river adventures, including documenting floods, going on overnight canoe trips and weekend afternoons at Indian Pool and Goshen Pass. I've also had a lifelong association with Nature Camp in Vesuvius, where I went as a kid, and that shaped my early world as an environmentally minded person. But it was my first introductory geology class with Sam Kozak in the Winter Term of my sophomore year at W&L— I was a recent transfer student as well as coed—and then after that, a subsequent Spring Term class on the geology of the Southwest with Ed Spencer, that got me hooked on geoscience and shaped the course of my career to come.

It was these experiences with my geology professors, both Sam and Ed, as well as Odell Maguire and Fred Schwab. Also learning along with my classmates, including our Spring Term travel courses and weekend adventures, and sometimes misadventures, great opportunities for summer fieldwork in Canada with the Keck geology program, that led to a senior thesis, my honors thesis, all this within our
liberal arts setting here that helped shape what I wanted to do and what I continue to want to do when I grow up.

Ruth Candler 03:09
That was early, your dad definitely helped set that path in stone.

Elizabeth Knapp 03:14
Yes, absolutely.

Ruth Candler 03:15
Oh, that was a bad pun. I'm sorry. [laughter]

Elizabeth Knapp 03:18
Oh, I loved it!

Ruth Candler 03:18
I'm sorry about that. That was awful. So one thing I really enjoy about talking with scientists is that like artists, or philosophers, they see the world differently than the rest of us. I've heard it said that geologists "read" a landscape. Would you explain how that's done?

Elizabeth Knapp 03:39
Sure, gladly. So, you know, a landscape, of course, is everything you see when you look across an area of land—its character, its shape, including the hills and the rivers and buildings and roads and trees, plants and the climate. And yeah, it's getting a sense of place from understanding, I think, really three things. One is the underlying geology, so including the rocks and the soil of a landscape, the tectonic history, meaning how the earth has moved and pushed and pulled and molded the rocks and shaped the land in that way. And then also active surface processes, meaning things like water and wind, and maybe glaciers or coastal processes that have also shaped it. So all of the rocks and the soils and the vegetation, topography or the shape of the land, tells us about the possible history of that land. But, too, for us also evokes a sense of artistry and wonder.

Ruth Candler 04:37
That sounds like a wonderful process, and almost being mindful of your surroundings. So moving just a little deeper into that landscape, would you walk us through the analysis of a rock? Like if you're trying to figure out, say, how old a rock is, or where it came from, what are you looking for?

Elizabeth Knapp 05:00
Right. So, you know, first—and this is what I tell my students also—I would first locate where I am, maybe on a map, right? One of the things that my former mentor Ed Spencer, who I have already mentioned, he used to always tell us, "If you don't know where you are, you don't know anything." And so, you know, really understand sort of where are you located and what you're actually looking at because that gives you some context for it.
And then secondly, and I talk to my students about this all the time, we try to understand whether that rock is what we call in place, is it sitting in an outcrop? Is it still in the place where it was formed, or maybe got tilted, etc., or has it been transported or moved from its original location, right. So you might look to see if it has been transported just by gravity, falling off of its original place, maybe along a roadside. Has it been transported by a river, maybe by a glacier? And you can tell some of that by whether or not it's been smoothed or rounded. We've all been along a riverside, and we see cobbles along a river, and you can tell that the river has transported them from where they originally were formed. And so that can tell us something.

And then secondly, we try to understand what you can see in the rock. So can you maybe see individual minerals? So if you were looking, let's say, at a rock you might find in the core of the Blue Ridge Mountains, a granite, you might be able to see individual light and dark minerals to tell something about that rock, so the texture of the rock, or you might find a rock that's cemented bits of other things, like a sandstone. You might find those maybe along the ridges of House Mountain or in Goshen Pass. And that can tell you that you're then looking at a sedimentary rock. And so part of what, when I look at a rock, I try to look at its texture, and what it's made of, and try to understand, am I looking at something that was formerly in a beach setting, which many of our rocks that we now have at the tops of our mountains were, or maybe something that formed under a shallow sea, like the limestones we would see beneath us today, Ruth, you and I right here. Or maybe it was something that was formed in an earlier volcano in the region or deeper in the Earth. And so we try to understand how did it get to where it is today, and what was the context of its original formation.

And then, as you mentioned, there are other kinds of features that can tell us more about the history of the rock. There might be fossils that are in that rock that can tell you about the age. There might be folds or breaks in the rock that can tell us something about other forces that have impacted that. And now, of course, as geologists, our understanding and identification of rock goes far beyond sort of field observations, right. We would take a rock back to the laboratory, we would look at it under a microscope, we would do chemical analysis. But, you know, anywhere you go, you can learn a lot just by looking at the rocks of a particular region to help you understand the history of that area in the context of the landscape.

So today, there are a lot of great online resources, and even apps that you can use to go anywhere, and using GPS, it'll tell you what kinds of rocks to expect underneath you. So that's a great thing. Whenever I travel anywhere, one of the very first things I do, of course, is to try to look at what the history of that area is when I'm traveling to a new place. So there's lots that anybody can begin to learn in your travels across the country and the world about the geology of a particular landscape. And it's very easily accessible even to the layperson, on many websites.

Ruth Candler 08:23
I have two thoughts with that. The first is, after the recording’s done, I'd like to get a list of those apps so that we can include them in our episode notes for our listeners.

Elizabeth Knapp 08:32
Yeah, that would be... Yes!
And then the second. So, you know, if you were blindfolded and someone picked you up and dropped you off somewhere else in the United States, would you be able to identify where you are based on the rocks?

I could make some intelligent guesses, right. I mean, I think there's, for example, that there are a lot of landscapes that are covered with limestone, much like we have here. Areas of Florida, across some of the... Missouri and some of those other areas, so I could narrow it down. And I might be able to use other things like climate and other things to try to figure out where I am. The mountains, some of which... I was in Vermont this past week, and those mountains in many ways are much like our mountains here, but they've also been glaciated. And so some of the rocks, even though very similar in age to what we see here, I could also tell by looking at the slopes of those ski mountains that they actually were a little bit different because glaciers had affected those rocks and not here. So... There are a lot of different pieces, so I would say I could probably narrow it down to a few possible spots in the country if I could see the rocks.

That's fun to think of. Some of your research has to do with how rocks weather, or break down, and how that weathering affects carbon dioxide levels in the atmosphere. I find that so fascinating, the relation between rocks and the atmosphere, but that relationship—to me, anyway—may be just a little difficult to comprehend. Can you walk us through the effect that rock weathering has on the Earth's carbon cycle?

Yeah, absolutely. You know, as we think about the global carbon cycle these days, and we think a lot about carbon dioxide emissions into the atmosphere, and especially humans' role in that system, rock weathering is one of the ways that carbon dioxide is taken out of the atmosphere naturally. This happens because CO2 is dissolved in rainwater as it's passing through the atmosphere, and then more carbon dioxide gets picked up through microbial respiration and soil. So when bacteria break down organic matter and soils, they give off CO2, so that makes more CO2, even in water that's passing through the ground. So that creates something called carbonic acid. It's a very weak acid, but it's also a primary cause of chemical weathering, or the breakdown of rocks. And so this reaction varies a lot—by rock type, by climatic factors, including temperature and rainfall, for example. And it's an area of study that's necessary for our understanding and the modeling of climate and climate change over geologic time, right.

So as we think about the shifts in climate over time, these are, you know, one part of the natural climate cycle. So I've had the great fortune to study these processes with our students right here on our very own back campus, and the underlying limestones here; in the Rose Hill formation, which creates these shales and sandstones up and down the Appalachian region, a collaborative project with some folks at Penn State; and most recently, I've been doing work in what's called the Alakai Swamp, which is in the center highlands of the island of Kauai, that's one of the oldest of the main Hawaiian islands, about 5
million years old, and in that center part is one of the rainiest places on the Earth. So it rains more there than almost anywhere else on the Earth. And so we try to understand better how much carbon or removal of CO2 is there with the weathering of those basaltic volcanic rocks in this very high intensity rainfall environment.

So for many, many scientists studying these processes around the globe, and in many different geologic and climatic environments, it's something that we call the critical zone. So this is the area from the bedrock, meaning the solid rock, up through the soils and into the atmosphere. So all of those reactions that are happening there can help us better understand the role of these processes in natural Earth systems and global cycling. So it's one piece of a large puzzle.

Ruth Candler 12:38
Great explanation, still mind-boggling to me. I may ask for a couple of your papers to post on our episode notes for that and just to brush up as well. Over the years, you've taken W&L students on a number of trips, and you've said that one of your favorite places for field study is Hawaii, not just because of its natural beauty, but because of the way people relate to the land there. Would you elaborate on that relationship for us?

Elizabeth Knapp 13:11
Yes, happy to. You know, since ancient times, Hawaiian people have had integral connection to and stewardship of the land and the surrounding... and the sea surrounding the islands, from traditional division of land to current understanding of both environmentally vulnerable and sacred spaces. Hawaiian oral history and tradition, including chants, story and hula, for example, for the Hawaiian deity of Pele, the goddess of volcanoes, and her sisters, including Namaka, the sea goddess, and their constant struggle throughout the islands and time, reflect and enhance our scientific understanding of tectonics, the creation of new land with volcanic processes and the constant competing surface processes that are breaking down that land. Further, local geologists have recently been much more attuned to oral tradition and chants, for example of Pele and her younger sister, Hi’iaka, who is the goddess of hula, and understanding how those stories of past eruptions in volcanic events that happened prehistorically helped to really enhance our understanding of the eruptions on Kilauea.

It's a wonderful place to study the many different ways of knowing, to understand our world. And I see this approach as a really more holistic way of studying geosciences, respecting history, respecting culture and the peoples of the lands that we visit, as well as their sacred spaces, and bringing in multiple aspects of understanding land so that all our students can be sort of more included along what their interests are in the liberal arts, whether it's culture, whether it's arts, whether it's sciences. And so I think it provides a sort of rich learning environment for everyone.

Ruth Candler 15:01
That's a wonderful way to look at that. Well, your description of that relationship between people and the land gets me thinking about our own geology and the way geology has shaped Rockbridge County’s history. What can geologists tell us about how the Shenandoah Valley formed?

Elizabeth Knapp 15:23
Yeah, so first, Ruth, you know, while it's... we culturally think of and put on our publications and all of that that we're part of the Shenandoah Valley, in geology terms, we're technically not.

Ruth Candler  15:35
Really?

Elizabeth Knapp  15:36
Really. So to actually be in the valley of the Shenandoah River, even though, again, it's culturally thought of as being part of the Shenandoah, you'd really have to drive about 20 miles northward on I-81, or Route 11, north of Raphine, Virginia, to the Rockbridge County-Augusta County border. And if you do that, you actually notice you're going uphill the whole way until you cross over the county and you realize that you're actually changing over into a new drainage divide, which is the drainage divide of the Shenandoah River. Now, so, as W&L is not actually located in the Shenandoah River Valley or the Shenandoah Valley, we actually started that way. So we think about Augusta Academy was Washington and Lee's roots when we first began, and that was in the Shenandoah Valley. So we have our roots in the Shenandoah Valley. But we're about 20 miles north, I mean 20 miles south, in an area that's geographically called the Great Valley of Virginia.

And so we're actually part of the upper James River watershed, which is also a very important waterway and contributor to what flows into and impacts the health of the Chesapeake Bay. So we worry a lot as hydrologists and geochemists and biologists about what's happening in these upper chains reaches because that does impact the health of the Chesapeake estuary. So Woods Creek that comes through our campus and into the Maury eventually flows into the James at Glasgow and then eventually to the Chesapeake Bay. So we also talk about our... the Appalachian region, so the mountains all up and down the eastern seaboard, those old, old mountains, as part of different physiographic provinces. And so we're in what is called the valley-end ridge. What that means is we have a sort of landscape that is valleys, and these series of ridges. To our east is the Blue Ridge province. So those are very old, billion-year-old rocks that are older yet stronger igneous and metamorphic rocks, and those form the ridges along which the Blue Ridge Parkway and part of the Virginia Appalachian trails run. But where we are here in the valley is, you know, underlaid by weaker limestone rocks, and as you get to places to our west, like House Mountain and Goshen Pass and North Mountain, places that we all enjoy, those are made of a little bit stronger sandstones, or silicate rocks.

And so that landscape is sort of, you know, part of a sort of geologic history, as well as what kinds of rocks are different parts of the landscape made of. And thinking historically, of course, the geology and the landscape, and certainly the rivers, all contributed to the early European settlement patterns of the region, including the development of the valley, and foothill farming settlements, and also early economic, like early the ironworks that were part of some of the early economic pieces of the region. So it all has a sort of interplay in the way in which this region was developed.

Ruth Candler  18:32
You've definitely changed the way I'm going to look at driving up Route 81 in the future, that's for sure. So Rockbridge County was named for Natural Bridge, a geological wonder of some renown. Thomas
Jefferson described it, George Washington allegedly carved his initials on it, and Herman Melville mentions it in Moby Dick. So for those of us who may not be familiar with how the Natural Bridge was formed, would you explain its formation geologically?

Elizabeth Knapp 19:09
Sure, and, you know, there are several parts to the story of the Natural Bridge and how it formed geologically. It kind of goes back to those three things that I mentioned earlier about what shapes landscapes, right. So it’s originally the type of rock, so what was deposited there originally, and then what we think of as the tectonic history, so how the rocks were pushed and pulled and shaped in that way, by forces, and then later what we call surface processes. And what’s important, particularly, at Natural Bridge as is where we are here at W&L, is what we call a karst environment. And so this is the weathering of rocks that are carbonates, like limestones, where that carbonic acid actually begins to break down rock underground. So that gives rise to this whole region of the valley that has caves and sinkholes and all of that.

So that's kind of how it really worked. And basically, Natural Bridge is the remnant of a cave roof that collapsed. But it’s got a kind of back history to some of that, too. So the rock itself at Natural Bridge was formed about 550 million years ago, during what geologists would call the Ordovician Period. So we named different time periods, basically, based on what lived in the water, or later on land, during that time. So as limestone developed in the ocean bottom, so it would've been a shallow sea around this area, and the little calcium-rich shells and things died and fell to the bottom, and some of that rock was also chemically altered to be a slightly stronger rock, something we call dolomite. It’s got some magnesium in it. So the rock right at Natural Bridge is a little bit stronger. And then later, around 250 million years ago, as tectonic plates collided in this region, making our mountains, it also caused the rocks of those areas of the bridge to be folded into kind of an upward U-shaped pattern, it’s something we call a syncline. And the rocks of the bridge itself were actually relatively flat at the bottom of that U.

So if you go to Natural Bridge, as you're walking down the pathway from the top of the state park, you can actually see the rocks are tilted on one way, and then they flatten out right where the bridge is, and then they tilt back up the other way. So we’re actually at a sort of little bit less deformed spot right where the bridge is today. And then more recently, probably more on the order of, you know, 500,000 years, about a million years, these rocks are still underground. [laughter] I know, that seems like...

Ruth Candler 21:36
You said recently! That's not recent!

Elizabeth Knapp 21:39
But at that point, those rocks were still underground, right? They have formed, they've been bent, but they were still... the land surface was well above them. So water started to seep down underground. And as I mentioned, that carbon dioxide became dissolved in the water and slightly acidic, and that water dissolved and started to carry away some of that calcium carbonate. And then spaces started to open up in the rock underground. And so it began to get larger and larger passageways, right, to form a cave. And then as it got bigger and bigger, some of the places of that cave would start to collapse.
So you've... people have seen, of course, like, along even on our back campus, or you go back to Peniel Farm, sinkholes, right, these places where an underground cave has collapsed, and you get sort of a depression. And as that started to happen more and more, water from other areas upstream started to divert, or what we call get stream captured, into those basins. And so you started to collect more and more water to start coming through that cave. And so that increased water began to make that cave deeper, so you got a very significant gorge underground. And then eventually the roof of the cave mostly was just unstable, and it collapsed. And so what's left of Natural Bridge is just what's left of that cave roof. It might be a little stronger rock, it might be a little less deformed. So it's got a fantastic history that includes lots of things, but in sort of geologic terms, it probably doesn't have a whole long history to come.

Ruth Candler 23:09
So you mentioned that dolomite was a strong rock. Is that what... Is it the dolomite that's left in the bridge right now that's holding it steady?

Elizabeth Knapp 23:19
That's my understanding, that, you know, there are places in Rockbridge County where there is dolomite that's a little bit stronger rock. It's in places like Timber Ridge or some others that are a little bit higher landscape. So the fact that you stick magnesium in this carbonate structure does help it be held a little bit tighter. So the rocks... That rock is just a little bit stronger than the surrounding carbonate. So that's thought to be part of why it is, sort of, a little bit more, you know, resistant there to collapse.

Ruth Candler 23:50
Okay, well, thank you for that description. That was fascinating, and for alumni who are coming back to campus that haven't seen Natural Bridge, I have a feeling they will put that on their bucket list.

Elizabeth Knapp 24:01
Yes. And I would say, too, you know, it's recently passed over into state, you know, state park management, and they've done a fabulous job of putting in new trails and, you know, lots of new interpretive work. So, yes, I think it's a fabulous place, even if you've visited... for those, you know, back in the day where they take them there to... take the new students there for orientations, I would say if you haven't been in many years to definitely make a trip out there.

Ruth Candler 24:27
Geology has a reputation at W&L as leaving a particularly strong mark on its students. Why do you think there's such a strong connection between alumni of the geology department and the university that stretches back decades?

Elizabeth Knapp 24:44
You know, we all have, of course, a shared passion for learning about the world around us, and sort of... we call it being in the field, right, so traveling together, working in labs outside together with our fellow students and faculty really creates great bonding experiences, and we all know that regardless of what sort of generation we had, right. We had our own experiences here in the department, and we want to share that across generations and pay those opportunities forward. In addition to the generosity
of our alums in both time and support for our current students, we also really love to get together and celebrate one another, whether it's regular reunions on campus or gatherings across the country during national geoscience conferences. And, of course, during those, we always plan both local field trip days and gatherings over food and beverages.

I think of it as a sort of special place within a special place, right. And that... and I'm certainly incredibly grateful for what it has given me, and I certainly try to help share that with many, many next generations of geology students.

**Ruth Candler 25:45**
During the pandemic, we talked about silver linings, and one of those silver linings that you mentioned was time with your daughter. And you started a research project with her last year, and she's college age, right? Now?

**Elizabeth Knapp 26:08**
That's right. That's right. Yeah.

**Ruth Candler 26:09**
Tell us about that project and what it was like to work on a project with your daughter.

**Elizabeth Knapp 26:16**
Yeah, so my daughter Jenner is a junior out at Whitman College and is a geology and environmental studies student. What was so interesting during the pandemic, as we were learning that things were getting canceled, right, so all of our research travel was cancelled, her research travel, her research experiences were canceled, we knew that she'd come home for the summer. And I spent a lot of time during the pandemic walking around this area of Brushy Hills, it's a 500-acre wooded area that is owned by the City of Lexington. It's a beautiful space, lots of trails.

**Ruth Candler 26:47**
So peaceful, yeah.

**Elizabeth Knapp 26:49**
Another place that, you know, we love sort of biking and hiking. But I've noticed in that these sort of what they call tree throws, or trees that have been pulled over by some kind of process that are one of the ways in which hill slips get broken down. And I've done some research with several other students in the past, but I tried to come up with something that didn't need a lab, didn't need indoor time, because all of that was cancelled and shut down because of COVID. And I also wanted, because her research experiences were being canceled, to have an opportunity to have her continue to be engaged in science, even during that.

So we develop this project, we go out, at least, you know, in the mornings for about a month of the summer, and measure tree throw in Brushy Hills, and it was fabulous. And having that experience and being able to kind of write that up and explain that back to her faculty has gotten her an NSF-funded research project for the summer, you know, having that research experience. So it was really special to
get to be with her, to watch her develop as a young scientist as well. So I'm really grateful for that as a silver lining.

**Ruth Candler  27:51**
Well, and not to bring your whole family into this, but your son also has a love of science, too. And he, if I remember correctly, grew up going to Nature Camp, which is a local camp for the summer that specializes in natural history and environmental science education. What do you think learning about geology and other sciences brings to a child's life?

**Elizabeth Knapp  28:15**
Yeah, I mean, I think for me, it was, you know, as I mentioned earlier, it's one of the most transformative things for me as a young person, both just trying to understand about environment, but living outdoors and getting to explore nature, both learning the science and the art of it, but also just being able to be in nature and to be around other young people with similar kinds of interests. That was such a fabulous time for me. It was transformative. I... You know, I continue to be on the foundation board there. As you mentioned, my son goes there. I think it also was a big, important part of his thinking. He's a senior in high school, and in the next couple of weeks has to decide about colleges. He's got some great options. But, you know, he wrote about and thought about that for himself. It has also been transformative for him as a young person.

**Ruth Candler  29:03**
Thank you for sharing that. I'd like to switch gears a bit here and talk about the Johnson Program in Leadership and Integrity. It's one of those programs that almost everyone on campus has heard about, but not everyone may know the details. You've been the director of the Johnson Program since 2013. Would you share with us the history of the program, beginning with the gift that funded it?

**Elizabeth Knapp  29:32**
Yes, of course. The Johnson Program in Leadership and Integrity was launched in 2007 with an incredible and unprecedented gift from alumnus Rupert H. Johnson Jr., who is the Class of 1962, with $100 million to provide access and support for W&L students regardless of their financial circumstances. It was conceived with one big idea: those with the intellect to excel and the selflessness to care should have the opportunity to lead. The primary part of the program focus supports the full tuition, room-and-board scholarship for about 10% of W&L students. Other aspects support the scholars, campus programming, and really all on campus in additional and significant ways.

**Ruth Candler  30:19**
What a gift.

**Elizabeth Knapp  30:20**
Yes, absolutely.

**Ruth Candler  30:23**
There are many ways that the Johnson Program has enhanced campus life, not only through scholarship funding for students, but also opportunities for campus speakers and research grants and
endowed faculty positions, which are all incredible opportunities. Would you be able to give us some examples on how W&L has benefited from this gift?

**Elizabeth Knapp  30:46**
Yes. You know, I am so grateful for all the ways this generous support has enhanced student access, experiences and success at W&L. And I often think about that in three ways. So one is the opportunities that W&L itself provides, the connections that are made here, and life on campus and beyond. And the outcomes that happen for students having these experiences. The scholarship launch, now about a dozen years ago, has allowed us to have a much broader applicant pool, almost doubling our applicant pool from before then, and allows us to reach so many more students across the country and the world, to help them to get to know W&L's distinctiveness, the many opportunities here, and to see if it's the right fit for them for college. As we look for scholar candidates, we think about impact makers and leadership potential. So not just those who are intellectually curious, but also who are involved and are leaders in their communities. Having so many engaged students on campus—while only 10% are Johnson Scholars, roughly 70% of any entering class applied for one—and as a faculty member, all of that provides sort of an elevation of classroom conversations and around campus.

But as you mentioned, in addition to the scholarship itself, the Johnson Program supports all on campus. Through summer opportunity grants, we can support about 100 different student internships, volunteer or research experiences each year. And those can be hugely impactful as students are sort of working towards how they develop their sort of next steps in their life and career. Through, as you mentioned, lectures and symposia. This year, we're doing a yearlong symposia on activism and Black lives, but in recent years, we've done one and supported one on law, justice and society, and another on new perspectives and evolution, and so everyone on campus is able to enjoy those as well. There’s also program support for broad campus strategic initiatives. So support for our Spring Term travel courses, for example, ensuring all students, regardless of their financial ability, are able to participate, and for our AIM, or Advanced Immersion and Mentoring Program. And other recent initiatives have included support for data science as a new curricular opportunity, for STEM pedagogies and for our general education review, as some examples.

We've now graduated eight years of Johnson Scholars, and we watch as they do incredible things in the postgraduate world. And they have great gratitude for their experiences here and desire to give back, as all of our dedicated alumni do.

**Ruth Candler  33:28**
So you mentioned eight years of Johnson Scholars. How many students is that? Do you know off the top of your head?

**Elizabeth Knapp  33:35**
So, if we can do the math together... So between, about 40 to 45 in a class, times eight.

**Ruth Candler  33:43**
Ah, so, roughly 320.
Elizabeth Knapp  33:48
Yeah, yeah. And so of course year nine will be this upcoming year, will be in a few weeks coming up. And then we’re really excited to think about year 10, sort of having those sort of 10th year kind of reunion of that group and coming back together.

Ruth Candler  34:03
You’ve mentioned that one of the most satisfying parts of directing the program is reading the letters that Johnson Scholarship recipients write reflecting on their time at W&L and how their experience here changed their lives. Are there any highlights from those letters that you can share with us?

Elizabeth Knapp  34:23
Yes. I mean, they are so many—they’re one of my greatest joys to get to read as students reflect on all of the things that have impacted them here at W&L. And, you know, I think, for example, of a student a few years ago who wrote about the opportunity the scholarship gave her to follow her curiosities to the end of the Earth. She cited in her notes that the first airplane ride she ever went on was from the Midwest to the Johnson Scholarship competition.

Ruth Candler  34:50
Wow, I just got goosebumps.

Elizabeth Knapp  34:52
But since then, she... At graduation she shared that she researched or studied abroad every year, taking her to 12 countries on five continents. And after graduation at the top of her class, she was awarded a Fulbright to study art history in India. And that's just one little snippet, but important on how many opportunities that she had and how reflective she is about that. And I think of another student who's spoken about the one word that describes W&L to her, and she described that as “limitless.” During her time at W&L, she was not forced to be one thing or to only have one passion, sharing that this is a community that supports and even encourages a dancer to lead a business organization, the premed bio major to lead the choir and the basketball player to pick up soccer as well. All things she did, adding that W&L is truly a place where limits don’t exist.

So again, that's just two examples. And there are so, so many.

Ruth Candler  35:31
Wow, yeah, I just want to sit with that for a moment. No wonder why you find reading those letters so gratifying. I'd like to end our podcast with what we call our lightning round, which are just some fun, quick questions for us to get to know you a little more as a person in addition to the educator. So when I ask you a question, just give me the first thing that comes to mind. So which do you prefer, a mountain or a volcano?

Elizabeth Knapp  36:24
Well, mountains because I like hiking them. But volcanoes can also be mountains. So I think that's a trick question.
Ruth Candler 36:30
That wasn't very fair of me, was it? And I didn't know it was a trick question. What do you think is the most interesting thing about geology?

Elizabeth Knapp 36:39
That it's everywhere you go, and it shapes everything from the economy to the culture of a region, but most importantly, is our evolving understanding of the interconnectedness of the Earth system.

Ruth Candler 36:51
Oh, right. So do you have a rock collection at home?

Elizabeth Knapp 36:55
You know what? I don't, really.

Ruth Candler 36:57
You don't!

Elizabeth Knapp 36:58
The reason is, and I'll tell you, this is sort of interesting, I have evolved over time in my thinking on this, this might be more than a lightning round. Now, we have beautiful specimens, grateful for so many alums who have given us beautiful specimens in the geology department, as well as collections that I use in my teaching, and my research. And I have... I certainly do collect things where I go if I need them for teaching and research, but I've started to really have a different thinking about taking from places that I go.

So I do have some beautiful things in my office. But at home, what I generally tend to have is more artwork of local artists. I have a whole plethora of artwork from Hawaii, for example, or from Chile or places I've been in the world. And so supporting local artisans, and having representations—they may be an abstract picture of a volcano or a really beautiful photograph of a sea turtle, or... So I actually collect art, and works of artisans, more than I do rocks.

Ruth Candler 37:57
I like the way you're making us think about not taking. I appreciate that. You grew up in Lexington, you were an undergrad at W&L and you pursued your graduate degree an hour away at UVA. Having lived in this area your whole life, what is your favorite local spot from your perspective as a geologist?

Elizabeth Knapp 38:25
So what... it seems odd, but you know, again, we mentioned Nature Camp—there's a little place up the road called Table Rock that is in the very old, billion-year-old rocks. But you can walk down a pathway from that and put your hands on something called an unconformity. And it's a break in time, in this case, almost 500 million years of time, where you have a billion-year-old rock and a, roughly, you know, 500 million-year-old rock that are right next to each other because of the way that the geology there works. I find that fascinating. But of course, I can't, I mean, I can't list one. I love the caves here. I love...
Devil's Marbleyard. I mean, there's so many places. I'm so grateful to get to teach geology here with all that is around. So it's a wonderful, wonderful place to be.

**Ruth Candler** 39:06
Yeah, and Devil's Marbleyard... I wish we had more time so I could ask you about that from your perspective. But we'll list some of those places on our episode notes page. So if you take geology out of the equation, where are some of your favorite places to hang out?

**Elizabeth Knapp** 39:21
So a couple: Um, so I love being on water, not because of necessarily the geology, but if I were to go do something in the summer, it would be kayaking or paddleboarding or canoeing, or just floating on an inner tube. But I also love listening to music. So live music in the outdoors is sort of another favorite thing, and it's probably been what I've missed the most this past year, and I'm really looking forward... This summer I hope to be able to change that. So my other sort of favorite place to hang out is listening to live music.

**Ruth Candler** 39:52
Yeah, we've bumped into each other quite often listening to live music.

**Elizabeth Knapp** 39:56
Yes! Exactly. Yes.

**Ruth Candler** 39:58
What do you enjoy doing... Well, you just answered this: the live music. When you're not on campus or studying rocks, other than hiking and listening to live music, what else?

**Elizabeth Knapp** 40:08
Well, I was gonna say, I mean, that probably outdoors is always going to have a component there, right? So and it could be sitting on the back porch on a rainy day reading a novel, right. So it's generally being outside is the thing I love. And of course, we do love hiking a lot, my husband and I. We... One of the things that's sort of interesting, you mentioned that I've lived here my whole life, and one of our goals is—and he's lived here for a long time as well—to find something new that we've never done before, right, to find a hike that we've never done. And we're really pretty good at it. It takes some work.

**Ruth Candler** 40:37
I'm sure.

**Elizabeth Knapp** 40:39
We have old favorites that we continue to do. But especially over the last year, we've tried to find places that we've never been, and it's so fun for me, whether it's, you know, going to a new restaurant or going to a new venue or hiking a new thing, like, for being here for a good part of my life, it's great to find new things to do. And we are successful at it. We can do that.
Oh, you should put that all down in a book. Well, I'm sure you've seen amazing things in your many travels. What's the most amazing thing you've ever seen?

Elizabeth Knapp 41:13
So on any geologist's bucket list is getting to see up-close active lava flows. While they're not flowing overland right now, I have had the fortune in the past to take students to hike overnight, you have to start at about 2 a.m. and hike across the lava fields to arrive at dawn to the pahoehoe flows that go into the ocean, and be literally up close to them. So that was one of the most amazing. I have so many more. It's hard to pick, but I'm picking that one.

But I'll also say, you know, I've seen the geysers of Iceland or been on the glaciers in the northern Patagonian icefield or on the Rio Negro in the Amazon. But there are a couple places that I've actually cried when I've seen, not because... I mean, just because they're just amazing. And one is being with alums in the deep gorges of the Grand Canyon, just to even be in that space and witness it made me cry. So, you know, even though we're scientists, just the wonder of being in some of these places can have that effect as well. So there's...

Ruth Candler 42:12
How wonderful to be so moved.

Elizabeth Knapp 42:13
I can make a long, long list, but I'll stop.

Ruth Candler 42:14
No! That's fabulous. So in those places, what's the most amazing thing you've ever eaten?

Elizabeth Knapp 42:22
So this is hard too, because I'm kind of a foodie. My husband, thankfully, is a good cook. So I have just a funny one, in sort of the, you know, Food Network, sort of "the most amazing thing you've ever ate." There's a little place called Island Taco in Waimea on the island of Kauai, and it has this sort of amazing sort of spicy ahi tuna dish. So that would be just a very specific thing I've eaten that I, like, would go back to, like, go all the way around the island to go eat again, and I can't wait to get to do it. There's so many more, but that's one.

Ruth Candler 42:52
That's making me salivate.

Elizabeth Knapp 42:53
I know.

Ruth Candler 42:56
Alright, so, as we approach graduation day, what one piece of advice would you like to offer our graduates?
Elizabeth Knapp 43:06
So I want to remind them to reflect on how many people have been part of their lives to this point, right. Who's had the impact on them and where they are in their life right now. So just remember that, because it really is about sort of our connections to others that binds us, whether it's to this place or even going forward and sort of cherish that, and to also share that experience with others going forward. And, of course, to continue learning, continue exploring and always just find, you know, joy and comfort in their natural spaces.

Ruth Candler 43:40
Fabulous advice. So Elizabeth, thanks so much for joining us today.

Elizabeth Knapp 43:44
You're welcome!

Ruth Candler 43:45
It's been a great conversation. I really appreciate your taking the time out of your very busy schedule. And thanks as always to you for listening. We hope you've discovered something new. To read more about today's podcast and check out other ways to continue your lifelong learning with W&L, you can visit our website, wlu.edu/lifelong, where you'll find our previously recorded webinar series "Prejudice, Discrimination and Antiracism" and also "Truth, Opinion and the News Media." We hope you'll join us back here soon. Thanks again, and until then let's remain together not unmindful of the future.