



VOLUME 19, ISSUE 1

SPRING 2019

*Myakka* ('my-yak-ah' – Seminole word for "big waters") gives a special identity to our department, as it is also the name of Florida's State Soil, Myakka fine sand. The State of Florida has the largest total acreage of Myakka fine sand (sandy, siliceous, hyperthermic Aeric Alaquod) on flatwood landscapes.

## Charting a Course for the Soil and Water Sciences Department

Dr. Matt Whiles began serving as the UF/IFAS Soil and Water Sciences Department (SWSD) chair this past January. In his first several months on the job, he faced the same learning curve as all new hires of the University of Florida. However, he had to hit the ground running, dealing with annual faculty and staff reviews, a budget plan, and securing new graduate students. Whiles still found time to answer questions for Myakka, to give SWS alumni, partners, and friends an idea of what he has in mind for the future of the department.

**Myakka:** Before we look to the future, can you tell us what interested you about this position to make you apply for the job?

**Matt Whiles:** Several things attracted me to this position; in particular, I was impressed with the breadth of expertise across the department and the numerous large-scale, collaborative research projects that faculty members are involved in. I was also aware of the excellent reputation of this program, IFAS, and UF, and how so much of the science that happens here influences agriculture, ecosystem management, and policy. I'm excited to be back in a land grant university, where research, extension, and teaching are all priorities.

**Myakka:** Since beginning the job in January, what have you heard from your colleagues in the discipline about the SWS programs and their reputation?

**MW:** My colleagues are quite familiar with the SWSD programs and think very highly of this department. This program has an excellent reputation, nationally and internationally, and I'm excited to be part of it.

**Myakka:** The SWSD has hired, and is in the process of hiring, more faculty due to some recent retirements and as part of UF's effort to hire 500 new faculty members. After we finalize the three current openings (two assistant professors and one lecturer), would you be happy with the breadth of expertise the faculty has? Are there other research and teaching initiatives you would like to see that require another position or two in the near future?

**MW:** We seem to have some areas very well covered, and some where we could use more personnel and expertise, including soil physics and aquatic chemistry. The direction we go with future hires will ultimately be a group decision by the department. I look forward to working with the SWSD faculty to plot the course for the future of the SWSD.

**Myakka:** The SWSD has many on- and off-campus students, both at the undergraduate and graduate level. Do you foresee any academic program changes that could impact enrollment? Are the current recruitment and retention levels where you want them to be?

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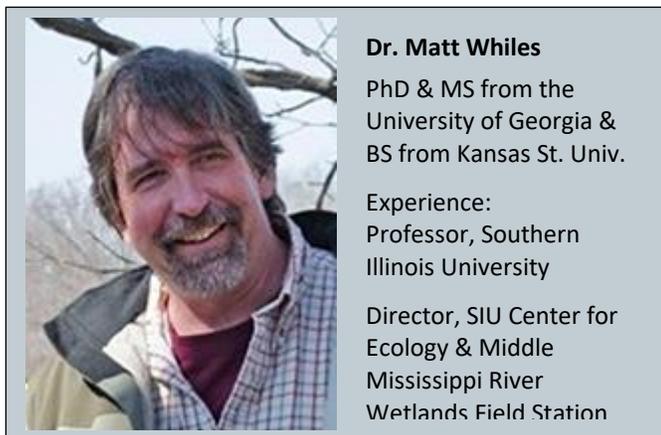
Dr. Matt Whiles | [mwhiles@ufl.edu](mailto:mwhiles@ufl.edu)  
Chair, UF/IFAS Soil and Water Sciences Department

2181 McCarty Hall A, Box 110290  
Gainesville, FL 32611-0290

Phone: (352) 294-3151  
Website: [soils.ifas.ufl.edu](http://soils.ifas.ufl.edu)



**MW:** I don't see any changes in the short term that would affect us in that way. I still have a lot to learn about academic programs that we interact with and/or influence our programs and students. I do think that we need to address the current low number of undergraduate Soil and Water Sciences majors. I met with many of them recently and they all indicated that they really like the program and people. We are in the process of putting together a committee that will explore recruiting, visibility, and related issues with the major. We have plenty of students in the Interdisciplinary Studies major (Environmental Management in Agriculture and Natural Resources), but I would like to see more Soil and Water Sciences majors. As I mentioned, the current majors indicate they are having a great experience; this suggests the low number may be more a function of visibility and recruiting. I also think we need to look at ways to better communicate the diverse career options for Soil and Water Sciences majors.



**Myakka:** There are a number of SWSD alumni in Florida as well as spread across the country and the world. How would you like to see them be involved in the department?

**MW:** We are always interested in hearing from our alumni. In my opinion, the ultimate measure of a program is the accomplishments of its students. I would like for our alumni to stay in touch as much as possible. I hope they will check in every now and then to let us know what they're up to, and certainly inform us of any exciting news or significant accomplishments. Alumni are also an important part of our institutional memory; understanding the history of a program is important for plotting the future.

**Myakka:** What type of partnerships do you envision for the SWSD within UF or with government, nonprofits, and industry?

**MW:** One of the many impressive aspects of this program is the array of connections, partnerships, and collaborations. This is an existing strength I think we can continue to build on. Diverse partnerships and collaborations are key to success in science, and our students benefit by learning and gaining experience in large, diverse networks. Studies from the social sciences demonstrate that success as a scientist is directly linked to the breadth of the professional network. SWSD faculty members collaborate extensively with government, industry, and NGOs in their research and extension activities. This is central to addressing today's complex challenges related to balancing food and energy production, sustainable development, and healthy ecosystems.

**Myakka:** You have said soil and water are the foundations of ecosystems and vital resources in urban, agricultural, and natural landscapes. How can the SWSD better position itself to address the grand challenges facing these two resources?

**MW:** The SWSD is poised to address many facets of these challenges. In order to continue doing so, we need to maintain, and in some cases enhance, our expertise in basic areas of the soil and water sciences, while also adapting and responding to emerging issues and new technologies. This program has an impressive track record of communicating science to stakeholders through our excellent extension programs. I think maintaining and building on that success is critical as we move forward. Doing great science is one part of the impact "equation" – communication is the other. As we plan for the future, we need to make sure to maintain top-notch teaching, extension, and research programs across the disciplines we cover.



# “Phosphorus Release from Biochar of Various Feedstocks: Implications for Land Management”

Andressa Freitas (Soil & Water Sciences PhD 2019)

## Topics

**Phosphorus:** Excessive fertilizer use can lead to nutrient loss from the soil resulting in algae growth in receiving waters. Reserves of the phosphate mineral are being depleted and could be eliminated in less than a century under current consumption levels.

**Biochar:** Environmental benefits include mitigation of greenhouse gas emissions, soil carbon sequestration, waste management, recycling nutrients, heavy metal remediation. Agronomic benefits include a decline in bulk density and increases in soil pH, water holding capacity, cation exchange capacity, microbial activity. It also stabilizes elements such as phosphorus.

**Biochar Feedstocks (raw material):** Animal-based feedstocks include poultry litter, biosolids, swine manure, and bones. Plant-based feedstocks include bagasse (sugarcane/sorghum), wood chips, sawdust, and tree bark/leaves/branches.

## Research Questions

What is the proper feedstock to use – plant-based (hardwoods, maple, and pine) or animal-based (biosolids and poultry litter)?

What effect does biochar additions have on different soils?

What is the effect of biochar application on crop yield?

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“I became interested in biochar, because of its discovery in my home country, Brazil, hundreds of years ago,” Andressa Freitas said. “My research started looking at characteristics of biochar and which feedstocks were suitable sources of phosphorus.”

The results showed animal-based biochar is more suitable as a source of phosphorus, while plant-based biochars are a potential source of other nutrients, such as potassium. Biosolids

converted to biochar significantly increased total phosphorus and decreased water-soluble phosphorus without compromising phosphorus available to the plant. Chemical and physical characteristics of poultry litter biochar suggested that it could act as a slow P-release fertilizer. Freitas needed to validate these results in the field, which showed positive effects on crop yield.

“Pyrolysis (the process of making biochar) could be used to decrease the environmental risk of phosphorus loss from biosolids,” Freitas said. “This might still leave phosphorus available for the crops to use depending on the biosolids source.”



Andressa Freitas stands by corn grown on a test field with biochar-amended soil. *Photo from Vimala Nair*

But what is the effect of biochar in Florida’s sandy soils? Freitas needed to determine phosphorus desorption from sandy soil that had been amended with biochar. Specifically, she wanted to know whether animal-based or plant-based biochar would release more phosphorus when applied at the same rate. Experiments were conducted on two different soils: Apopka (more phosphorus retentive) Ultisols and Candler (less phosphorus retentive) Entisols.

“We found plant-based biochar leached the same amount of phosphorus, regardless of the soil type,”

Freitas said. “For the poultry-litter biochar, soils played a role. We had less phosphorus release in a more phosphorus retentive soil.”

The last part of the study was to test poultry-litter biochar in the field. Freitas compared it with an inorganic phosphorus fertilizer treatment and a control plot of no phosphorus. This was done in two locations with different soil types (Entisols and Spodosols) over two years (six cropping cycles). The results showed poultry-litter biochar can be a safe substitute for inorganic fertilizer as a phosphorus source.

“In addition, poultry-litter biochar generated higher cumulative biomass than an inorganic phosphorus treatment when applied to the Entisol site compared to the Spodosol one,” Freitas said.

“I’m surprised by the different biomass amounts generated when the same amount of poultry-litter biochar was applied in each location,” Freitas said. “I’m still trying to figure out what would be the cause of that, and I hope to better understand that with additional tests we will be doing.”

Freitas did the research under the guidance of the chair of her advisory committee, Dr. Vimala Nair, a research professor of environmental soil chemistry in the Soils and Water Sciences Department. Dr. Nair believes the research has considerable implications.

“With all of Andressa’s results, now we know which biochars might work and which ones might not work as a plant nutrient under site-specific conditions,” Nair explained.

“In the developing world where there’s a lack of fertilizer or fertilizer is too expensive and difficult to obtain, biochar could be an alternate nutrient source,” Nair continued. “Those populations have farm wastes that they need to dispose of so they’re not paying for the raw material, and the conversion to biochar can be done in their backyard or in community kilns.”

“The main thing I want people to take away from this work is that not all biochar is the same,” Freitas said. “What works well as a nutrient source in one soil for one crop, may not be beneficial for another in different soil.”



Dr. Andressa Freitas (SWS '19)

## Making an Impact

During her five years at UF, Andressa Freitas has made a noticeable impact in service and scholarship. Her resume includes working as a research assistant in the Soil and Water Sciences Department since she arrived in 2014. She also served as a teaching assistant for two courses; having a major role for one of those during a semester.

“I love teaching,” Freitas said. “I have a degree in agricultural education, and I was a teacher in Brazil before coming to UF.”

The Association for Academic Women at UF awarded her an Emerging Scholar Award for her dissertation. The Madelyn Lockhart Dissertation Awards Committee at UF selected Freitas for her “ability to articulate the importance and transformative potential” of her dissertation work.

As a member of the Soil Science Society of America (SSSA), Freitas was selected for the 2019 Congressional Visits Day. She was one of approximately 70 representatives of the SSSA, American Society of Agronomy, and Crop Science

Society of America to lobby lawmakers in Washington, D.C., for more research funding.

“We spent about ten to 20 minutes just discussing some issues, mostly with congressional staff members,” Freitas explained. “For one of them, their district had Marianna, so I said ‘Oh, we have an experiment going on in Marianna,’ and we discussed what is needed.”

She calls it an eye-opening experience to see how the government works in America, compared to her native Brazil. The societies provided training for the participants before heading to the Capitol, another learning experience Freitas appreciated.

“We, as scientists, need to communicate with policymakers, to translate what the needs are and try to convince them what we need is necessary,” she said.

Freitas will be spending another year with the SWSD as a postdoc working with Dr. Nair, but her goal is to work with the United Nation’s Food and Agriculture Organization (FAO). The agency is leading the international effort to achieve food security for all by making sure everyone has regular access to high-quality food.

“My dream job is definitely FAO,” Freitas said. “There’s a long path until I get there, but that’s my main goal.”

## SPRING 2019 GRADUATES

### PHD

Alisheikh Atta (Morgan)  
Yan Liao (Gerber)

### MS

Emma Fain (Strauss)  
Traci Goodhart (Deitch)  
Nicole Miller (SNRE) (Meyer)  
Kyle Richards (Bhadha)  
Nicole Salvatico (P. Inglett)  
Sarah Stover (Wright)

Carlita Fiestas-Nunez received her MDP degree from the Center for African Studies & Center for Latin American Studies, advised by Ann Wilkie.

### BS – SWS

(Advisor - Bonczek)  
Caroline Buchanan  
Lindsay Furr

### BS - IS-EMANR

(Advidors - Curry & Enloe)  
Monica Fernandez  
Benjamin Grubbs  
Erik Moretuzzo  
Mark Parrish  
Jacqlyn Rivas  
Deysia Roberson  
Ethan Weinrich  
Wyatt Windham

### SWS MINOR

(Advisor - Bonczek)  
Holle Capps  
Anna Dicks  
Logan Loadholtz  
Austin Rankin  
Michelle Rochette  
Logan Stacey  
Edward Stamborski  
Jacob Thayer  
Ethan Weinrich  
Brooklyn Wilhelm  
Anna Yoon



### KEY RESEARCH AREAS

Carbon Dynamics and Ecosystem Services  
Landscape Analysis and Modeling  
Nutrient, Pesticide and Waste Management  
Soil, Water and Aquifer Remediation  
Wetlands and Aquatic Ecosystems

# Graduating Senior Taking Soil & Water Sciences Knowledge Overseas

Ethan Weinrich has packed a lot of experiences into his time at the University of Florida. As a community college transfer student from Tallahassee, it seems that was the only option for his two years in Gainesville. Ethan is graduating with a Bachelor of Science degree in Interdisciplinary Studies with a concentration in Environmental Management in Agriculture and Natural Resources through the Soil and Water Sciences Department. His resume includes an undergraduate research project, an on-campus internship, volunteer work, and membership in a student club. Ethan even knows what he is doing after graduation.

## Coming to UF

After Ethan earned his Associate in Arts degree, he was ready for UF and enrolled for the Fall 2017 semester. He wanted to study sustainable agriculture and chose the Environmental Management program because he thought it was a good fit.

“At the time I was looking for broad systems,” he said. “You know, start broad and then narrow it down as you learn more.”

Ethan already had some ideas of what he wanted to learn. While working at a small organic farm near Tallahassee, his boss introduced him to mycorrhizal fungi, specifically its role in plant growth.

“I’m interested in mycorrhizae just as a proxy for soil health, and how microorganisms are able to thrive in agriculture,” he said. “That hasn’t been a focus in contemporary, large-scale agriculture.”

Ethan wanted to learn more about mycology but said he could not find the right classes. He decided to pursue it on his own by conducting his own research project.

## University Scholars Program

The same year Ethan arrived, Dr. Masanori Fujimoto began working as a research assistant professor in the Soil and Water Sciences Department. He was setting up his research program and sent out an email looking for

undergraduates to work in his lab. Ethan thought this would be a good opportunity and applied.

“I was looking for a position where I could start doing someone else’s research – learning some lab or field-based processes – and maybe getting paid,” Ethan recalls, but that is not how it worked out. “He really encouraged us to look for what we’re interested in doing.”

“I just wanted to help him to reach his goal,” Dr. Fujimoto said. “Align what he is doing now with what he is going to do in the future.”

He encouraged Ethan to develop a research proposal he is passionate about and to look into the University Scholars Program (USP), which includes a \$1,750 stipend. Selected students conduct a full research project, under the guidance of a faculty member. Ethan developed a proposal to study the cover crop effect on mycorrhizae abundance and diversity in an agricultural setting. His project was accepted and funded by USP for the 2018-2019 academic year and Dr. Fujimoto became his faculty mentor.

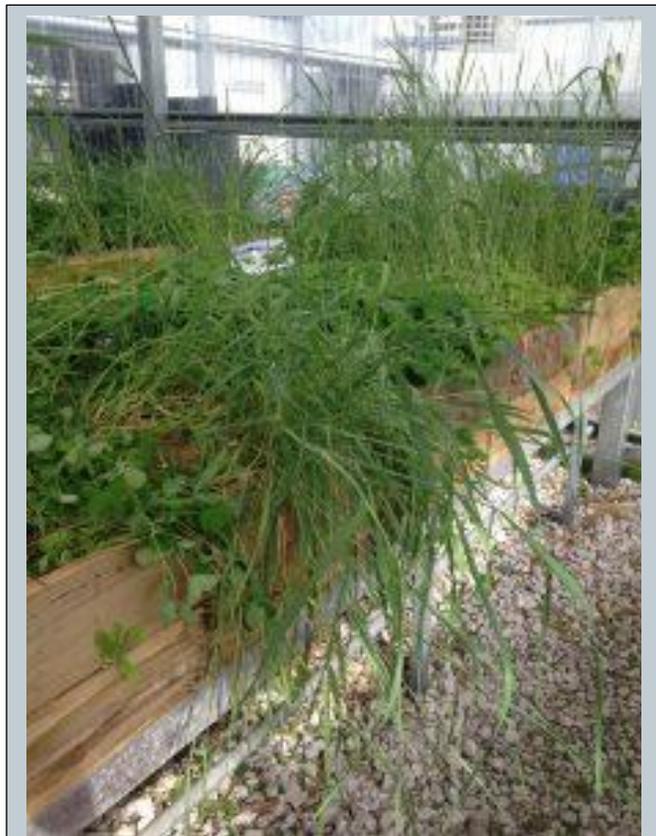


Ethan Weinrich prepares microscope slides in the lab.

## Research Project

Both cover crop and mycorrhizal fungi are utilized in sustainable agriculture and are transferable across the globe including those countries where sustainable food production is challenging.

“I was hoping to get information that could inform management decisions for farmers,” Ethan explains.



Weinrich built boxes for his plots of rye, clover, & Seminole pumpkin to grow over the winter months in the campus greenhouse, shown here with plants before cutting and returning nutrients to the soil. *Photo from Ethan Weinrich*

The research was conducted in a greenhouse on campus to protect the plants from severe weather. Rye, clover, and Seminole pumpkin were planted in separate boxes and one had a mixture of all three. The results show cover crops had a positive effect on mycorrhizae abundance compared to the control. However, Ethan says the mixture of plants had no significant additive effect on mycorrhizal abundance compared to a homogeneous plant plot, which leads to further investigation.

“It could be antagonism between plants or mycorrhizal species because they’re all trying to compete to colonize at the same time,” he hypothesized. “Maybe the plants were benefiting each other, so they did not initiate the need for mycorrhizae.”

Ethan presented his findings at the Undergraduate Research Symposium. Ethan is also working with Dr. Fujimoto to get the work published in a peer-reviewed journal after DNA sequencing-based mycorrhizal diversity analysis is completed.

“I try to help as much as I can,” Dr. Fujimoto said. “I told (my lab students), I’m going to teach you how to do research, how to design a study, collect the data, process data, statistical analysis, making figures, communicating with people. That’s what it takes to do research, to complete research.”

## In the field

Outside the classroom and the lab, Ethan was involved in the Organic and Sustainable Agriculture Club. Part of the Club’s service was to work in the Field and Fork garden.

“We were doing whatever farm tasks were left over at the end of the day,” Ethan said. “I like the slow pace of just enjoying the space and enjoying learning about food production and sustainable agriculture and agroecology.”

The experience also gave him the chance to put into practice the lessons learned from his coursework and research.

“I’m able to really think about why these things are happening,” he explained. “Really make connections when you’re involved in something like that and solidify them a lot more efficiently also.”

The volunteer work led to Ethan earning an internship with the Field and Fork program.

## After Graduation

Ethan is not facing the question of “what will I do after graduation?”. The Peace Corps accepted him, and he signed up for two years of volunteer service.

“I’m shipping out to Senegal in September,” Ethan said. “I figure they know what programs are going on, they know where I would be the best suited.”

His position title is “sustainable agriculture specialist.” The Peace Corps website lists job duties as “assist(ing) smallholder farmers and their family

members to adopt improved crop cultivation technologies and practices, particularly conservation agriculture, home gardening, improved soil and water conservation, improved post-harvest management, and better farm management.”

“I love working out in the field, but my goals are to learn about how to address food insecurity primarily,” Ethan said.

Dr. Fujimoto knows Ethan’s experience in farming and what he has learned as an undergraduate will serve him well in Western Africa.

“He knows the Peace Corps is also a learning opportunity,” Dr. Fujimoto said. “He’s willing to learn a lot about their local way of doing it.”

Ethan is learning to speak French between now and his three months of training in Senegal. After that, he will have two years to show his adoptive community all he has learned at UF and help it build a more sustainable agricultural system.

## **INCOMING STUDENTS SUMMER SEMESTER**

### **PHD**

Miurel Brewer (Kadyampakeni & Kanisery)

Samuel Kwayke (Kadyampakeni)

Leandro Vieira (Silveira)

### **MS**

Austin Dartez (Deitch)

### **BS - IS-EMANR**

(Advisors - Curry & Enloe)

Samuel Bowling

Russell Hansen

Pommary Kem

Justina Mattson

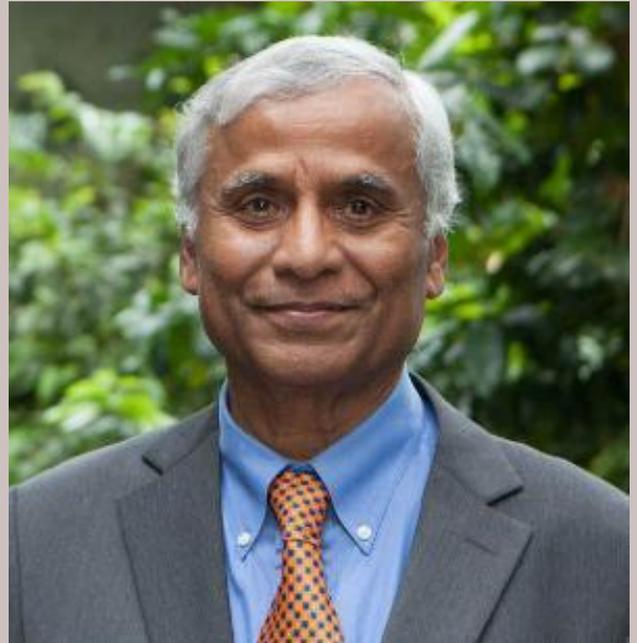
Maria Robinson

Richard Rodriguez

Charles Sardisco

Chelsea Slofkin

## **DR. K. RAMESH REDDY TAKES ON NEW ROLE**



After 18 years as chair of the Soil and Water Sciences Department, Dr. K. Ramesh Reddy stepped down in June 2018. Reddy is the second longest serving chair, after F.B. Smith (1944-65) who served for 21 years.

“I am proud of my service as department chair,” Reddy says. “By working with faculty, we developed a productive and successful department that could compete for resources and funds and effectively meet the needs of our diverse clientele.”

He lists the departmental strengths during his tenure as inter-disciplinary programs and grant activity, renowned faculty expertise, research on foundational science and problem-solving applications, diversity of faculty and students, and national and international recognition of the department. While serving as chair, Reddy also maintained strong research and teaching programs.

Starting May 15, 2019, Reddy began a new administrative role as the Interim Director of the School of Natural Resources and Environment. He also continues serving as coordinator of the SWSD Distance Education program.

# Soil and Water Sciences Alumna's Service is Rooted in Alaska

The straight-line distance between Gainesville and Anchorage, Alaska, is a little more than 3,700 miles. Still, that cross-country divide did not deter one Soil and Water Sciences graduate from making the move. Dr. Liz Hodges Snyder is almost ten years removed from the PhD program, but the lessons learned at UF continue to guide her as an associate professor in the Department of Health Sciences at the University of Alaska Anchorage (UAA).

"I applied for a job with the Master of Public Health Program and I did not think I was going to get it," Snyder recalls. "I hadn't even defended my dissertation yet. I just figured it was a good trip to Alaska and great practice."

She was already married. Her husband, Sam, was also finishing up his PhD in the Religion and Nature program. Both had been to Alaska and were interested in possibly living there.

"Then it turns out I got the job," she says. "We love it here."



Dr. Liz Hodges Snyder (PhD '09)  
*Photo from Liz Snyder*

## Research and Service

Snyder now serves as an associate professor of public health at UAA. Her education in the Soil and

Water Sciences Department served her well because Snyder points out there are many water and sanitation needs in Alaska.

"We still have communities in rural Alaska that don't have piped water in the home," she says. "There may be centralized Water and Sewer or there may not be. There's a lot of hauling of water and wastewater and then all of the environmental and human health implications associated with that."

Snyder's research and service work brings her to communities throughout the state. She says this allows her to learn from a wide range of people to meet a community's identified needs. One of those areas is sanitation. The Alaska Department of Environmental Conservation has funded a team project called [Reuse Water AK](#), which includes Snyder.

"The project focused on developing household-level water and sewer treatment, so moving away from the very expensive, centralized treatment plants," she explains. "We have incorporated design thinking into this project, so it is very community engaged in terms of what the challenges are, what the solutions should be, what rural residents would like out of the project."

The state just approved the team for another phase of this project. It will begin testing the in-home treatment system in a truly residential setting where team members will have nearly constant access. They will collect quantitative water quality and system function data, as well as qualitative user response data.

Snyder says a new passion grew from a different proposal that did not receive funding – food security. Personally, she and her husband have gardened for years and even raised chickens. They started the first local slow foods convivium. The more she got involved, the more she learned about it.

"There's such a great need up here around food system development and food security and access,

and the interest was there,” Snyder says. “That led me to the Alaska Food Policy Council. I ended up on the board and served as co-chair for several years.”

She and another board member, Rachael Miller, assistant professor of business at Alaska Pacific University, have partnered on a new initiative – the [Food Research, Enterprise, and Sustainability Hub](#) (FRESH). It is designed as a place to turn to for information, connections, and expertise on circumpolar food systems.

“We’ve intentionally done our very best to do the research and groundwork needed to inform the development of such a resource, making sure that it’s responsive to actual needs and anticipated needs,” Snyder says. “I’m very proud to say that three years in, we have it, it exists, and people know it now.”

*“I was essentially a lab rat for five years (as a doctoral student). Now it has been much more qualitative and social science, which I really enjoy. It allows me to really live in the applied world, which even in grad school, I knew was the general direction I wanted to go.”*

## Campaigning for Change

Snyder calls her evolution away from her original training “exciting, even a little anxiety-inducing.” Working in the social science realm allows her to apply what she has learned in the communities she serves. Boots on the ground is how she describes it.

“That’s what I find myself doing now more than ever,” she says, “but still having my finger in the pie of a few projects that are more related to my original training.”

Snyder decided to go in a different direction in 2018. She filed to run for a seat in the Alaska House of Representatives. She ran on a platform of sustainable economic growth, public safety, and education.

“I had been thinking about policy for a few years at that point, and had gotten to know some of our



Snyder (front, left) waving campaign signs with supporters during her campaign for Alaska state representative in 2018.

*Photo from Liz Snyder*

legislators who have an interest in food systems development and was able to reach out to them and get some mentorship from them and actually make this all feel possible,” she recalls.

With the encouragement of her family, Snyder jumped into the race. She campaigned across her east Anchorage district and “left it all on the field” with no regrets. The incumbent representative won with less than three percent – 181 votes.

“We ran a campaign you can feel really good about without making any compromises. I went from zero name recognition to almost beating an eight-year incumbent,” Snyder says. “The general plan, at this point, is to do it again (in 2020).”

## Remembering UF

While Snyder is happy with her job and feels she is making a real impact in Alaska, she says she still misses UF after being away for ten years.

“My experience in the Soil and Water Sciences Department was so amazing,” she says. “My office mates and lab mates were incredible. I had an advisor who really set me up and prepared me for a successful career as did all the instructors.”

Dr. George O’Connor was Snyder’s PhD advisor after she switched her focus in the first year. He

remembers how hard she worked as a student who came to SWSD with a public health background.

“Liz never objected to back-filling her credentials with several difficult courses in the basic sciences and worked very hard,” he says. “All of this effort with a positive attitude paid off in an excellent dissertation and a confident professional.”

Snyder’s work won the SWSD’s Outstanding Dissertation Award in 2009.

O’Connor notes that even as a doctoral student, Snyder was a great teacher and gives her most of the credit for creating a new course.

“She is largely responsible for designing, assisting, and “mothering” our Soils, Water, and Public Health course from the first day,” he recalls. “The course combined her previous expertise on Public Health and the detailed soil and water and risk assessment training she received here.”

“He was one of the most challenging advisors I’ve ever had, and it was always to my benefit. I owe a lot to him,” Snyder says. “It was a wonderful experience and I will forever be grateful for that.”

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## FACULTY, STAFF, AND STUDENT ACCOMPLISHMENTS

**Clayton Nevins** received the Soil Science Society of America (SSSA) *2019 Clark Soil Biology Graduate Student Scholarship*. (Advisors: Inglett and Strauss)

**Evandro B. da Silva**’s dissertation represented the SWSD in the UF/IFAS 2018 Awards of Excellence for Graduate Research competition. (Advisors: Ma and Wilkie)

**Yaslin Gonzalez**’s thesis represented the SWSD in the UF/IFAS 2018 Awards of Excellence for Graduate Research competition. (Advisor: Bacon)

**Chris Clingensmith** was awarded the *Delores A. Auzenne Dissertation Award* for Spring and Summer 2019 semesters. (Advisor: Grunwald)

**Andressa Freitas** was a winner of the Association for Academic Women’s (AAW) *Emerging Scholar Award*. (Advisor: Nair)

**Benjamin Grubbs** (Environmental Management in Agriculture and Natural Resources), was a finalist for the *Larry J. Connor Medal of Excellence* from the College of Agricultural and Life Sciences. (Advisors: Curry and Enloe)

**Lindsay Furr** (Soil and Water Sciences), was a finalist for the *Emelie Matthews Award of Excellence* from the College of Agricultural and Life Sciences. (Advisor: Bonczek)

**Lukas Pidgeon** (Soil and Water Sciences), received an internship with the Howard T. Odum Florida Springs Institute for Summer 2019. (Advisor: Bonczek)

**Michael Sisk**, SWSD academic program specialist, was named a First-Gen Advocate with the First-Generation Student Success program at UF.

**Lilit Vardanyan**, post-doctoral associate of Dr. Reddy, celebrated the first-place finish of her 12-year old daughter, Sophie De, won the first place, the grand prize for outstanding violinist and gold medal in the National Concerto Competition held in Atlanta on May 23, 2019. Since moving to the U.S. in 2014, she continues to have online video-classes with her violin teacher in Armenia. [VIDEO](#)

## Professors retiring with over 130 years of combined experience



*Dr. Peter Nkedi-Kizza*



*Dr. Willie Harris*



*Dr. George O'Connor*

The UF/IFAS Soil and Water Sciences Department is celebrating the service of three professors who have spent decades contributing to the department, its students, and the disciplines in which they pursued their research. They each have made a lasting impact among their colleagues and the students they taught and mentored. Now, Drs. Willie Harris, Peter Nkedi-Kizza, and George O'Connor are planning their futures away from campus.

Dr. Nkedi-Kizza, a professor of soil physics and hydrology, came to the department in 1979 as a post-doctoral research associate. He had just completed his PhD from the University of California-Davis.

"I had been accepted as a post-doc at the International Institute of Tropical Agriculture in Nigeria and UC-Riverside, but because of the nature of PhD research I had done at UC-Davis on solute transport through aggregated porous media, I decided to come here," he says. "Similar research was being carried out by Drs. Jim Davidson and P. Suresh Rao."

In 1986, Nkedi-Kizza became an assistant professor of soil physics. He notes there were four other faculty members who were also soil physicists at the time.

Dr. Willie Harris joined the SWSD as an assistant professor of soil mineralogy in 1984. He was finishing up his doctoral work at Virginia Tech, where he was working as a research associate. Harris admits he was hesitant to apply because the idea of moving to Florida was not too appealing.

"I had lived in the Limestone Valley and Blue Ridge Mountains region (of Virginia) for ten years," he notes. "Hardly anyone wants to leave such a beautiful place. They cry and write sad songs when they have to leave."

Eventually, Harris realized the position at UF was a good fit with his education and experience.

"My appreciation for Florida and my departmental cohorts quickly grew and homesickness for the Limestone Valley abated," he says. "I didn't get around to crying or writing songs."

For Dr. George O'Connor, the appeal of working at the SWSD came at a different stage of his career. He was on sabbatical from New Mexico State University and spent time in the department. Shortly after, the department chair's position opened up, and he jumped at the opportunity. O'Connor chaired the department from 1990-94. He was eager to return to teaching and research.

"I decided I wanted to be a university professor while I was still an undergraduate," he recalls. "I had no idea about research, but I wanted to teach."

O'Connor knew he had to earn a PhD, if he wanted to be a professor.

"I had some wonderful interactions in graduate school, and I understood research, but still my focus was – it's only to get me to the point where I get to teach," O'Connor says. "I started a typical (faculty) appointment

which is 80:20, research:teaching, so you see where the heavy emphasis is!”

## Research

The three have published hundreds of articles. Other scientists have cited that work thousands of times, according to data from Google Scholar. Harris focused on basic soils research initially, because he was a part of the Florida Soil Survey Program (FSSP).

“The papers produced during this period, in collaboration largely with FSSP cohorts, were some of the most significant in my eyes,” he says. “They shed some new light on fundamental aspects of weathering and genesis of Florida soils.”

He followed that work by collaborating with SWSD colleagues, and those in Environmental Engineering Sciences and Agricultural and Biological Engineering, on the chemistry and fate of such things as phosphorus, metals, and carbon in soils.

“An example of this research, that I feel contributed something substantively, was documentation of a suspected interactive effect of anions on the precipitation of calcium phosphate and efficacy of its recovery from a waste stream,” Harris says.

Similarly, O’Connor has a research focus on environmental soil chemistry. That work involves fate and transport of waste materials and their constituents.

“That’s everything from trace organics to heavy metals to salt to nutrients and the impact on the soil,” he explains.

Several areas of Nkedi-Kizza’s research are solute transport in aggregated porous media, the application of the Solvophobic theory to the interaction of strongly hydrophobic organic chemicals (SHOCs) with soils, and the comparison of Carbonatic-Marl soils with Carbonatic soils in terms of adsorbing hydrophobic organic chemicals. More recently, [another study](#) was the development of an extraction procedure of the insecticide Imidacloprid (IMD) from citrus leaf tissue and the analysis of IMD extract with HPLC-MS/MS.

“The method was important in correlating IMD concentration in leaf tissue and the Asian citrus psyllid (ACP) counts,” Nkedi-Kizza says. “The psyllids are

responsible for Citrus Greening, a serious disease for the citrus industry in Florida.”

## Teaching

While O’Connor is proud of his research work, he considers teaching and working with students the highlight of his career. He taught more than a dozen different courses at the undergraduate and graduate level between New Mexico State and UF. A textbook he co-authored with Hinrich Bohn and Brian McNeal, [Soil Chemistry](#), is coming out in a fifth edition with the help of Daniel Strawn.

“We’re finishing up the fifth edition,” O’Connor says. “We started writing the first one in 1976 and it was published in 1979.”

The book also appears in Hungarian and Spanish.

“Teaching has been one of the most rewarding components of my position at UF,” Nkedi-Kizza says. “Even before being appointed in a tenure track position, I was asked by UF students and staff to advise them.”

In addition to teaching, Nkedi-Kizza served as faculty advisor to the African Student Union (ASU) at UF for nearly a decade. He also supervised students from Sub-Saharan African universities through summer courses and the Institute of International Education (IIE) programs.

“I am proud to report that two of the PhD students I recruited are now faculty members in our department – Drs. Bonczek and Kadyampakeni,” Nkedi-Kizza points out.

Harris says the interaction with students has been a very gratifying aspect of his life at UF.

“The opportunity to teach was a great privilege, but also a great responsibility that I took more seriously with time,” he says. “It was mostly joyful, but sometimes it could be humbling.”

## What’s Next

For all three, their future plans are fluid, at least in the near-term. Each will be tying up loose ends in SWSD and finishing out their service on student committees.

"I want to have time to do things that I have been sort of sacrificing or not doing by virtue of my focus on work-related and other things," O'Connor says. "Read. I'd love to travel. I want to get back into a decent exercise program."

"I would like to complete some unfinished papers," Harris says. "Beyond that, my wife and I plan to become more involved in community service and causes we feel strongly about. We have no plans to relocate. Gainesville has become our home."

"I plan to continue to supervise two PhD students in our department as co-chair and one PhD and one MS student at Makerere University, Uganda, also as co-chair," Nkedi-Kizza says. "I will write manuscripts using data from my graduate students who did not publish their research in scientific journals."

None of them worry about the future direction of the SWSD. O'Connor cites a renewed effort to hire faculty that strengthen the Department's core research, teaching, and Extension focus.

"I am optimistic about the future of the Department," the former chair says. "I think the new faculty are excellent, so the potential is wonderful."

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## Current Research

[Andy Ogram](#): *Floc & periphyton harbor diverse groups of potential mercury methylating prokaryotes in the Everglades.* Most mercury in the Everglades enters as inorganic mercury via atmospheric deposition, some of which is transformed to the more toxic methylmercury through the activities of anaerobic microorganisms. Like most freshwater wetlands, the Everglades comprises diverse habitats, including soil, flocculent material (floc), and periphyton, that harbor diverse microbial communities. Assemblages of potential Hg methylators in the Everglades are functionally diverse (including methanogens, syntrophs, sulfate reducers, fermenters, and others), which differ between the habitats. This great diversity suggests that the environmental controls on the activities of potential methylators, and on mercury methylation rates, are complex and differ among the different habitats. The research was accepted for publication in [Applied and Environmental Microbiology](#).

[Sarah Strauss](#): *Citrus row middle management to improve soil and root health.* This Citrus Research and Development Fund (CRDF) grant covers a three-year project to examine the use of cover crops in commercial citrus groves. Dr. Davie Kadyampakeni (CREC) is a co-PI from SWSD, along with a weed scientist, agricultural economist, and entomologist collaborator. They are planning to measure a suite of parameters including tree and root growth, soil moisture and nutrients, soil microbial communities, and weed abundances. Dr. Strauss will have a new postdoc from Spain beginning work on the project this summer.

[Jehangir Bhadha](#): *Feasibility of using bagasse to improve soil quality and sugarcane yields on mineral soils.* This is a four-year research study funded by U.S. Sugar Corp. to evaluate the commercial feasibility of utilizing bagasse as a potential soil amendment on mineral soils. Bagasse is an agricultural by-product derived from the sugarcane milling process. It is a dry and fibrous residue left after the extraction of sugar juice from sugarcane. Approximately 140 kg of bagasse are produced for every ton of sugarcane processed. With almost 2.5 million metric tons of bagasse generated last year alone in South Florida, need exists to find environmentally friendly and sustainable ways of utilizing the material. As part of graduate student Nan Xu's dissertation research is to evaluate the change in soil quality and sugarcane yield when bagasse is applied at various rates commercially on mineral soils in South Florida, compared to conventional practice.

[Jehangir Bhadha](#): *Effect of cultivating flooded rice on soil & water quality within Everglades Agricultural Area.* Flooded rice is cultivated on nearly 28,000 acres every summer in Everglades Agricultural Area of South Florida in rotation with winter vegetables and sugarcane. Starting spring 2019, graduate student Leandra Gonzalez will be evaluating the impact of various flood depth on water quality, soil health, and rice yields. This is a three-year study funded by the U.S. EPA and Florida Department of Environmental Protection that includes an extension and outreach component in addition to research. Potential research impacts could help growers conserve water, improve water quality, and provide insights into soil sustainability within the region without compromising yields.

# Undergraduate Research, Internships, & Individual Projects

## Honors Theses and Individual Research Projects, Spring 2019

### *SWS 4911-Supervised Research in Soil and Water Sciences*

Lars Bjorndal ([Wilkie](#)) researched the benefits and effects of rainwater collection in Florida: [Bjorndal SWS4911 research](#)

Caroline Buchanan ([Judy](#)) researched the aggregation of gold nanoparticles in the presence of soil materials: [Buchanan SWS4911 research](#)

Connor Tringali ([Fujimoto](#)) researched microbial communities found within six lakes in the Ordway-Swisher Biological Station system.

### *SWS 4915-Honors Thesis Research in Soil and Water Sciences*

Rebecca O'Connell ([Wilkie](#)) researched the growth of filamentous algae compared to microalgae: [O'Connell SWS4915 research](#)

## 20th Annual [Spring Undergraduate Research Symposium](#) (April 2019)

### Poster Presentations

Advised by [Wilkie](#): Lars Bjorndal, Brett Higgins, Jennifer McGann, Rebecca O'Connell, and John Upchurch

Advised by [Fujimoto](#): Hannah Gutner, Meylin Muniz, Serena Sakkal, and Ethan Weinrich.

## Individual Projects and Internships, Spring 2019

### *SWS 4905-Individual Work in Soil and Water Sciences*

Monica Fernandez ([Curry](#)) interned as a project manager with development and construction company Stiles.

Vita Repina ([Clark](#)) surveyed residents and visitors of Cedar Key about shoreline restoration.

Alexander Fast ([Osborne](#)) conducted analytical chemistry analysis on soil and water samples related to a doctoral student's research.

Daniel Lambert ([Curry](#)) trained in wetland delineation by identifying soils, vegetation, and monitoring hydrology. Mark Parrish ([Curry](#)) monitored the endangered plant species *Conradina glabra* at Torreya State Park with the Florida Department of Environmental Protection.

Deysia Roberson ([Curry](#)) worked on a Best Management Practices (BMP) plan for a farm in Tennessee.

Danielle Turner ([Levy](#)) analyzed citrus plants infected with Huanglongbing (HLB) Disease as part of a broader project on treatment options for HLB.

### *SWS 4941-Full-time Practical Work Experience in Soil and Water Sciences*

Elizabeth Fleck ([Curry](#)) worked at the Jacksonville Zoo and Gardens on all aspects of animal husbandry.

Robyn Guy ([Curry](#)) worked on GPS field collection of soil and water sample coordinates and excavations with the U.S. Department of Energy.

Carmen Hernandez ([Curry](#)) worked on an aquaponics project with AgriInnova, an agroecological products development center in Puerto Rico.

Jacqlyn Rivas ([Curry](#)) worked with UF/IFAS Extension in Hillsborough County on curriculum development and program assessment, research, and outreach.

## Publications by Faculty & Graduate Students

John F. Hallas, [Cheryl L. Mackowiak](#), [Ann C. Wilkie](#) and [Willie G. Harris](#). 2019. Struvite phosphorus recovery from aerobically digested municipal wastewater. *Sustainability* 11(2):376.

José A. Rubio, Luis I. Romero, [Ann C. Wilkie](#) and José L. García-Morales. 2019. Mesophilic anaerobic co-digestion of olive-mill waste with cattle manure: Effects of mixture ratio. *Frontiers in Sustainable Food Systems* 3:9.

**Tanumoy Bera**, **Lilit Vardanyan**, [Kanika S. Inglett](#), [K. Ramesh Reddy](#), [George A. O'Connor](#), John E. Erickson and [Ann C. Wilkie](#). 2019. Influence of select bioenergy by-products on soil carbon and microbial activity: A laboratory study. *Science of the Total Environment* 653:1354-1363.

**Peng Gao**, **Evandro B. da Silva**, Timothy Townsend, Xue Liu, and [Lena Q. Ma](#). 2019. Emerging PAHs in urban soils: concentrations, bioaccessibility, and spatial distribution. *Science of The Total Environment* 670: 800-805.

Min Xu, **Peng Gao**, ZhiJun Yang, LinLin Su, Jun Wu, Gang Yang, Xiaohong Zhang, Jing Ma, Hong Peng and Yinlong Xiao. 2019. Biochar impacts on phosphorus cycling in rice ecosystem. *Chemosphere* 225: 311-319.

**Peng Gao**, Yungen Liu, Xue Liu, Yan Wang, Ziquan Wang and [Lena Q. Ma](#). 2019. Spatial and temporal changes of P and Ca distribution and fractionation in soil and sediment in a karst farmland-wetland system. *Chemosphere* 220: 644-650.

**Peng Gao**, Hongbo Li, Chris P. Wilson, Timothy G. Townsend, Ping Xiang, Yungen Liu and [Lena Q. Ma](#). 2018. Source identification of PAHs in soils based on stable carbon isotopic signatures. *Critical Reviews in Environmental Science and Technology* 48:13-15, 923-948.

Yungen Liu, **Peng Gao**, Jing Su, **Evandro B. da Silva**, Letúzia M. de Oliveira, Timothy Townsend, Ping Xiang and [Lena Q. Ma](#). 2019. PAHs in urban soils of two Florida cities: concentrations, distribution, and sources. *Chemosphere* 214: 220-227.

Ping Xiang, Yue Jia, Kun Wang, Meng-Ying Li, Yi-Shu Qin, Rui-Wen He, **Peng Gao**, Yungen Liu, Xue Liu and [Lena Q. Ma](#). 2018. Water extract of indoor dust induces tight junction disruption in normal human corneal epithelial cells. *Environmental Pollution* 243: 301-307.

## Presentations by Faculty & Graduate Students

**Trista Brophy**, Jihao Tang, David Bracciano, [Samuel J. Smidt](#). 2019. Greenhouse Gas Emissions of Water Production at Tampa Bay Water. [National Sustainability Summit & National Extension Energy Summit](#). Tampa, Florida, April 16-19.

[Samuel J. Smidt](#), Anthony D Kendall, and David W Hyndman. 2018. Increased Dependence on Irrigated Crop Production across the CONUS. [American Geophysical Union Fall Meeting](#). Washington D.C., December 10-14.

Erin M K Haacker, [Samuel J. Smidt](#), Anthony D Kendall, and David W Hyndman. 2018. Depletion of the Southern High Plains Aquifer: Simulating the Effects of Conserving Irrigation Water through Reduced Irrigated Area and Limited Application. [American Geophysical Union Fall Meeting](#). Washington D.C., December 10-14.

[Sarah L. Strauss](#), **John M Santiago**, Kim D Bowman and Ute Albrecht. 2019. Influence of genotype and propagation method on citrus rhizosphere microbiome. [Soil Science Society of America Conference](#). January 6-9.



## Presentations by Faculty & Graduate Students (continued)

Andrea Nuzzo, [Arnold W. Schumann](#), [Davie M. Kadyampakeni](#) and [Sarah L. Strauss](#). 2019. Benefits of biochar on HLB-affected citrus trees in sandy soils. [Soil Science Society of America Conference](#). San Diego, January 6-9.

Andrea Nuzzo, Bryce Meyering, Ute Albrecht and [Sarah L. Strauss](#). 2019. Impact of commercial management practices on soil microbiomes of HLB-affected citrus trees. [Soil Science Society of America Conference](#). San Diego, January 6-9.

[Sarah L. Strauss](#). 2019. Digging into the interactions of soil amendments, soil microbes, and citrus growth. [Florida Citrus Show](#). Ft. Pierce, January 23-24.

[John M Santiago](#). 2019. Influence of soil type on citrus rhizosphere composition. [Soil Science Society of America Conference](#). San Diego, January 6-9.

[Clayton Nevins](#). 2019. Investigating biological soil crusts and nutrient availability in citrus agroecosystems. [UF Plant Science Symposium](#). Gainesville, January 22-23.

[Julie L. Meyer](#), Valerie J. Paul, Blake Ushijima, Greta S. Aeby and Claudia Häse. 2019. Microbial community shifts associated with the on-going Stony Coral Tissue Loss Disease outbreak on the Florida Reef Tract. [ASLO Aquatic Sciences Meeting](#). Puerto Rico, February 23-March 2.

Nicole Miller, [Julie L. Meyer](#), Tom Frazer and Paul Maneval. 2019. Microbiome structure of nursery-reared Acropora cervicornis. [ASLO Aquatic Sciences Meeting](#). Puerto Rico, February 23-March 2.

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Dr. Matt Whiles | [mwhiles@ufl.edu](mailto:mwhiles@ufl.edu)  
Chair, UF/IFAS Soil and Water Sciences Department

2181 McCarty Hall A, Box 110290  
Gainesville, FL 32611-0290

Phone: (352) 294-3151  
Website: [soils.ifas.ufl.edu](https://soils.ifas.ufl.edu)

