

## Research Activities of Our PhD Students

### *A Message from the Chair - K. Ramesh Reddy*

The Soil and Water Sciences Department (SWSD) is one of the few academic units in the USA that offers a comprehensive interdisciplinary graduate program in soil, water, and environmental sciences. In addition, the department participates in the interdisciplinary ecology degree program and in several concentration programs including agroecology, hydrologic science, and wetland science.

At present 114 graduate students (MS and PhD) are advised by our faculty members. Our graduate students conduct their research in a wide range of ecosystems including agricultural and urban lands, industrial sites, grasslands, forested ecosystems, springs, wetlands and coastal ecosystems. In addition to Gainesville, our graduate students are located at nine Research and Education Centers located throughout the State of Florida.

We awarded the first PhD degree in 1955, and since then we have graduated 300+ doctoral students. In 2017, we graduated 10 during the Spring and Summer terms and plan to graduate two in the Fall semester. Our PhD graduates are employed as faculty members in universities, as senior scientists and managers in state and federal agencies and in agricultural industry, and as environmental scientists with leading consulting firms.



*Soil and Water Sciences PhD graduates at Summer 2017 commencement.*

Several of our former students are recognized as Fellows of the Soil Science Society of America and the American Society of Agronomy.

In this newsletter, we highlight select examples of research conducted by current doctoral students to show the breadth of our research programs in a wide range of topical areas.

## Setyono Hari Adi

Advisor: Sabine Grunwald

### Soil-landscape modeling for agro-ecological policy development in the developing regions

This research introduces a new technique of soil prediction by utilizing multi-response modeling for soil visible/near infrared spectrum prediction. We focus on soil spectroscopy modeling to reduce the cost to include quantitative soil information in the policy development, especially in the region with limited soil data.



## Ryan Blaustein

Advisor: Max Teplitski

### Citrus-associated microbial communities and Huanglongbing disease

My PhD research aims to: (1) define the core microbiomes of citrus roots and leaves, the factors that drive citrus microbiota structure, and implications for managing Huanglongbing (HLB; commonly known as “citrus greening”), and (2) determine the effects of novel antimicrobial treatments on the HLB-pathogen and the citrus microbiome.



## Rose Collins

Advisor: Rao Mylavarapu

### The effect of short-term inundation on biogeochemical properties in coastal soils

Evidence has shown that many coastal landscapes will experience an increase in storm surge frequency in coming years, while a rising sea level will leave more inland soils susceptible to flooding. Therefore, this study observes the biogeochemical response of various ecosystems to a flooding event while determining possible soil indicators for future predictions.



## Evandro Barbosa Da Silva

Advisors: Lena Ma & Ann Wilkie

### Phytoremediation of As-contaminated soils by As-hyperaccumulator *Pteris vittata*: long-term efficiency and biomass disposal

I have been working on a long-term remediation project using the arsenic hyperaccumulator *Pteris vittata*. I am working to improve disposal techniques by developing methods that combine extraction, precipitation and anaerobic biomass degradation with the potential to produce methane.



## Amanda Desormeaux

Advisor: Jim Jawitz

### Nitrate leaching and attenuation in a mixed land-use

My research focuses on quantification of nitrate fluxes below the root zone of dominant land uses within a karst springshed and modeling of groundwater quality at multiple scales. Direct measurements of nitrate fluxes improve current estimates of nitrate loading and allow for more accurate estimates of attenuation in the soil.



## Andressa Freitas

Advisor: Vimala Nair

### Biochar as an alternate phosphorus source to inorganic fertilizer

After evaluating properties of various biochars, I chose poultry litter biochar for field studies. This biochar, which contains a sparingly soluble phosphate mineral, is expected to provide phosphorus to plants on a long-term basis while at the same time reduce nutrient leaching relative to the more soluble commercial fertilizer.



### Claire Friedrichsen

Advisor: Samira Daroub

#### Human dimensions of soil management

I examine how cognition affects how people interact with soil. I identify differences in stakeholders' perceptions of soil management as related to food security that might hinder extension communication in communities in south Florida and India. I hope to provide insight on how to improve soil management technology development and dissemination.



### Peng Gao

Advisors: Lena Ma & Chris Wilson

#### Background concentrations of PAHs in Florida urban soils

Polycyclic aromatic hydrocarbons (PAHs) are ubiquitous persistent organic contaminants. The presence of PAHs in soils is of environmental concern due to their carcinogenic toxicity. The objective of our research is to determine their background concentrations, bioaccessible concentrations and sources' apportionments in Florida urban soils.



### Carla Gavilan

Advisor: Sabine Grunwald

#### Understanding soil carbon dynamics in the Central Andes

The Andean Region is among the most threatened of ecosystems under current predicted global warming scenarios. I am using proximal soil sensing, geospatial - remote sensing technologies and integrative soil-landscape-climate simulation modeling to bring new insights on the complex interrelationships between soils, topography, climate and humans in this understudied region.



### Victor Guerra

Advisor: Cheryl Mackowiak

#### Drought and perennial grass-legume intercropping systems

My research project investigates deep soil profile rhizosphere response to water deficit and its effect on plant nitrogen and water uptake in the forage legume, rhizoma perennial peanut (RPP), *Arachis glabrata* Benth. My findings will further develop sustainable grass-legume intercropping systems.

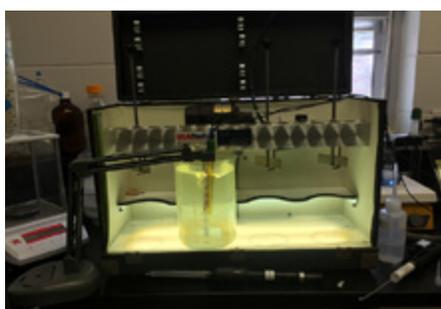


### John Hallas

Advisors: Cheryl Mackowiak & Ann Wilkie

#### Towards a sustainable P future: Assessing small WWTPs as a potential P recovery source

While demand for phosphorus (P) continues to increase, economically available  $P_2O_5$  may be exhausted within this century. Municipal wastewater treatment plants (WWTPs) are an attractive source of renewable P. The recovery of P from wastewater at small WWTPs can potentially meet 4% of the demand for P in the United States.



### Laibin Huang

Advisor: Andy Ogram

#### Phylogenetic and functional diversity of microbial community associated with submarine groundwater discharge (SGD)

Microbial communities in groundwater control much of the geochemical cycling that impacts water quality associated with SGD. We characterized microbial communities, particularly groups associated with nitrogen cycling, from two SGD areas to understand the controls on biogeochemical cycles in these environments.



## Stephen Jennewein

Advisors: Samira Daroub & Jehangir Bhadha

### Examining management effects to identify sustainable practices in the Everglades Agricultural Area

My study examined the management effects (water table depth, nitrogen fertilizers, and tillage) typical to agricultural production in the Everglades Agricultural Area. Data collected in this study can assist in developing sustainable and environmentally friendly practices for continued production.



## Paul Julian

Advisor: Alan Wright

### Biogeochemical controls of nutrient cycling within the Everglades STAs

Large treatment wetlands known as stormwater treatment areas (STAs) were implemented to reduce nutrient concentrations from stormwater runoff prior to waters entering Everglades ecosystems. The primary objective of my research is to further understand internal nutrient loading and biogeochemical processes within the STAs to better inform regulatory and management agencies in achieving water quality improvement goals.



## Kay Kastner-Wilcox

Advisor: Sabine Grunwald

### Soil degradation along an urban-rural gradient

Urbanization has created a plethora of soil stakeholders that have no connection to soil, yet whose survival depends upon the ecosystem services that it provides. My research explores soil and its degradation along the urban - rural gradient in South Florida through the interconnection of environmental, social, cultural and political spheres.

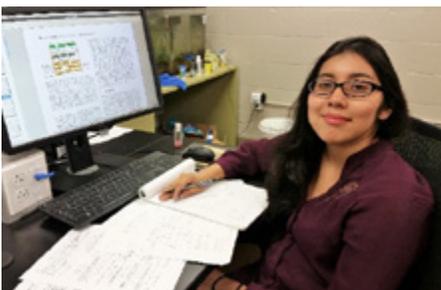


## Kalindhi Larios

Advisor: Stefan Gerber

### Everglades biogeochemistry modeling

My research objective is to identify key biogeochemical mechanisms controlling residual phosphorus accumulation in the Everglades Stormwater Treatment Areas (STAs) by integrating data with a biogeochemical model. This knowledge is critical for understanding STA limitations or possible areas of improvement, and consequently, may have implications on achieving management goals.



## Tiantian Li

Advisors: Yuncong Li & Zhaohui Tong

### Lignin-based materials for soil quality improvement

My research is using lignin-based materials as soil amendments to improve soil fertility and crop production. These lignin-based materials were derived from waste products "black liquor" of a paper mill, which is using wheat straws as raw materials.



## Yanyan Lu

Advisor: Maria Silveira

### Agronomic and environmental impacts of land application of biosolids to bahiagrass pastures in FL

During the next three years, my research will focus on evaluating the agronomic and environmental impact of biosolids application to pastures in Florida. Hopefully, the results from my research will generate important science-based information suitable for demonstrating and promoting the benefits of land application of biosolids to producers in Florida.



**Kathryn McCurley**

Advisor: Jim Jawitz

**Socio-hydrological perspectives on land use change and the regional hydroclimate**

Our interdisciplinary research employs a multi-perspective hydrology in order to address critical water resource-related issues. We are considering land use change across the tropics as it influences regional precipitation rates. Tropical land use change is often related to deforestation as driven by agricultural production, which depends on consistent and reliable rainfall rates.

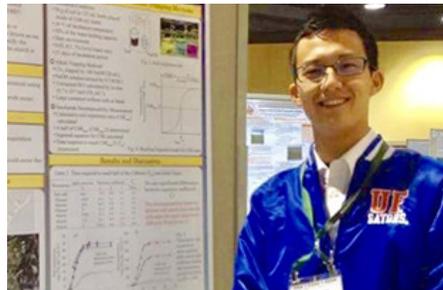


**Katsutoshi Mizuta**

Advisor: Sabine Grunwald

**New integration research in soil science: Pedo-Econometrics**

With a research scope of development and spectral prediction of indication systems for improving soil quality, health, and security, I have integrated econometric methods and theories in soil science research. The new research realm we have developed is called Pedo-Econometrics (Soil Science + Economics + Mathematics/Statistics).



**Siti Jariani Mohd Jani**

Advisors: Gurpal Toor & Andrew Koeser

**Nitrogen in urban waters**

Urbanization leads to elevated nitrogen (N) in water bodies causing eutrophication, onset of harmful algal blooms and hypoxia. Organic N is the most dominant form of N and has been proven to be a dynamic contributor to these water impairments. Therefore, our objectives are to investigate the composition, sources, and bioavailability of N from residential stormwater runoff to estuarine waters in an urban watershed.



**Elise Morrison**

Advisors: Andy Ogram & Ben Turner

**Peatland microbial community dynamics**

I study microbial communities in tropical and sub-tropical peatlands. Microorganisms drive many processes, including carbon cycling, but little is known about their ecology in these systems. My work investigates prokaryotic and fungal community structure and diversity in Panamanian and Everglades peatlands to understand how they may influence peatland processes.



**Hanh Nguyen**

Advisor: K. Ramesh Reddy & Julie Meyer

**Microorganisms mediating phosphorus availability**

My project focuses on the biological basis of the organic phosphorus (P) mineralization and inorganic P insolubilization in the constructed wetlands near Everglades, Florida. Characterizing microorganisms and biochemical pathways involved in these processes will not only help to tackling the P-limited soil problems but also can help to deal with eutrophication caused by overloaded P in the aqueduct system.



**Anna Normand**

Advisors: K. Ramesh Reddy & Mark Clark

**Global peatland soil organic carbon chemical composition and greenhouse gas production**

My research explores the effects of climate and land-use change on soil stability in wetlands. I have traveled across climate zones and fostered collaborations to determine the soil organic carbon composition of 125 peatlands from across the globe and how that composition dictates greenhouse gas production and soil loss.



## Josh Papacek

Advisor: Patrick Inglett

### Nutrients influence recent harmful algal blooms in the Indian River Lagoon (IRL)

I investigate the factors controlling harmful algal blooms in the IRL and focus on availability and cycling of nutrients. I use stable isotope-tracing techniques to measure biogeochemical processes that contribute to the timing and magnitude of blooms with the goal of informing managers and expanding knowledge on nutrient cycling in estuaries.



## Dipti Rai

Advisor: Patrick Inglett

### Effects of management intensification on greenhouse gas fluxes in grazing lands

The objective of my research is to determine the impact of land management practices on greenhouse gas fluxes in grazing lands in Ona, Florida. This research will enhance the understanding of soil carbon sequestration and long term ecological sustainability in subtropical grasslands through process-based assessment.



## Andres Rodrigues

Advisors: Samira Daroub & Stefan Gerber

### Soil subsidence in the Everglades Agricultural Area

My research focuses on understanding biogeochemical changes associated with soil subsidence, and formulating soil conservation strategies for the Everglades Agricultural Area (EAA). This research will provide new information to be used in order to prevent soil losses in this area, one of the biggest concerns for this community.



## Saroop Sandhu

Advisors: Stefan Gerber & Kanika Inglett

### Climate sensitivity of microbial processes in grazing lands

I am working to develop and implement a microbial model to improve a process-based model with microbial dynamics to predict greenhouse gas emissions under global change scenarios in the sub-tropical grassland ecosystem. To develop and implement this microbial model, I am assessing soil microbial community structure and function through molecular, enzymatic, and gas flux measurements in both laboratory and field settings.

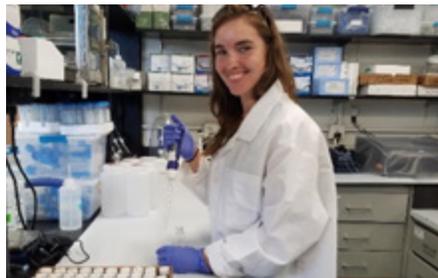


## Tracy Schafer

Advisors: K. Ramesh Reddy & Todd Osborne

### Photolytic effects on nitrogen and phosphorus mineralization

I am studying the effects of UV-light on the degradation of organic matter and how this alters bioavailability to micro-organisms, potentially increasing rates of nitrogen and phosphorus mineralization in wetland systems. If bioavailability of nitrogen and phosphorus increases through photolytic processes, potential increases in UV-intensity through climate change could lead to increased levels of eutrophication.



## Anne Sexton

Advisors: Samira Daroub & Jehangir Bhadha

### Floating aquatic vegetation, water quality, and farmers

My research assesses the feasibility of suppressing floating aquatic vegetation growth as a means of reducing bioavailable phosphorus in the Everglades Agricultural Area (EAA) drainage canals. Our work fosters the relationship between SWS researchers and EAA farmers with the goal of meeting mandated phosphorus load reductions and improving water quality.



## Xiaoping Xin

Advisor: Zhenli He

### Smart Nano-delivery System in sustainable agriculture

My research focuses on applying Smart Nano-delivery System in sustainable agriculture by using biodegradable nanoparticles as carriers to deliver nutrients and pesticides/herbicides to targeted sites in plants, aiming to improve the targetability, efficacy and sustainability of agronomic chemicals, and therefore increasing yields and minimizing environmental pollution.



## Aloha to Nick Comerford

Congratulations to Nick Comerford on his selection as the Dean of the University of Hawaii Mānoa College of Tropical Agriculture and Human Resources and Director for Research and Cooperative Extension. His new role in this position will start September 1, 2017.



Nick retired from UF/IFAS after a distinguished career of 37 years as a faculty member of our department. Since 2008, he served as Center Director of the North Florida REC, Quincy, Florida.

Dr. Comerford has accumulated a distinguished record of major scientific contributions, dedicated professional service, visionary leadership, and effective mentoring of graduate students. He is nationally and internationally recognized for his outstanding accomplishments and we wish him all the best in his new role as the Dean of University of Hawaii. <http://www.hawaii.edu/news/article.php?ald=8727>

**Myakka** (pronounced '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.

## Join us at...

### The 18th Annual Soil and Water Sciences Research Forum

The 18th Annual Soil and Water Sciences Research Forum will be held September 14, 2017, in Gainesville, Florida.

The forum is designed to bring together representatives from state and federal agencies, private industry, faculty, graduate students, and prospective students interested in soil and water sciences.

The forum will provide an opportunity for all those interested in soil and water sciences to interact with our students, faculty, and administrators on campus.



Our Keynote Speaker will be Dr. Thomas Bianchi, Jon and Beverly Thompson Endowed Chair of Geological Sciences, Department of Geological Sciences, UF.

His major interests are in the areas of organic geochemistry, biogeochemical dynamics of aquatic systems, and application of chemical biomarkers with particular emphasis in estuarine and coastal ecosystems.

We look forward to your participation in the forum. If you are planning to attend, please register at <http://soils.ifas.ufl.edu/research/research-forum/2017-sws-research-forum/>.

For additional information, contact James Jawitz at: [Jawitz@ufl.edu](mailto:Jawitz@ufl.edu).

## Congratulations to faculty and students for their outstanding achievements:

**Soil Science Society of America Fellow:** This is the highest honor bestowed by our professional society. For the year 2017, **Sabine Grunwald** was a recipient of this award.

Sabine joins the following 11 current SWS faculty members who received this recognition in the past:

Zhenli He (2015); Vimala Nair (2014); Yuncong Li (2010); Willie Harris (2005); Lena Ma (2003); Nick Comerford (2001); Wes Wood (2000); Jack Rechcigl (1999); K. Ramesh Reddy (1988); George O'Connor (1986); and Pedro Sanchez (1983).

**Zhenli He** was selected by the American Society of Agronomy and the Agronomic Science Foundation to receive the 2017 Kingenta Agricultural Service Award.

## Congratulations Graduates

### Summer 2017

#### PhD

Nasiru Danmowa (Nkedi-Kizza and Jawitz)  
Laibin Huang (Ogram)  
Stephen Jennewein (Daroub & Bhadha)  
Liguang Li (He)  
Elise Morrison (Ogram & Turner)  
Anna Normand (Reddy and Clark)  
Christopher Wade Ross (Grunwald)  
Anne Sexton (Daroub and Bhadha)

#### MS

Katelyn Foster (P. Inglett)  
Steph Jamis (Reddy)  
Haley West (Wright)

#### BS - IS-EMANR (Advisor - Curry)

Jesse Baughman  
Rachelle Berger  
Michael Black  
John Carroll  
Paul Duff

#### BS-SLS-SS

(Advisor - Bonczek)  
John Santiago

#### SLS Minor

(Advisor - Bonczek)  
Jessica Hong

### Spring 2017

**BS - IS-EMANR (Advisor - Curry)**  
Viness Eugene

## Welcome New Students

### Summer 2017

#### MS

Nick Andreacchio (Wilson)

#### BS - IS-EMANR (Advisor - Curry)

Matthew Zion Brooks  
Regan Fox

### Fall 2017

#### PhD

Evelyn "Prissy" Fletcher (Morgan and Nkedi-Kizza)  
Caleb Gravesen (Judy)  
Suman Raja Jumani (Deitch and Jawitz)  
Julio Pachon (Bacon)  
Jamila Roth (SNRE) (Reynolds)  
Nan Xu (Bhadha and Mylavarapu)  
Jiahua Zhou (Deitch and Grunwald)

#### BS - SLS (Advisor - Bonczek)

Lindsay Mikell (Water Science)  
Lukas Pidgeon (Water Science)  
Alexander Yelvington (Soil Science)

#### MS

Timothy Beach (Li)  
Rachelle Berger (Reddy)  
Franky Celestin (Mylavarapu)  
Juhi Chaudhary (Reddy)  
Theresa Gruninger (Reynolds and Osborne)  
Kelly Jennifer Mahan-Percivall (Bhadha)  
Nicole Miller (SNRE) (Meyer)  
Benjamin Moose (Reddy)  
John Santiago (Strauss)  
Cayla Rose Sullivan (Reynolds)  
Jessica "Arielle" Taylor-Manges (Reynolds)  
Neetika Thakur (Kadyampakeni)  
Qudus Oladimeji Uthman (Kadyampakeni and Nkedi-Kizza)

#### BS - IS-EMANR (Advisor - Curry)

Corrina Adams  
Dylan Blosser  
Emily Cline  
Elizabeth Fleck  
Crystal Flores  
Jordan Gandy  
Hannah Gutner  
Carmen Hernandez  
Donna Kaminski  
Richard Kidd  
Liam MacLean  
Jacqlyn Rivas  
Jennifer Ronderos  
Hannah Shellenback  
Benjamin Tubbs  
Sophia Visent  
Ethan Weinrich