



FROM THE CHAIR



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In this newsletter we highlight the Soil and Water Science Department's (SWSD) research and outreach activities in the St. Johns River Basin. For the past decade, we have conducted several research projects in this basin addressing soil and water quality issues. The St. Johns River Basin includes: Upper St. Johns River Basin, Indian River Lagoon Basin, Upper Ocklawaha River Basin, Orange Creek Basin, Lake Apopka Basin, and Lower St. Johns River Basin. Land use changes in the St. Johns River Basin over the past few decades, including increased drainage, fertilizer application, and intensification of agricultural and other land uses has resulted in increased nutrient loading into St. Johns River.

Our faculty at the Indian River REC has been active in developing management practices to improve nutrient use efficiency and water quality in the Indian River Lagoon Basin. Our faculty in Gainesville, in collaboration with the scientists from the St. Johns River Water Management District (SJRWMD), have been conducting research on various projects including: fate of organics in the Lake Apopka Basin, determining the indicators of change in the Blue Cypress Marsh located in the Upper St. Johns River Basin, and establishing the significance of internal nutrient load in the Lower St. Johns River Basin. Our collaborators at the SJRWMD include: Larry Battoe, Mike Chimney, Matt Fisher, Lawrence Keenan, John Hendrickson and others. A few examples of our current activities in the basin are presented in this newsletter.

St. Johns River Basin in Focus

The following are some of the highlights of the Spring semester:

- Peter Vitousek, Clifford G. Morrison Professor of Population and Resource Studies, Stanford University presented the 2004 Hubbell Seminar.
- Mary Collins was elected as the President of the Soil Science Society of America. She will serve as president-elect in 2005 and as president in 2006.
- Lena Ma's fern research continues to bring recognition to the department, IFAS, and UF. Lena was selected to receive the 2004 USDA Secretary's Honor Award.
- Vimala Nair is recognized as the 2003 Outstanding Associate Editor (Journal of Environmental Quality) by the ASA/CSSA/SSSA.
- George O'Connor organized an international conference on "Sustainable Land Application" held in Orlando, Florida. Tom Obreza organized a national conference on "Water Quality" held in Clearwater, Florida. Both conferences were successful and well attended.
- John White accepted a tenure track position with the Wetland Biogeochemistry Institute, Louisiana State University, Baton Rouge, La. We wish him all the best.

As of July 1, 2004, UF switched all business and personnel data management system to the PeopleSoft Bridges system. In the next few months we will face many challenges and difficulties in trying understand this new system. When everything is done, we hope that the new system will help us to function more efficiently. Thanks to our office staff: Cheryl Combs, Kelly Lewis, and Heather Barley for keeping all of us on track as we adopt this new system.

As always, we welcome comments and suggestions from alumni, colleagues, and clientele to improve our programs.

UNDERGRADUATE COURSES IN FOCUS

GRADUATED STUDENTS

SPRING 2004

Michael Bond, MS, Advisor, H. Popenoe
 Chakesha Martin, MS, Advisor, J. White
 Carla Sperry, MS, Advisor, D. Graetz
 Leighton Walker, MS, Advisor, D. Graetz
 Travis Hanselman, PhD, Advisor, D. Graetz
 Kelly Morgan, PhD, Advisor, T. Obreza
 Jaime Sanchez, PhD, Advisor,
 R. Mylavarapu

NEW STUDENTS SPRING 2004

Daniel Herrera, PhD, Advisor, W. Harris
 Claudia Arrieta, MS, Advisor, S. Daroub
 Steve Barlow, MS, Advisor, M. Clark
 Jennifer Leeds, MS, Advisor, M. Clark
 Lidya Meding, MS, Advisor, T. Obreza
 Laura Parkel, MS, Advisor, C. Wilson
 Louis Philor, MS, Advisor, S. Daroub

SOS 2008 Soils, Humans, and Environmental Impact This general education course focuses on relationships between human activities and soils, and environmental quality.

SOS 2007 The World of Water This general education course explores the full range of water issues including abundance and quality of water in the environment, water policy, and conflict.

SOIL AND WATER SCIENCE SHORT COURSES

Hydric Soils (W. Hurt) This exclusive training program focuses on the interrelations of hydrology and hydric soils and how to distinguish hydric soils from nonhydric soils. Wade Hurt (wade_hurt@ifas.ufl.edu).

GIS Applications in Soil and Water Science (S. Grunwald) This exclusive training program focuses on how to make use of readily available geo-data layers of soils, geology, land use, and topography. Sabine Grunwald (SGrunwald@ifas.ufl.edu).

Basic Soils – An introduction (M. Collins) is scheduled for offering during July 2004. Details of these courses can be seen at: <http://conference.ifas.ufl.edu/soils/index2.html>.

5TH ANNUAL SOIL AND WATER SCIENCE RESEARCH FORUM

The Fifth Annual Soil and Water Science Research Forum is scheduled for **September 2, 2004**, in Gainesville, Florida. The forum is designed to bring together representatives from state and federal agencies, and private industry, faculty and graduate students, and prospective students interested in soil and water science. The forum will provide an opportunity for all interested in soil and water science to interact with our students, faculty and administrators on campus. Please register at <http://soils.ifas.ufl.edu/forum>.

FACULTY, STAFF AND STUDENTS

AWARDS

Sampson Agyin won the Best Student award (cash prize of 1000 Euros) for his MS research in the Physical Land Resources Program at the University of Ghent. Sampson is currently working on his PhD with George O'Connor.

Mary Collins was elected as President of the Soil Science Society of America. She is the first woman president in the history of the SSSA.

Lena Ma won the 2004 USDA Secretary's Honor Award. The Secretary's Honor Awards are the most prestigious awards presented by the USDA in recognition of outstanding contributions to agriculture, to the consumers of agricultural products, and to the ability of the USDA to serve rural America.

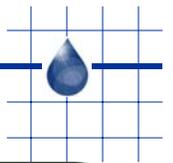
Vimala Nair was selected to receive the Outstanding Associate Editor Award for 2003, presented by ASA/CSSA/SSSA for "Exemplary service and sound technical skill in the peer review process for the Journal of Environmental Quality".

PhD candidate Lynette Malecki has received \$680 in funding for her project from the Professional Association of Diving Instructors Foundation. The Foundation encourages and supports underwater science, environmental projects, and education.

SWS ALUMNI

We are in the process of updating contact information. Please visit our website and update your contact information. If you do not have access to a website, you can send us the updated information. In our future newsletters, we would like to include alumni news. So please send us information that you would like to share with your friends and colleagues. Please register at <http://soils.ifas.ufl.edu/department/alumni.html>.

The SWSD-IFAS and Teagasc Research Center, Johnstown Castle, Co. Wexford, Rep. of Ireland jointly hosted an international symposium on **Nutrient Management in Agricultural Watersheds: A Wetlands Solution**, (May 24-26, 2004), Wexford, Ireland. The symposium was attended by 120 participants from 8 different countries. Several SWSD faculty (Mark Clark, Don Graetz, Jim Jawitz, Ramesh Reddy, and John White) made presentations at this symposium. The U.S. portion of this symposium was funded in part by a grant from the U.S. Department of Agriculture.



RESEARCH PROGRAMS IN THE ST. JOHNS RIVER BASIN

INTERNAL NUTRIENT LOAD IN THE LOWER ST. JOHNS RIVER



Dr. Jim Jawitz and Kimberly Cayse preparing to deploy porewater equilibrator in the St. Johns River

Eutrophication refers to nutrient pollution of a body of water. Eutrophication of Florida's lakes, rivers, and estuaries is a result of decades of agricultural, industrial, and urban point and non-point source nutrient loading. A large amount of nutrients in fresh and estuarine waters can result in a variety of ecological responses such as algal blooms, decreased dissolved oxygen levels and fish kills due to the low oxygen levels in the water. The 1972 Clean Water Act required states to identify impaired

water bodies and establish total maximum daily loads (TMDLs). The St. Johns River Water Management District is mandated to set TMDLs for nutrients in the Lower St. Johns River (LSJR).

The LSJR is considered to be the northern 101 mi portion of the SJR from the mouth of the Ocklawaha River in Putnam County to the inlet at the Atlantic Ocean in Duval County. The LSJR is an elongated, shallow, estuarine river. Unique among rivers in Florida, it is characterized as a black water river, meaning it has a shallow zone of light penetration but high productivity. Release of nutrients such as phosphorus (P) and nitrogen (N) from the sediment must be considered an important contribution to the total nutrient load to the river when determining TMDLs. The objectives of this study were to determine and to calculate the annual internal loading of nutrients from the sediment to the water column. Internal loading results when nutrients from the sediment are introduced into the water column.

The average annual internal load of P was estimated to be 405 Metric Tons yr^{-1} , one fourth of the total P load to the LSJR. The average annual internal load of N was determined to be 2,555 Metric Tons yr^{-1} , one third of the total N load to the LSJR estuary. Results from this study suggest the contribution of internal loading (nutrients from the sediment) is a major component of the LSJR estuarine nutrient budget. This load will likely decrease as external loading (nutrients from agricultural and urban runoff, industrial and domestic wastewater discharge, etc.) is decreased over time, resulting in fewer anaerobic events, thereby improving the water quality of the Lower St. Johns River Estuary. For additional information, contact John White at jrwh@ifas.ufl.edu

DEVELOPMENT OF SLOW RELEASE FERTILIZERS FOR FLORIDA ACID SANDY SOILS

ODPR materials in Central Florida



Acidic sandy soils (Spodosols and some Alfisols)

occupy a wide area under citrus and vegetable production in the Indian River Drainage Basin. The Phosphate Industry in Central Florida annually produces over 800,000 short tons of oversize dolomite phosphate rock (ODPR) at the beneficiation sites. Use of the ODPR in the mines through recycling or blending generates very little revenue. Our analysis indicates that the ODPR materials contains up to 103 g kg total P, 309 g kg^{-1} Ca, 19 g kg^{-1} Mg, and 2.2 g kg^{-1} K_2O . The calcium carbonate equivalent of the dolomite phosphate rock (DPR) material is 77%, which is approximately close to the best quality limestone in Florida. Therefore, these industry byproducts can be a good source of nutrients and lime for crop production on acidic sandy soils. Greenhouse studies indicate that the newly developed DPR fertilizers are superior to water soluble NPK blend fertilizers for both citrus and vegetable crops on acidic soils, as the DPR fertilizers can not only provide adequate supply of

multiple nutrients (P, Ca, and Mg), but also improve soil conditions, especially neutralizing soil acidity. Results from this research are expected to benefit the phosphate industry by substantially increasing the economic value of the ODPR materials and to be beneficial to both agriculture and the environment by reducing crop production costs and minimizing impact of fertilization on the environment. This on-going project is funded by Florida Institute of Phosphate Research. For additional information, contact Zhenli He at zhe@ifas.ufl.edu.

LIMITING HERBICIDE EXPORT IN SURFACE WATER DISCHARGED FROM INDIAN CITRUS PRODUCTION AREAS



Herbicide application in a citrus grove. The herbicide is applied as a band underneath each side of the trees.

Pesticide losses from citrus groves are a concern within the St. Lucie Estuary (SLE) and Indian River Lagoon (IRL) drainage basins. Of special concern is the loss of herbicides that may negatively impact submerged aquatic plant populations downstream in the freshwater and estuarine receiving water

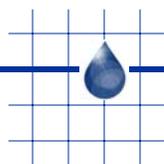
bodies. Pre-emergent and emergent herbicides are usually applied underneath citrus trees to limit competition for nutrients and water, and to allow workers to harvest fruit more easily. Herbicide bandwidth refers to the area underneath the trees that is usually maintained weed-free. An interdisciplinary project funded by USEPA R4 through FDACS was initiated at the UF/IFAS-IRREC to investigate the influence of limiting the herbicide bandwidth on discharge of two representative herbicides (norflurazon and simazine) in surface runoff water.



Stimulation of surface water runoff events using overhead irrigation.

Results indicate that export of herbicide residues from citrus production areas can be greatly reduced by minimizing the width of the herbicide bands underneath trees. Possible explanations are that the herbicide is more sheltered from the rainfall impacts, and/or that significantly less herbicide is applied with the smaller

bandwidth. The principal investigators for this project are Chris Wilson and Brian Boman (UF/IFAS-IRREC), and Jane Ferguson Foos (FDACS). For additional information contact Chris Wilson at pcwilson@ifas.ufl.edu.



BLUE CYPRESS MARSH: PEAT PALEOCHEMICAL RECORD OF WETLAND NUTRIENT STATUS

The headwaters of the St. Johns River are located in Indian River and Brevard County, just west of Vero Beach. The “river” at this point consists of extensive shallow marshes that surround several shallow lakes. In this region, the St. Johns River resembles a shallow inland lagoon, characterized by shallow water and a very slow northward flow of water. Land use in the area is principally agricultural; mostly citrus farms and cattle ranches. Similar to the Everglades, the floodplain of the Upper St. Johns River (USJR) was extensively diked and drained in the early 20th century to allow for agricultural development. Surface water runoff from agriculture and urban development pose threats to the low nutrient-adapted flora and fauna of the USJR. One goal of water management agencies nationwide has been to determine a safe or allowable nutrient load to lakes and wetlands.

A study underway in the Upper St. Johns River is examining biogeochemical changes in organic matter and phosphorus (P) in peat deposits of the Blue Cypress Marsh Conservation Area. Deep peat cores taken from the marsh allow examination of changes that have taken place over the last ca. 3000 years. Once these transformations are better understood, the rate of historical P accretion can be better modeled, perhaps leading to better estimates of ecologically safe P loading rates. Techniques that are being used in this study include classical acid – base phosphorus fractionation into inorganic and organic pools. In addition to the chemical techniques, novel thermal organic P fractionation techniques are also being investigated. These techniques have shown promise in providing more resolution to the continuum of organic P recalcitrance. Other techniques used in this study include spectral fluorescent and absorbance properties of extracted organic matter, characterization of plant biopolymers, nuclear magnetic resonance (¹³C-NMR) and carbon (¹⁴C) dating. This project is funded by the St. Johns River Water Management District. For additional information contact Matt Fisher at mfisher@sjrwm.com.

EXTENSION

DEPARTMENT PARTICIPATES IN 45TH ANNUAL STATE LAND JUDGING CONTEST

The 45th Annual Florida State Land Judging Contest was held on March 26th at the Florida Sheriff's Boys Ranch, Live Oak. The host for this outstanding event was the Suwannee County Conservation District, with numerous agencies, organizations, and individuals assisting with the event and/or providing sponsorship. Thirty-five teams participated in four Divisions. High Teams and High Individuals in each of the four Divisions were:

Division	High Team	High Individual
High School FFA	Charlotte Sr. FFA	Clay Myers (Charlotte)
High School 4-H	Manatee Sr. 4-H	Britten Couch (Manatee)
Middle School FFA	Clermont Middle FFA	Cassidy Caldwell (Clermont)
Middle School 4-H	Manatee Jr. 4-H	Tyler Reckner (Manatee)

The top teams in the High School Divisions (Charlotte Sr. FFA and Manatee Sr. 4-H) won a trip to the National Land Judging Contest, held in Oklahoma in May.

Land judging (conducted at three different soil-landscape locations at the State Contest), entails the determination of specific soil attributes such as surface texture, rooting depth, drainage class, degree of erosion, and classification at the Order level, plus selection of appropriate conservation practices and fertilization recommendations. In addition to the contest host and the landowner (Florida Sheriff's Boys Ranch), the many other sponsors included—but were not limited to—the Florida Department of Agriculture and Consumer Services, Office of Ag Water Policy; the UF/IFAS Soil and Water Science Department; the USDA-Natural Resources Conservation Service; the UF/IFAS Family, Youth and Community Sciences Department, 4-H Youth Development Office; and the Florida FFA Association. The Soil and Water Science Department is proud to join the many other participating organizations in the state land judging program, providing an education in soils and land use for many youngsters and adult leaders. Further information may be found at the Land Judging Website (<http://landjudging.ifas.ufl.edu/>) or by contacting Randy Brown at rbb@ifas.ufl.edu.



Dr. Peter M. Vitousek, Clifford G. Morrison Professor in Population and Resource Studies, Department of Biological Sciences, Stanford University, Stanford, CA, presented the 2004 Hubbell Seminar. His seminar entitled “Sources of nutrients during four million years of soil and ecosystem development”, was attended by 200 people including faculty, staff, and students. Dr. Vitousek was hosted by Land Use Change Institute, School of Natural Resources and Environment, and SWSD. Previous speakers in this series include: Derek Lovely (2000), University of Massachusetts, and Malcom Sumner (2002), University of Georgia.

NEW SOIL AND WATER SCIENCE FACULTY MEMBER AT THE INDIAN RIVER REC, FORT PIERCE, FL ZHENLI HE



Dr. Zhenli He was born and raised in Zhejiang, China. He received his BS in Soil Science and Plant Nutrition (1982), MS in Soil Chemistry and Fertility (1985), and PhD degrees in Soil Chemistry and Environmental Science (1988) from Zhejiang University, China.

From 1989 to 1993, he served as a visiting scientist at the University of Newcastle Upon Tyne, England and the Macaulay Land Use Research Institute, Scotland, where he conducted research on soil microbial ecology and nutrient cycling related to sustainable agriculture and environmental quality, won a technical cooperative award from the British Council of Culture Exchange, UK, and secured a grant from Science and Technology Development Bureau of European Union for conducting an international collaboration research on acidic soils in China. At the Zhejiang University, Dr. He was hired as an assistant professor in 1989, and promoted to an associate professor 1991 and a full professor 1993, where his responsibility included course teaching, graduate supervision, and research. He migrated to the U.S. in 1996 and worked as a postdoctoral research associate at the Virginia Polytechnic Institute and State University. He joined the Indian River REC (IRREC) as a postdoctoral research associate in 1997 and was promoted to assistant scientist in 2001. At the IRREC, Dr. He conducts research on soil biogeochemistry of nutrients and heavy metals in relation to soil and water quality, citrus nutrition, and best management practices. In 2004, Dr. He was hired as an assistant professor with teaching and research responsibilities in soil and water science at the IRREC, University of Florida. Contact information is zhe@ifas.ufl.edu.