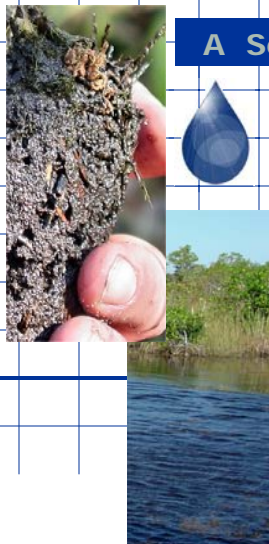




FROM THE CHAIR

The Suwannee River Basin in Focus



In this issue: Suwannee River Basin



In this newsletter we highlight the Soil and Water Science Department's (SWSD) research and outreach activities in the Suwannee River Basin (SRB). The SRB spans several Florida counties and includes parts of Georgia as well. Our faculty has been active in conducting research and outreach programs associated with nutrient management in the basin on projects related to risks associated with nitrate and phosphate in surface and ground waters.

Agricultural activities pose a major threat of non-point source pollution, particularly on karst landscape, which is underlain by limestone and characterized by good drainage and vertical water movement. These conditions minimize denitrification, and nitrate leaching is a risk. Environmental phosphorus risks are related to leaching potentials rather than surface runoff.

Our faculty is committed to a nation-wide effort ongoing within the USDA/ Natural Resource Conservation Service (NRCS) and land grant colleges to establish guidelines for the management of manure P that will protect the water resources. The approach being taken is to develop guidance in the form of a P-Index that will assess the risk of phosphorus loss from agricultural lands. Existing forms of P-Index developed on a national basis attribute all phosphorus transport and loss to runoff and erosion, whereas vertical transport rather than surface runoff can govern the phosphorus fate in soils in the SRB.

Demonstration of Best Management Practices (BMPs) on representative farm-scale operations on a row crop farm, poultry farm and dairy farm in the SRB are being conducted by an interdisciplinary team (IFAS/UF SWSD, Agricultural and Biological Engineering and North Florida REC (Quincy and Live Oak) and 24 partners of the Suwannee River Partnership, also known as the Suwannee River Basin Nutrient Management Working Group (SRBNMWG).

This group was formed in 1998 to "assess sources of nutrient loadings to the Suwannee River and optimize reductions in loadings to waters of the Basin, emphasizing voluntary, incentive-based programs for protecting the environment and public health." Pre- and post-BMP monitoring of groundwater and soil nitrate concentrations is being conducted under actual production conditions to document and verify the effectiveness of the BMPs.

Our recent and current research and extension activities are funded by state agencies such as the Florida Department of Environmental Protection, and federal agencies such as the USDA-IFAFS (Initiative for Future Agricultural and Food Systems) and USDA-NRI (National Research Initiative). Our cooperators include agencies such as the NRCS and the SRBNMWG.

The following are few highlights of activities during summer 2004:

- James Bonzeck, Mary Collins, Sabine Grunwald, and Wade Hurt taught outreach short courses to soil and environmental professionals. A total of 50 professionals attended three courses taught by these faculty.
- Fifth Annual Soil and Water Science Research Forum was held on September 2, 2004, in Gainesville, Florida. Dr. Rattan Lal, Professor, The Ohio State University gave a key note lecture on climate change and global food security.
- Dr. James Sickman joined the department as an assistant professor of biogeochemistry of wetlands and aquatic systems.
- Dr. Mary Collins was elected as President of the Soil Science Society of America (SSSA). Her election to this prestigious position will be recognized at the Annual Meeting of SSSA in Seattle (October 30-Nov. 5, 2004).
- Former E. T. York Lecturer William H. Patrick, Jr., Boyd Professor, Louisiana State University died on August 5, 2004. Bill Patrick was the first E. T. York Lecturer hosted by the department.

As always we would like to welcome comments from our alumni and friends of SWSD. If you have any newsworthy items you would like to share, please send it to Pam Marlin (pem@ufl.edu).

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Perennial forage nutrient management and leaching mitigation 4

EDITORS:

Pam Marlin
Darryl Palmer
Dr. Vimala Nair



At the 5th Annual CALS Teaching Enhancement Symposium the session "Developing Your Distance Education Course" featured learning mechanisms, tools and techniques to teach off-campus students. Several presentations in this session featured courses offered through the Distance Education Graduate Track in Environmental Science (<http://soils.ifas.ufl.edu/distance/>) including SOS6448 *Biogeochemistry of Wetlands* and SOS5720C *GIS in Land Resource Management*. Technologies to teach distance education courses were presented including interactive synchronous and asynchronous communication tools and a virtual computer lab. For additional information contact Sabine Grunwald, sgrunwald@ifas.ufl.edu.

GRADUATED STUDENTS

SUMMER 2004

Omar Harvey, MS, Advisor, R. Rhue
Nadine Kabengi, PhD, Advisor, S. Daroub
Konstantinos Makris, PhD, Advisor, W. Harris
Fernando Munoz, PhD, Advisor,
R. Mylavarapu

NEW STUDENTS

SUMMER 2004

Kelly Hamilton, MS, Advisor, J. Jawitz



NEW UNDERGRADUATE COURSE

THE WORLD OF WATER SOS 2007 Offered in Spring 2005

This general education course explores the full range of water issues including abundance and quality of water in the environment, water policy, and conflict. For additional information contact James Bonczek at bonczek@ifas.ufl.edu.

FACULTY, STAFF AND STUDENTS



NEW FACULTY MEMBER - JAMES SICKMAN

Dr. James Sickman works in and across the fields of biogeochemistry and limnology in lakes, rivers and wetlands. He received his Ph.D. from the University of California in 2001 and specializes in the application of environmental isotopes to the study of terrestrial wetlands and aquatic ecosystems. Prior to coming to UF, Dr. Sickman worked with the California Department of Water Resources on ecosystem restoration issues in the San Francisco-Bay-Delta region and on coastal restoration in the Mississippi Delta while an assistant professor at the University of New Orleans. His research program includes studies to understand how disturbed and undisturbed ecosystems are affected by major environmental problems such as acid rain, eutrophication, climate-change and surface-water pollution. Dr. Sickman's field sites currently include the Sierra Nevada of California, the Sacramento-San Joaquin Delta, and Karst springs in northern Florida. He plans to pursue some of these research ideas in Florida's wetlands and aquatic systems. Dr. Sickman also plans to teach two courses: Environmental Biogeochemistry and Advanced Biogeochemistry.

Sabine Grunwald was elected Vice Chair of the Commission 1.5 Pedometrics, Division 1 of the International Union of Soil Science (IUSS).

Graduate student, Sanjay Lamsal, was awarded 2nd place in the Graduate Student Paper Presentation Contest for his thesis research, Soil and Crop Science Society of Florida, Tallahassee, FL, May 20-21, 2004.

Rao Mylavarapu has been elected at the 2004 Joint Work Session in Delaware, as the Secretary of the Southern Extension and Research Activities Information Exchange Group (SERA-IEG-6), a USDA-CSREES sponsored group focusing on cooperation among the southern states on Methodology, Interpretation, and Implementation of Soil, Plant, Byproduct, and Water Analyses. In a six-year commitment, Mylavarapu will be the Secretary (2004-2006), Vice-Chair (2006-2008) and Chair (2008-2010) of the group.

FIFTH ANNUAL DEPARTMENT RESEARCH FORUM

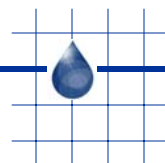
The Fifth Annual Soil and Water Science Research Forum was held on September 2, 2004, in Gainesville, Florida. The forum was attended by faculty and graduate students of the department, and representatives from state and federal agencies, and private industry. The forum provided an opportunity for students and faculty to interact with representatives from state and federal agencies, and private industry. Dr. Jimmy Cheek, Dean for the Academic Programs addressed the group on the role of SWSD in overall educational programs of College of Agricultural and Life Sciences. Dr. Rattan Lal, Professor, The Ohio State University gave a key note lecture on climate change and global food security. Graduate students and post-doctoral fellows presented 8 oral and 35 poster presentations. One best oral and 4 best poster presentation awards were presented. Winner of oral presentation was: Larry Ellis (Collins advisor). Winners of best poster presentations were: P. Inglett (Reddy advisor), I. Yapsilantis (Ogram advisor), G. Kertulis-Tartar (Ma advisor), and T. Osborne (Reddy advisor).



PEDOMETRICS 2005 FRONTIERS IN PEDOMETRICS

September 12-14, 2005, Naples Beach Hotel & Golf Club, Naples, Florida

Dr. Sabine Grunwald will be hosting the Biannual Meeting of Commission 1.5 Pedometrics, Division I of the International Union of Soil Science (IUSS). Pedometrics is the application of mathematical and statistical methods for the study of the distribution and genesis of soils. Please visit the website <http://conference.ifas.ufl.edu/pedometrics> for more information.



RESEARCH PROGRAMS IN THE SUWANNEE RIVER BASIN

MANURE PHOSPHORUS MANAGEMENT FOR THE SUWANNEE RIVER BASIN: A MODEL FOR HIGHLY LEACHABLE SOILS

This project was funded in 2000 by the USDA-Initiative for Future Agricultural and Food Systems (USDA-IFAFS). The Principal Investigators of the project that integrates research, teaching and extension components are Willie Harris, Vimala Nair, Dean Rhue, Don Graetz, Jerry Kidder and Rao Mylavarapu. Also involved in the project is Clint Truman of USDA-ARS, Tifton, Georgia. The main outputs from this project are given below:

- A rapid field test, called the *Phosphorus Quick Test* (PQT): The PQT could be a valuable tool for rapid, on-site evaluations of the extent of P leaching that has resulted from previous P applications and for estimating the future potential loading capacity of field sites. The depth to which P has impacted the soil profile is indicated by changes in intensity of blue color. A comparison of the PQT results



Performing the P quick test in the field

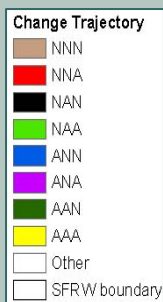
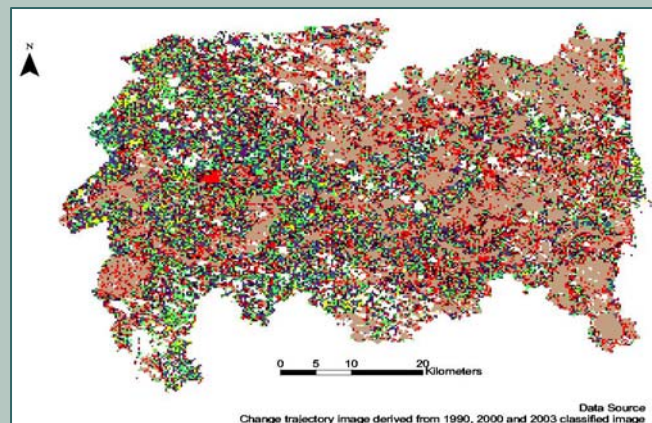
with Mehlich 1 P (soil test P in Florida) showed that the PQT could accurately determine the depth of P movement in sandy soils in a matter of a few minutes. Details of the procedure can be found in our Research Brief located at <http://soils.ifas.ufl.edu/departments/briefs/sws03-03.pdf>

- A second output of this project is the introduction of a new concept, the *soil P storage capacity* (SPSC). Soil test P concentrations (STP) are often used as measures of environmental P risk. However, a low STP is not valid justification for further P application in the nutrient management scheme because risk of application relates to P sorption capacity up to some threshold where additional P could be detrimental. The SPSC can be used to predict a "safe" lifespan of a field where manure is being applied, with respect to P leaching risk. We are now looking into the possibility of introducing the SPSC concept as a parameter in the Florida P-Index, a P risk assessment tool. Details can be found in our Research Brief, <http://soils.ifas.ufl.edu/departments/briefs/sws04-03.pdf>.

- Insight has been gained into the long-term sorption properties of sandy coastal plain soil materials from Florida and Georgia. Cyclic loading and desorption experiments in unsaturated columns have shown a time dependency of sorption for the most tightly bound P, and a progressive depletion of these highly-retentive sites until P sorption becomes essentially reversible. The latter stage indicates that the soil has become a potentially long-term source of P. Details can be found in our Research Brief, <http://soils.ifas.ufl.edu/departments/briefs/sws03-02.pdf>.

- An alternative approach to the SPSC (explained above) for predicting the "safe" lifespan of a P application site was developed based on principles influencing the retardation of vertical P movement (leaching) in soil. This "retardation" approach is complementary to the SPSC in that the former would not be confounded by naturally phosphatic soils whereas the latter more effectively reflects previous agricultural loading. For additional information, contact Vimala Nair at vdna@ifas.ufl.edu.

ASSESSMENT OF LAND COVER DYNAMICS IN THE SANTA FE RIVER WATERSHED



Trajectories of land cover change in the SFRW from 1990 to 2003 (A: agriculture; N: non-agriculture)

In water year 2002 about 2,970 tons of nitrate-nitrogen was transported to the Gulf of Mexico by the Suwannee River Basin. The Santa Fe River Watershed (SFRW) accounted for 19.5% of these total loads but covers only 5.7% of the total area of the Suwannee Basin (SRWMD, 2002). Land cover and land use dynamics are pivotal to

understanding loading trends. We used Landsat TM and ETM+ satellite imagery to quantify the land cover shifts in the SFRW using a multi-temporal change detection analysis. Pine plantations covered 29.5%, agriculture 23.5%, rangeland 15.1%, wetlands 13.7%, upland forest 8.9%, urban 5.5%, and water 1.1% (2.7% misc.) in 1990. In 2003, pine plantations covered 23.3%, agriculture 37.3%, rangeland 4.3%, wetlands 17.9%, upland forest 10.5%, urban 5.6%, and water 1.1%. Our results showed that land cover shifts in the SFRW occurred between 1990 and 2003 significantly increasing the agricultural area; yet no significant increase in urban land cover. In this USDA and USEPA-funded ongoing project, soil samples are collected seasonally over a 2-year period at about 128 sites at four different depths (up to 180 cm) spatially distributed throughout the SFRW. Soil samples are analyzed for a variety of soil properties, including nitrate-nitrogen, total phosphorus, total carbon, soil texture and other. Geospatial modeling techniques are used to characterize geo-temporal patterns of soil properties throughout the SFRW. Our goal is to develop spatially explicit soil-landscape models that describe the geo-temporal distribution and variability of soil characteristics. We use quantitative upscaling techniques to predict soil properties at watershed-scale using site-specific geo-temporal observations. Our goal is to gain a better understanding of soil and land cover / land use characteristics and how they relate to soil and water quality. Investigators on this project are Sabine Grunwald, Randy Brown, Nick Comerford, Mark Clark, and Don Graetz. For additional information contact Sabine Grunwald at sgrunwald@ifas.ufl.edu.

PERENNIAL FORAGE NUTRIENT MANAGEMENT AND LEACHING MITIGATION



Bermudagrass K fertilization test plots at the NFREC-Suwannee Valley. The light green plots are checks (no fertilizer).

Strategically located perennial forages, whether for haying/grazing or silvopasture operations, have the potential for taking up large quantities of nutrients that would otherwise be lost to surface runoff and leaching. The Suwannee Valley North Florida Research and Education Center (NFREC) serves as both a demonstration and a research site for studying and developing forage fertilization BMPs and nutrient leaching mitigation. A nutrition study was initiated this spring at the NFREC-Suwannee Valley to compare the current IFAS forage fertilizer recommendations with

additional potassium (K) fertilization of bahiagrass and bermudagrass hay fields. Extension issues concerning stand declines in bahiagrass and bermudagrass may be related to low K nutritional status, resulting in lower productivity and therefore lower soil nitrate removal. Future research will include a proposal to study nitrate mitigation via plant uptake and soil denitrification and evaluate forage variety selections within bahiagrass and bermudagrass for improved nutrient removal. To address the different soil conditions (i.e., soil type and moisture), these studies will be located at several sites throughout the state. The overall goal at the NFREC-Suwannee Valley is to determine how these, as well as other forages (perennial peanut and ryegrass cover crops), may play a role in nutrient recovery by reducing nutrient inputs into groundwater in the Suwannee River Basin. For additional information contact Cheryl Mackowiak at clmackowiak@ifas.ufl.edu.

EXTENSION

The NRCS National Nutrient Management Team visited Florida on February 19, 2004 to gain first-hand knowledge about the "Florida Practicum" – the Technical Service Provider training program being offered by the IFAS-NRCS team led by Rao Mylavarapu. As a part of the visit, the team took part in a demonstration field trip to Byrd Dairy in Lafayette County. Soil and Water Science faculty members, Willie Harris, Vimala Nair, Rao Mylavarapu, Dean Rhue, and Don Graetz discussed the risks from applied phosphorus particularly through animal manures on sandy soils with a *karst* geology. The team conducted soil borings at the dairy to show soil features that influence nutrient retention and to discuss the importance of site-specific assessments. Bill Reve, Senior Laboratory Technician in the SWSD led a demonstration of the Phosphorus Quick Test to determine the extent of leaching of phosphorus in the soils.



The NRCS team with SWSD personnel at the field site

the presentations and the material provided. The visitors were notably upbeat at the level of collaboration between the IFAS and the local NRCS teams, which apparently is lacking in several other states. For additional information contact Rao Mylavarapu at raum@ifas.ufl.edu.

Rao Mylavarapu and Susan Curry discussed the Nutrient Management training program that is conducted in partnership with the Florida NRCS to educate and certify nutrient management technical service providers. The NRCS National team was provided with materials developed for the course. Steve Boetger (Florida NRCS) informed that the NRCS National Team was extremely impressed by

2004 DEPARTMENT RESEARCH FORUM



Dr. Rattan Lal, professor in the School of Natural Resources at the Ohio State University, presented the keynote lecture entitled "**Climate change and global food security**" at the 5th Annual Soil and Water Science Research Forum (September 2, 2004). The Research Forum is an annual event and was attended by 150 people, including Dr. E. T. York, Dr. Jimmy Cheek, faculty, staff and students. Dr. Lal conducts research on soil processes and the greenhouse effect, soil erosion and its management by conservation tillage, tropical soils, soil degradation and environment quality, restoration of degraded soils and water table management. He received numerous awards at national and international levels for his research and educational contributions. He authored over 550 publications and 48 books. For additional information see: http://snr.osu.edu/fac_staff/cv/lal.html.

EXTENSION ROLE IN SUWANNEE RIVER PARTNERSHIP



Sarah Carte

The University of Florida's Institute of Food and Agricultural Sciences (IFAS) is one of the original signatories of the Suwannee River Partnership. UF-IFAS is expanding its role in this program by devoting more resources to the work of the Partnership, including education, outreach, and research/demonstration projects. Sarah Carte was hired as the educational coordinator for the Partnership and will work closely with county extension faculty and the UF-IFAS Extension Water Focus Team to identify educational needs within the Suwannee Basin and to develop and implement relevant programs. Best Management Practice research and extension efforts will continue within the basin. Also, in order to expand educational efforts to non-agricultural audiences, there are plans to bring the Florida Yards and Neighborhoods program to the Partnership area. By involving all stakeholders in our research, education, and outreach programs, the Partnership has been able to apply the best resources available to make the BMP process effective and achievable for agriculture and natural resource industries in the Suwannee and Santa Fe River basins. UF-IFAS is proud to play a key role in that effort. For additional information contact Tom Obreza at taob@ifas.ufl.edu.