Myakka

A Soil and Water Science Department Publication

Volume 2 Number 3 | **Institute of Food and Agricultural Sciences** | **Fall 2002**

Featuring
SWSD Thrust Area:

Wetlands and Aquatic Systems

Everglades – Water Conservation Area 2A

Graduate student sampling in wetlands

Editors:
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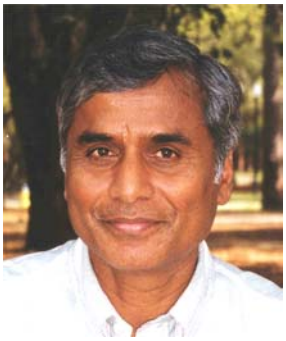
Darryl Palmer
Dr. Vimala Nair
Dr. John White

Visit the SWS websites:
http://soils.ifas.ufl.edu
http://wetlands.ifas.ufl.edu

FROM THE CHAIR



Approximately one-third of the land area in the State of Florida is in wetlands and aquatic systems. The water quality of these ecosystems is a major concern, as the demand from urban and agricultural land uses increase. In this newsletter we showcase the Soil and Water Science Departments research and educational programs in ***Wetlands and Aquatic Systems***. Emphasis in this thrust area includes: biogeochemistry, ecology, hydrology, hydric soils, ecological indicators, treatment wetlands, restoration of shallow lakes, and water quality.

The interdisciplinary nature of this program provides faculty and students an ability to conduct basic and applied research at multiple (molecular to landscape) scales in order to solve environmental problems and protect and manage wetlands and aquatic resources. Some examples of wetlands and aquatic ecosystems where research was conducted by our faculty in the past or currently being conducted include: the Everglades, Okeechobee Drainage Basin, Lower St. Johns River Basin, Upper St. Johns River Basin, Lake Apopka, Lake Okeechobee, Kissimmee River chain of lakes, Indian River Lagoon estuary, and several constructed wetlands throughout the State of Florida. Graduate students in this thrust area work closely with several UF departments and centers, and with scientists at state agencies including the five Water Management Districts. A few examples of research projects are highlighted in this newsletter.

Here are some highlights of the Fall 2002 semester activities of our faculty, staff, and students.

- 3rd Annual Soil and Water Science Research Forum was held on September 5, 2002. Graduate students presented 10 oral and 40 poster presentations. Several funding agency representatives participated in the forum.

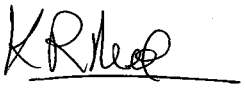
- Randy Brown, Professor of Soil and Water Science, joined the phased retirement program effective January, 2003. Randy plans to work half-time during the next three years through his involvement in teaching programs.

- Our graduate program is growing strong. During Fall 2002, 12 students joined the department, bringing the total graduate student enrollment in the department to 78, including 6 graduate students in the distance education graduate track in Environmental Science.

- Special thanks to Mrs. Mabel Robertson for her generous donation in support of the Robertson Scholarship, awarded annually to outstanding undergraduate or graduate students in Soil and Water Science.

- Thanks to David Calvert, Nick Comerford, Willie Harris, Yuncong Li, L.T. Ou, Curt Pennell, Arnold Schumann, Dilip Shinde, George Snyder, and Suresh Rao for their generous contributions in support of Arthur G. Hornsby Extension Professorship Fund.

The need for soil and water science discipline is at an all time high, as society places greater demand on protecting our soil and water resources. This places a major responsibility on us to meet society expectations in times of severe budget cuts and faculty reductions. So far our faculty, staff, and students have responded to this need by forming interdisciplinary teams with other scientists and generating grant funds to support their programs. It is critical that the core strength of the department be maintained to effectively serve our clientele. We are hopeful that some of our faculty lines will be restored in the near future.



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TEACHING

Fall 2002

NEW GRADUATE STUDENTS

Harvey, Omar, M.S., *Advisor:* R.D Rhue
Malecki, Lynette, Ph.D., *Advisor*: J.R. White
McKee, Kathleen, M.S., *Advisor:* S. Grunwald
Nehls, Teresa, PhD, *Advisor:* P. Nkedi-Kizza
Paris, Jeremy, M.S., *Advisor:* M.W. Clark
Sabesan, Aarthy, M.S., *Advisor:* S. Grunwald
Shen, Zhimin, PhD, *Advisor:* S. Grunwald
Silva, Maria, PhD, *Advisor:* L.Q. Ma
Wang, Xing, PhD, *Advisor:* Y. Li
Wheeler, Kevin, PhD, *Advisors:* AV. Ogram and K.R. Reddy
Yoon, Joon, M.S., *Advisor:* L.Q. Ma

DISTANCE EDUCATION

Bruce, Kimberly, M.S., *Advisor:* D.A. Graetz
Penton, Christopher, M.S., *Advisor:* K.R. Reddy

GRADUATES

Lane, Colin, M.S., *Advisor:* G.A. O'Connor
Malecki, Lynette, M.S., *Advisor:* J.R. White
Ramakrishnan, Vijayalakshmi, M.S., *Advisor:* A.V. Ogram
Seo, Mayumi, M.S., *Advisor:* K.R. Reddy
Skulnick, Ben, M.S., *Advisor:* W.F. DeBusk
Sharma, Kanika, PhD, *Advisor:* A.V. Ogram

NEW UNDERGRADUATE STUDENTS

Philip Darling
Mary Hauck

GRADUATES

Robert Paul Washington

Upcoming Summer Short Courses:

Ecosystems of South Florida: The SWSD is offering an intensive 2-week 3- credit hour course on South Florida Ecosystems in June of this year. The classroom section will be offered June 2-7, 2003 and the field portion of the course will take place June 16-20, 2003. The objectives of the course are to familiarize students with the complex mosaics of ecosystems in south Florida, expose students to real-world science and policy issues, and provide an understanding of the many governmental entities and special interests related to south Florida's fragile aquatic and wetland ecosystems. Details about the course can be found at http://earthproject.ifas.ufl.edu/ For additional information contact John White: jrwhite@ufl.edu

Hydric Soils: This exclusive training program focuses on the interrelations of hydrology and hydric soils and how to distinguish hydric soils from nonhydric soils. The course provides 35 hours of training and instruction, and a Certificate of Completion will be provided upon conclusion of the program. Two sessions scheduled: May 5-9, 2003 and June 23-27, 2003 For additional information visit the web site at: http://conference.ifas.ufl.edu/soils/index2.html, or contact Wade Hurt: wade_hurt@ifas.ufl.edu

GIS Applications in Soil and Water Science: This exclusive training program focuses on how to make use of readily available geo-data layers of soils, geology, land use, topography and many more features. You will learn where to find free GIS data on the world wide web, how to import data into a GIS, and how to analyze and interpret spatial data. Session schedule: August 12-13, 2003. For additional information visit the web site at: http://conference.ifas.ufl.edu/soils/index2.html, or contact Sabine Grunwald: sgrunwald@ifas.ufl.edu

Biogeochemistry of Wetlands: Science and Applications: This short course provides training to professionals on basic concepts involved in biogeochemical cycling of nutrients and other contaminants in wetlands, as related to soil, water, and air quality. Each course topic involves basic concepts and its application and usefulness in addressing environmental ecological significance to wetland restoration, water quality, and other ecological functions. Session schedule: October 13-15, 2003. For additional information visit the web site at: http://conference.ifas.ufl.edu/soils/index2.html, or contact Ramesh Reddy: krr@ufl.edu.

Distance Education Graduate Program:

The Distance Education Graduate Program is gaining momentum. We now have seven graduate students enrolled in the M. S program via distance education. The goal of this program is to provide opportunity for faculty at Research and Education Centers around the state to mentor graduate students. Details about the program can be obtained from Sabine Grunwald, Distance Education Coordinator, sgrunwald@ifas.ufl.edu or http://disteduc_sws. ifas.ufl.edu/

Wetland Biogeochemistry Laboratory

Graduate student, Todd Osborne, sampling in the Everglades

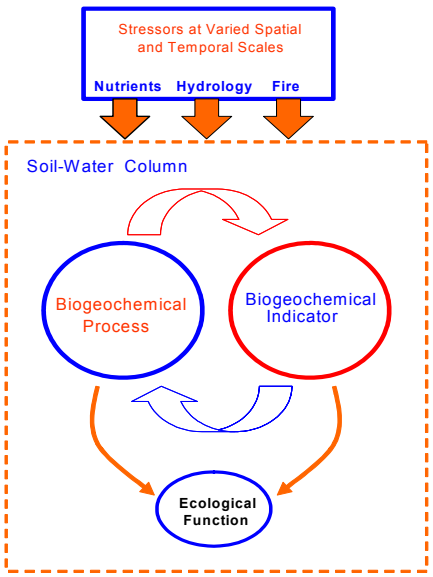
The mission of the Wetland Biogeochemistry Laboratory (WBL) is to promote excellence in teaching, research and extension/outreach activities on biogeochemical cycles in wetlands and aquatic ecosystems, with the primary goal of transferring basic research to solve practical problems, and to integrate process level information into policy development and regulation. The WBL also promotes the linkages necessary for cross-ecosystem comparisons as related to water and air (greenhouse gases) quality issues. The WBL was established in 1987 within the SWSD. Since its establishment, the WBL has provided a home for graduate students from various disciplines, post doctoral associates, and visiting scientists, and generated over $15 million dollars in grants and contracts. Specific examples of teaching, research, and extension activities of the WBL can be seen at our web site: http://wetlands.ifas.ufl.edu/.

The WBL activities include: (i) determining strategic research areas of special importance to wetlands and aquatic ecosystems; (ii) identifying extramural funding sources for interdisciplinary research; (iii) promoting educational activities such as offering interdisciplinary courses and organizing seminars, symposia, short courses, and workshops; (iv) expanding multi-institutional collaboration and maximizing utilization of available institutional resources to promote interdisciplinary activities; (v) developing working relationships with state agencies such as the water management districts and (vi) developing a link between the University of Florida and private industry, and other commodity groups and addressing their needs. The WBL works closely with the Center for Natural Resources and the Howard T-Odum Center for Wetlands.

RESEARCH

Wetland soils and lake sediments can serve as sinks, sources, and transformers of nutrients and other chemical contaminants, and as such they can have a significant impact on water quality and ecosystem productivity. The primary driver of these processes is the ecosystem biogeochemistry, which includes chemical, biological and physical processes in the sediment/soil and water column. Long-term goals of this thrust area are to: (1) evaluate biogeochemical indicators for routine use to evaluate pollutant impacts in wetlands and aquatic systems; (2) develop tools to extrapolate process-level to a wide range of spatial and temporal scales for use in restoration and management of wetlands and aquatic systems; (3) develop a GIS database of soil and sediment characterization in Florida wetlands and associated aquatic ecosystems; (4) provide process-level information for use in policy development and regulation, and (5) promote interdisciplinary teaching, research and extension programs, including ecology, limnology and hydrology. Here are some examples of research projects.

Biogeochemical Indicators



Linkages between microbial diversity and processes in wetlands

Biogeochemical parameters can be used as indices to characterize the ecological condition of wetlands and aquatic systems. Biogeochemical processes in the soil and water column are key drivers of several ecosystems functions associated with wetland values (e.g. water quality improvement through denitrification and long-term nutrient storage in the organic matter). Process level measurements provide a direct measure of the functionality of a wetland and potential impairment due to impacts; however, these measurements are often tedious and costly. Instead, it is possible to develop a relative measure of process rates and potential by evaluating components of biogeochemical cycles that are either end products or sources of material for a given process. In the case of many processes within the nutrient cycles, microbial communities mediate the rate and extent of these reactions in soil and water column. As a result, biogeochemical indicators associated with these processes often respond rapidly to perturbations and are spatially restricted to the impact zone, yet will persist over moderate time scales and in the absence of standing water.

At present, researchers at the WBL are in the process of evaluating various indicators that can potentially be used to evaluate impacts or recovery of an ecosystem. Research is currently funded by the National Science Foundation, and the South Florida Water Management District. Investigators on these projects are: Andy Ogram, Sue Newman, Ken Portier, and Ramesh Reddy. For additional information, contact Ramesh Reddy: krr@ufl.edu.

National Wetlands Biogeochemical Database and Survey of Southeastern Wetlands Water Quality

In 1999, the USEPA established a new initiative whereby numeric water quality criteria would be developed by water body type and regional area. The four water body types include lakes and reservoirs, rivers and streams, estuaries, and wetlands. Establishment of numeric nutrient criteria would provide states with antidegradation benchmarks by which water resources could be monitored and preserved. Establishing numeric criteria requires clear cause-and-effect relationships between contaminants and loss of designated use, or the decision to base criteria on least impacted or “reference” conditions that are presumed protective of the water bodies’ designated use. For wetlands, specific cause-and-response relationships have not been well established, specific designated use of these systems is often unclear, and indicators of degradation that can be used to identify impending impacts have not been clearly defined.

At present two USEPA-funded projects are underway at the Wetland Biogeochemical Laboratory to assist EPA, states and tribal governments in developing numeric criteria for wetlands and to select cross-community water quality indicators. The first project, initiated in September 2000, created a National Wetland Biogeochemical Database (NWBD) compiling existing literature on biogeochemical data of the nation’s natural wetlands from 1975 to present. This database presently has 1350 wetlands and 65,000+ data points. It is hoped that this database will become publicly accessible in the near future, although the specific user interface has not yet been decided by EPA.

The second project is in response to limited spatial data identified within the NWBD and the lack of consistency (and therefore comparability) between data reported in the literature. Because of this shortcoming, a survey of water quality indicators within wetlands of the southeastern United States will be conducted. This survey will evaluate twenty different indicators of wetland quality including plant, litter, soil, and water column nutrient parameters. Two hundred and twenty wetlands will be surveyed among forested, herbaceous, riparian and non- riparian communities. Wetlands will also be divided between least impacted watersheds within nine National Forest and adjacent watersheds with likely elevated nutrient condition. A comparison between parameters at impacted and unimpacted sites will provide an indication of parameters sensitive to nutrient change. Data will also be used to determine the variability in nutrient conditions under least impacted and impacted sites, among regional areas, among vegetative community types and among hydrologic connectivity. Investigators on these projects are: Mark Clark, Ramesh Reddy and Ken Portier. For further information contact Mark Clark: clarkmw@ifas.ufl.edu.

Soil Accretion and Development of the Everglades Landscape Mosaic

Aerial photograph of intact ridge and slough landscape in central Water Conservation Area 3A.

A three-year study is underway in the Florida Everglades to investigate soil accretion processes and their influence on the spatial vegetative mosaic of Shark River Slough. Although often referred to as the "River of Grass", the central Everglades might better be described as ribbons of sawgrass interspersed with deeper-water habitat dominated by waterlillies, maidencane, eleocharis, and periphyton. Historically this landscape pattern had a prominent orientation parallel to the direction of flow. This pattern is still prevalent in many areas; however, the "Ridge and Slough" landscape has shown signs of decline in linearity, senescence of ridge vegetation and encroachment of ridge and wet prairies species into the deeper water sloughs.

As part of the monumental effort to restore the Everglades, maintaining the Ridge Slough landscape is critical not only to the representation of pre-disturbance conditions, but also to many species including fish, waterfowl, and alligators that utilize the deeper water slough community and benefit from the tremendous edge effect provided by the interface between ridge and slough areas. Because the vegetative community of the Everglades is intimately linked to soil elevation and hydrology, understanding processes related to soil accretion are critical to short- and long- term restoration efforts.

To determine soil accretion rates the study will develop a carbon budget for ridge and slough communities at four sites within the Everglades, within the Water Conservation Area 3A and within the Everglades National Park south of Tamiami trail. At these sites organic matter production and decomposition rates are currently being evaluated.

Graduate Student Chris Lewis prepares samples after being dropped off by helicopter within Everglades National Park.

In addition, soil horizons are characterized for plant fragment analysis, and carbon isotopic fractionation will be used to determine historic plant communities that have been buried over time. This project is funded by the Department of Interior – National Park Service. Investigators on these projects are: Mark Clark, Ramesh Reddy, and Willie Harris. For additional information contact Mark Clark: clarkmw@ ifas.ufl.edu.

Internal Nutrient Load from the St. Johns River

Graduate student, Lynette Malecki and Dr. John White collecting intact sediment cores from the Lower St. Johns River.

Eutrophication of Florida's lakes, rivers, and estuaries is a result of decades of agricultural, industrial, and urban nutrient loading. This results 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).

Release of nutrients from the sediment such as phosphorus (P) and nitrogen (N) must be considered an important contribution to the total nutrient load to the river. The objective of this study was to calculate the annual internal loading of nutrients from the sediment to the water column using a series of field and laboratory experiments. The average annual internal load of P was determined to be 405 MT 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 MT yr^{-1}, one third of the total N load to the LSJR.

Results from this study suggest the contribution of internal loading (nutrients from the sediment) 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 LSJR. This project is funded by the St. Johns River Water Management District. For additional information contact John White: jrwhite@ufl.edu.

Vegetation Modification and Soil Management for the City of Orlando's Treatment Wetland

Graduate student, Sue Simon, collecting organic soils

For over 15 years, the City of Orlando's Easterly Wetland (OEW) has successfully provided final polishing of domestic effluent from the Iron Bridge treatment plant prior to discharging into surface waters. The OEW is 1,200 acres and came online in 1987. UF has completed a review of the system historical performance and has found that several components of the wetland should be modified to maintain exemplary performance during the coming decade. These modifications include 1) changes to the outflow region vegetation 2) management of accrued soils.

Years of operation have led to accumulations of organic soils throughout the system. This accumulation reduces wetland volume and can contribute P to the water column through re-mineralization. Graduate student, Sue Simon, is investing organic soil removal, drydown and reflooding, and chemical amendments including alum and calcium carbonate on water column P levels. Preliminary results suggest that alum treatments are effective at completely stopping P flux from the soil. For additional information contact John White: jrwhite@ufl.edu

Potential Impacts of Sediment Dredging on Internal Phosphorus Load in Lake Okeechobee

Lake Okeechobee

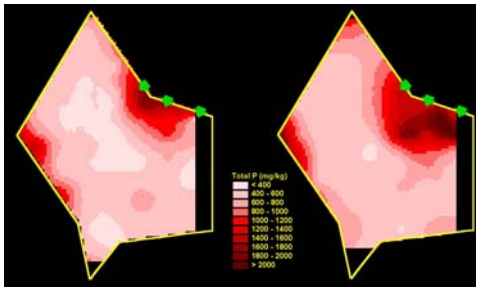
Lake Okeechobee, a large (1730 km^2) shallow (average depth 2.7 m) lake in south Florida, has become more eutrophic due to excessive external phosphorus (P) loads. The eutrophication of this lake has resulted in many changes over the past three decades that include: more than a doubling of total phosphorus (TP) in the water column, an increasing frequency of algal blooms, and an increasing abundance of nitrogen fixing cyanobacteria. There is a concern that the accumulation of mud sediments has continued over the past decade both in thickness and extent, and that it may be impacting water quality in certain lake regions. We conducted a study to determine the potential impacts that partial or complete dredging of mud sediments will have on mobility of P to and from the sediments.

All laboratory experiments suggest that dredging the surface 30 to 45 cm sediments can have a positive effect in improving water quality. It should be recognized that laboratory studies consider only diffusive flux from sediment to overlying water column and does not include repeated sediment resuspension events and inputs of organic material at the sediment-water interface. Dredging removes a substantial amount of P stored in sediments. Removal of top 30 cm sediment accounts for approximately 65% of TP storage. Implementation of P reduction goals such as dredging may have significant costs and economic impacts. Thus, management focus should be on reduction of external loads, which will ultimately have a positive effect in reducing the internal load. To determine the regulators of internal loading, it is critical that we have a thorough understanding of the dynamics of physical, chemical, and biological processes at sediment-water interface regulating the internal load within the lake. The key questions often asked are: (i) will Lake Okeechobee respond to P load reduction? (ii) if so, how long will it take for the lake to recover and reach its background condition? and (iii) are there any economically feasible management options to hasten the recovery process? The internal load can extend the time required for the lake to reach its original condition. This lag time for recovery should be considered in developing management strategies for the lake. Decisions regarding management and restoration of lakes are often difficult and controversial as they involve regulating P loads from both internal and external sources. For additional information contact Ramesh Reddy: krr@ufl.edu

Funding Agencies for Research in Wetlands and Aquatic Systems

CH2M Hill
City of Orlando
DB Environmental Labs
Florida Department of Agriculture and Consumer Services
Florida Department of Environmental Protection
Limno Tech, Inc.
National Science Foundation
Orange County, Florida
St. Johns River Water Management District
South Florida Water Management District
South West Florida Water Management District
U.S. Department of Agriculture
U.S. Department of Defense
U.S. Department of Interior
U.S. Environmental Protection Agency

Long-term Nutrient Loading Effects on Soil Phosphorus Enrichment in the Everglades Water Conservation Area -2A



Maps represent soil phosphorus in 0-10 cm depth in years 1990 (left) and 1998 (right)

Florida's Wetland WebGIS and Geo-Database

Thousands of soil samples have been collected in Florida's wetlands by staff and scientists of the Wetland Biogeochemistry Laboratory (WBL), UF. To preserve, standardize and centralize these datasets of soil physical, chemical, and biological properties, a seed project funded by the Center for Natural Resources was facilitated to develop a web-based, interactive information and visualization system.

The SWS-GIS Research Laboratory standardized and integrated 2130 geo-referenced point observations of 78 different soil physical, chemical, and biological attributes collected in Florida's wetlands from 1987 to the present. These datasets provide a valuable resource documenting historic and present environmental quality in Florida's wetlands. We created a WebGIS tool using ArcIMS software (ESRI Inc., Redlands, CA) to augment point observations with spatial data layers such as soils, geology, land use, and county boundaries providing users with query, selection, and navigation functions. A graphical interface was developed using VBScript to provide data services to users which can run SQL-based queries, select and retrieve specific data records using one or all of the following constraints: (i) geographic location, (ii) projection, (iii) time period, (iv) depth of soil sample, (v) vegetation type, and (vi) soil property.

Our datasets can be used to document the evolution of soil quality in Florida's wetlands including the ongoing restoration efforts in the Everglades ecosystem. Results from a geostatistical analysis conducted in the Water Conservation Area 2 illustrate the usefulness of the geo-database to assess the spatial variability and distribution of soil quality indicators. The global interactive learning environment for Florida's wetlands is accessible at http://GISWetlands.ifas.ufl.edu. For additional information contact Sabine Grunwald: sgrunwald@ifas.ufl.edu.

Phosphorus Retention and Storage by Isolated and Constructed Wetlands in the Lake Okeechobee Basin

In the Okeechobee Basin, phosphorus (P) discharged from various land use activities can be potentially assimilated in farm ditches, isolated wetlands, and riparian buffers. Small isolated wetlands are a common feature throughout the basin and may provide a significant storage and retention capacity for P runoff within the landscape. Historically many of these wetlands were truly isolated and only linked during periods of high water. Under present conditions most of these wetlands have been connected and partially drained through a network of ditches and canals that convey surface water from the watershed to Lake Okeechobee. Isolated wetlands cover approximately 17% of the landscape and understanding their role in P storage is critical to long-term efforts to reduce P loading to Lake Okeechobee. Isolated wetlands are dominant features on land areas used for cow-calf operation. In addition, constructed wetlands at various scales can be used to treat either on-farm discharges or basin-wide runoff.

South of Lake Okeechobee, large-scale regional wetlands are being deployed for removing P from agricultural (sugarcane and vegetable) runoff. The successful deployment of treatment wetlands in the watersheds north of the lake will, however, be somewhat more challenging, because concentrations of P and other constituents (nitrogen, oxygen demanding substances) in dairy runoff can be quite high. In this region, wetlands used for both regional (reservoir stormwater treatment areas [RSTAs]) and on-farm P control therefore will require designs that maximize areal P removal rates in order to maintain realistic wetland footprints. At present a multi-year research and education effort is underway to demonstrate and optimize P removal capacity of on-farm treatment wetlands and P retention capacity isolated wetlands.

This interdisciplinary project is conducted by faculty from several UF departments, including Agricultural and Biological Engineering, Environmental Engineering Sciences, Soil and Water Science, and DB Environmental Labs. This project is funded by the Florida Department of Agriculture and Consumer Services, the Florida Department of Environmental Protection, and the South Florida Water Management District. For additional information contact Ramesh Reddy: krr@ufl.edu.

Wetland Research at McArthur Agro-Ecology Center

The biogeochemical cycling of phosphorus (P) within wetlands may have a significant influence on the fate of P in the landscape. Several studies are ongoing to ascertain how depressional wetlands may influence loss or retention of P in pasture systems in Buck Island Ranch at the MacArthur Agro-Ecology Research Center, a 4,170 ha working cattle ranch within the Lake Okeechobee watershed in south Florida. Investigators involved with the soils component of these studies are Donald Graetz (SWS, UF/IFAS) and Patrick Bohlen (Archbold Foundation) along with Research Scientist, Stanley Gathumbi, and graduate students LaKeisha Hill and Carla Sperry.

Experimental pastures in the improved and semi-native pastures, 20 and 32 ha, respectively, were stocked at four animal densities (0, 0.46, 0.62, 1.08 cow/calf pairs per hectare). The soils of Buck Island Ranch are Alfisols (uplands) and Histosols (wetlands). The objective of Carla's study was to examine the influence of cattle grazing density on the amount and forms of phosphorus in soils of imbedded wetlands in the pastures. Depressional wetlands ranging from 0.5 to 2.0 ha were sampled within each grazing density treatment. Soils were sampled at four depths (detritus, 0-15, 15-30, and 30-45 cm). LaKeisha's research quantified the amount and forms of phosphorus present in the soil profile to a depth of 1 meter. Soil samples were collected by horizon from the center of a wetland and an adjacent upland in the control and high stocking density pastures. Increased cattle grazing density had no effect, for either study, on the various phosphorus parameters measured due to the relatively short time (2 years) of the studies. Effects of cattle grazing density are likely to be observed over a longer time period. Wetlands embedded within the rangelands appear to be accumulating P compared to the uplands. A major portion of the P in these soil profiles is present as organic P which may be subject to mineralization and possible loss in drainage waters.

For additional information contact Don Graetz: dag@ifas.ufl.edu

Biogeochemical Indicators of Watershed Integrity and Wetland Eutrophication

Joe Prenger (far right) and graduate students in the Blue Cypress Marsh

The purpose of this research project is to develop sensitive, reliable, rapid, and inexpensive indicators of ecological integrity for use in large-scale ecosystem management and restoration. For this work, we have focused on developing indicators of wetland eutrophication, a phenomenon that is presently threatening regionally significant wetlands in the southeastern United States. This study is being conducted in the Blue Cypress Marsh located in the Upper St. Johns River Basin. The multivariate statistical analysis results indicate that soil biogeochemical measurements can be used to discriminate between low impact and high impact regions, and to discriminate vegetation type (which itself can be used as a measure of ecosystem disturbance). The establishment of discriminant functions for these groups makes it possible to assign new samples to membership in these groups. Additionally, geostatistical analyses can extend such information over space. Key indicators identified include: nutrient content, soil oxygen demand, enzymes, microbial activity, and microbial diversity. Results obtained from this study can be used to identify nutrient impact as well as the recovery after the nutrient loads are curtailed. This project is funded by the U. S. Environmental Protection Agency and the St. Johns River Water Management District. This interdisciplinary project is conducted by faculty from UF departments including; Agricultural and Biological Engineering and Soil and Water Science, and the St. Johns River Water Management District. For additional information, contact Joe Prenger: jprenger@ufl.edu

EXTENSION

Wetlands, Watersheds and Water Quality

Wetlands are an integral part of watersheds and play a critical role in regulating water quality. Increasing pressures from agriculture and urban development on water quality of wetlands and associated watersheds is of major concern. This growing concern and the need to protect the state's water resources have heightened the need for public awareness and the application of innovative methods to address this issue, a perfect (though complex) opportunity for Extension. The SWSD Extension program uses a four-pronged approach to address critical water quality issues in wetlands and associated watersheds.

1) *Increase public awareness of wetland resources in the state and the role wetlands play in affecting water quality in watersheds*. Although the majority of Floridians or visitors do not directly utilize or recreate in wetlands, the quality of water at the beach, lake and river can be influenced by adjacent wetlands. Increasing the awareness of the water-quality-related benefits and many other attributes of wetlands will increase the desire to maintain this critical part of the landscape.

2) *Integrate new wetlands and enhance the function of existing wetlands in agricultural and developing landscapes to improve water quality*. Many technological advances and the implementation of Best Management Practices can reduce sources of anthropogenic pollutants; however, once these contaminants are in stormwater it becomes less technologically feasible and cost prohibitive to remove them. Integrating wetlands into urban and agricultural landscapes to improve water quality is a more passive process and may be the most cost effective alternative for pollutant load reduction.

3) *Emphasize the need to address water quality issues at the watershed scale*. Degraded water quality in wetlands, rivers, lakes and oceans are symptoms of a problem upstream. Most contaminants are applied to terrestrial landscapes and find their way into water bodies during storm events. Focusing efforts to fix the problem (in the watershed) and not just the symptom (degraded water bodies) will go a long way to improve water quality.

Mark Clark training young scientists on the importance of wetlands

4) *Link the above efforts to existing and forthcoming Federal and State regulatory mandates such as Phase II NPDES Stormwater regulations, TMDLs and minimum flows and levels*. These regulatory mandates have been imposed in an effort to turn around the long history of declining water quality in the nation.

These tasks seem daunting, yet the science and understanding of these issues and processes are well founded; it is the application and creative implementation of these concepts that will determine the fate of our remaining wetlands and the condition of our water resources. Extension will play a critical part in this process to make sure Florida is a role model and not the undesirable case study as we all attempt to implement a more sustainable future. For additional information contact Mark Clark: clarkmw@ifas.ufl.edu or visit the web site: http://wetlandextension.ifas.ufl.edu.

Randall B. Brown

Randy Brown, Professor of Soils and Land Use, and extension specialist, joined the phased retirement program effective January 1, 2003, after 22 years of distinguished service with UF-IFAS. During the next three years, Randy will continue to teach undergraduate and graduate courses in Soil, Water and Land Use, and Soil and Water Conservation. Randy's retirement leaves a major void in the Soil and Water Science Department (SWSD) extension program on soils and land use.

Randy began his career at the University of Florida in August of 1980. He served as an Extension specialist in soils and land use, with particular emphasis in his programs on 4-H/FFA land judging; onsite wastewater disposal; soil survey interpretations; and related areas. He served as the UF/IFAS liaison with soil and water conservation districts around the state. He also taught a senior-level course entitled Soil, Water and Land Use. From January of 1995 through June of 2000, Randy served as chair of the SWSD.

Randy received numerous awards and recognitions while employed with UF/IFAS, including the Honorary Florida State FFA Degree from Florida FFA and the E.L. Greenstein Award from the Florida Onsite Wastewater Association. He is a Fellow of the Soil Science Society of America and the American Society of Agronomy. Randy Brown can be reached at: rbb@ifas.ufl.edu

International Programs

Pedometrics
In November 2002, Sabine Grunwald was appointed Secretary of the International Working Group on Pedometrics Provisional Commission on Pedometrics, International Union of Soil Sciences (IUSS). Pedometrics is the application of mathematical and statistical methods for quantitative modeling of soils and their distribution, properties and behavior. The domain of pedometrics has changed somewhat since its foundation. At present, pedometrics is best defined as an interdisciplinary field between soil science, applied statistics/mathematics and geo-information science, i.e., it gathers many different scientific fields ranging from geostatistics, pedology and various soil science disciplines. Pedometrics integrates a variety of different methods ranging from soil classification to geostatistical applications with the goal to describe the soil-landscape space-time continuum. Details about pedometrics and soil landscape modeling can be found at: http://www.itc.nl/personal/hengl/PM/. For additional information, contact Sabine Grunwald: sgrunwald@ifas.ufl.edu.

US/Ireland Exchange Program - Phosphorus Retention by Wetlands
The WBL is currently hosting Ed Dunne, graduate student from Ireland, as part of US/Ireland Exchange Program. This program is jointly funded by US/Ireland Co-operation Program in Agricultural Science and Technology, International Organization Office, Foreign Agricultural Service, USDA, and the Irish Department of Agriculture, Food and Rural Development (DARFD), Johnstown Castle, Co. Wexford, Rep. of Ireland. Collaborators from Ireland included: Dr. Owen T. Carton, Head of Land Use and Environment Department, Teagasc Research Center, Johnstown Castle, Co. Wexford, Rep. of Ireland. For additional information contact Ramesh Reddy: krr@ufl.edu.

Study Abroad Program in Brazil - Natural Resource Management: From Tropical to Temperate Ecosystems This program is for undergraduate students of the University of Florida or the University of Georgia-Athens interested in studying in Brazil at the Federal Universities of Viçosa and Bahia. The objectives of this program are to experience Brazilian culture and make friends for life, to train students in characteristics and processes of tropical to temperate ecosystems, to help students become bilingual, and to facilitate all the above with scholarships. Details can be found at the web site: http://usbrazil.ifas.ufl.edu/. For additional information, contact Nicholas Comerford: nbc@ifas.ufl.edu.

FACULTY, STAFF and STUDENTS

Kanika Sharma was selected as runner-up of the 2002 American Chemical Society of Agrochemicals Division Young Scientist's Research Recognition Award. This award will be presented at the American Chemical Society meetings in New Orleans, La. She was also the recipient of the 2002 SWSD Award for Excellence in Graduate Studies. Kanika conducted her research on bioremediation of soils contaminated by chromium with Dr. Andy Ogram as her advisor.

Lynette Malecki has been selected to receive 2003 IFAS Award of Excellence for the Graduate Research-M.S degree. Lynette conducted her research on temporal and spatial variability of nutrient fluxes from sediment in the lower St. Johns River with Dr. John White as her advisor. Lynette was also awarded an alumni fellowship to pursue a Ph. D with Dr. White. Lynette is the third Soil and Water Science graduate to receive this award since 1998.

Dawn Lucas, chemist, received the 2002 SWSD Superior Accomplishment Award.

Travis Hanselman was awarded first place (Soil and Environmental Quality) in the 2002 Graduate Student Paper Contest of the Soil and Crop Science Society of Florida.

The following students received scholarships endowed by our alumni:

Carlisle Scholarship - Ravindra Ramnarine

Polston Scholarship - Abioye Fayiga

Robertson Scholarship - Travis Hanselman

F. B. Smith Scholarship - Robert Paul Washington

2002 SWSD Award for the Outstanding Undergraduate Student was presented to Thomas Rew.

Lena Ma was elected as a Fellow of the American Society of Agronomy in 2002.

Art Hornsby was awarded with 2002 Soil Science Professional Service Award, presented by the Soil Science Society of America.

P. K. Nair was elected as a Fellow of the American Association for the Advancement for Science

Jerry Sartain was awarded the International Gamma Sigma Delta Award of Merit. This award will be presented to Jerry on March 20, 2003 at the Gamma Sigma Delta annual initiation and awards banquet.

Ramesh Reddy was awarded the 2002 Environmental Quality Research Award, presented by the American Society of Agronomy. Reddy was also recognized as a highly cited researcher in Ecology and Environment by the Institute for Scientific Information (ISI).