WaterTalk

Georgia Water Planning & Policy Center Welcomes New Professional Staff Member Nick Ogden

Mr. Nick Ogden brings the Water Center program nearly twenty years of service with the US Army Corps of Engineers

The Georgia Water Planning and Policy Center welcomes their newest employee, Nick Ogden. Mr. Ogden comes to the center with a complete resume on water issues to include sixteen years with the Natural Resources Conservation Service, where he served as District Conservationist in several Metropolitan Atlanta area counties. In this capacity, he provided technical and planning assistance to land owners, developers and governmental officials on farm land and commercial, industrial and residential properties. Mr. Ogden also served sixteen years as Chief, Regulatory Branch for the U.S. Army Corps of Engineers Savannah District. He was responsible for permitting activities that impacted special aquatic sites (wetlands and waters of the United States) in the state of Georgia. These activities included all reservoir projects, road projects as well as commercial, industrial and residential development.

Nick now operates out of the Jack Kingston Conservation Center located in Richmond Hill, Georgia. Current projects include the Well to Pond Irrigation Locations initiative in Southeast Georgia and the Abandoned Open Well Capping project.

Water Talk is a publication produced by the Georgia Water Planning and Policy Center, a consortium of Albany State, Georgia State and Georgia Southern Universities, with research and academic programs focused on water planning and policy issues in Georgia. The primary purpose of Water Talk is to address questions in a manner that contributes to the clarification of issues that are of interest to stakeholders in the state.

All research is available upon request by calling the Georgia Water Planning & Policy Center or by following the "Research" link on our website. You will find all contact information listed in the section below.

In the Next Issue:

NEED SOMETHING FOR THE NEXT ISSUE>>>ANY IDEAS????

GEORGIA Water PLANNING & POLICY CENTER

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WaterTalk

Water Program Takes to the Air

Remote Sensing for Improved Water Quality Estimators: A Joint Project between the Flint River Water Policy Center and the ARS Southeast Watershed Research Lab

The increasing sensitivity to water quality issues stemming from agricultural production prompted an 80% increase for conservation programs in the 2002 Farm Bill. To gauge their effectiveness, the Natural Resource Conservation Service has partnered with the Agricultural Research Service (ARS) to evaluate the impact of these conservation programs on water quality at the landscape scale. However, many of the potential conservation benefits can only be evaluated through watershed scale computer modeling. To provide the most accurate models, detailed data regarding hydrology, soil, weather and land use must be collected. While many of these variables are readily available, timely and accurate land use information often limits the application of watershed models. Airborne and satellite remote sensing applications show great promise as tools to capture land use changes throughout the year. These data are keystone to providing policy makers with the most accurate information regarding the impact of conservation practices on water quality.

To evaluate the impact of conservation practices within the southern Coastal Plain, a collaborative relationship between the USDA-ARS Southeast Watershed Research Lab (SEWRL), NASA, and the Flint River Water Planning and Policy Center at Albany State University has been established. Spearheaded by Dana Sullivan, a Soil Scientist at the Watershed Research Lab, and Mark Masters, Resource Economist at the ASU Water Policy Center, a major goal of this research is to evaluate satellite and aircraft derived land use maps as input for watershed scale models. This multi-year study began in the fall of 2004 and is taking place in the Little River Experimental Watershed (LREW) in south-central Georgia (http://www.tifton.uga.edu/sewrl/). The LREW covers

Front view of the plane used for remote sensing research conducted jointly by the Flint River Water Policy Center and the ARS Southeast Watershed Research Lab

nearly 130 square miles and is subdivided with stream gage and precipitation stations at each of seven sub-watersheds ranging in size from just over 1 to more than 60 square miles. Intensive agricultural production near-year round necessitates frequent land use assessments that extend beyond the traditional growing season. Monthly land use surveys in three sub-watersheds will be used to provide additional ground cover information and assess the accuracy of satellite and aircraft derived land use maps.

Monthly airborne and bimonthly satellite data will be collected using the aircraft mounted SpectraView® Multi-Spectral Imaging System and NASA's Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER). Each system provides a remotely sensed image of the area of interest. Within that image digital values are recorded that provide information regarding the amount of energy reflected or emitted by object(s) on the ground. The spectral resolution of the sensor determines how much

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Continued from front cover

information is retained. Some sensors record values only in discrete portions of the visible (VIS) spectra, while others provide much more detailed information across the VIS, near-infrared (NIR) and thermal infrared (TIR).

Sullivan notes the sensors chosen for this study were selected based on the unique advantages of each. "ASTER data provide 15-30m spatial resolution imagery in the VIS, NIR and TIR regions of the spectrum. Onboard the Terra satellite, ASTER revisits our location approximately every two weeks. Data encompass a 60 x 160 km^2 area, roughly 23 x 62 square miles, and are ideally suited for watershed scale coverage. As a compliment to the ASTER, the aircraft mounted SpectraView® system provides 1-2 m spatial resolution in discrete regions within the VIS and NIR. While the SpectraView® is not designed to provide the coverage of ASTER, it provides greater spatial resolution and control of revisit time. This control is critical in the humid southeast, where cloud cover at midday can prevent timely satellite acquisitions."

Ground surveys, taken along with remotely sensed data, will be used to develop relationships between VIS and NIR spectral response and observed land uses. Based on these relationships, specific land uses at unsampled locations can be identified. The results between satellite and aircraft derived maps will be compared to determine the suitability of each in land use assessments. In addition, since agricultural practices in this area change throughout the year, seasonal trends for timing of remotely sensed data acquisition will be identified. Once satisfactory land use maps have been produced, these data will be used to calibrate watershed models. Modeling efforts are designed to provide an uncertainty estimate on model output using the best datasets available.

The use of a light plane, in this case a Maule MX-7, provides a means of data acquisition that is timely, flexible, and cost-effective when compared to the cost of operating larger aircraft

Extending through the belly of the aircraft, each of the lenses pictured above captures a separate spectral band including red, blue, green, and near-infrared (NIR)

At selected farms sites, we plan to conduct more detailed studies to evaluate the utility of satellite and airborne remote sensing for regional estimates of crop residue cover. To accomplish this, we will measure crop residue cover and organic matter on a 1/2 acre grid on four farm sites with a range in cover and tillage practices. If successful, field scale mapping will be used to assess the distribution of conservation tillage practices within the watershed and relative potential of these lands to store carbon.

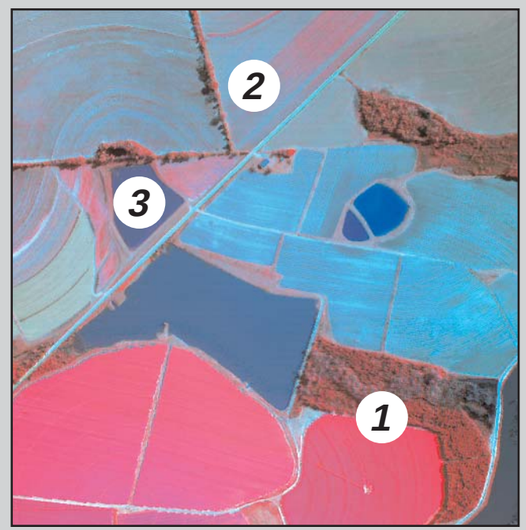
In the southern Coastal Plain, where agricultural bears the burden of public water quality concerns, an accurate assessment of the impact of conservation practices is critical. This study and partnership was designed to utilize satellite and aircraft derived land use maps to determine the most appropriate spatial and temporal resolution needed to capture land use changes and conservation practices, particularly conservation tillage, on water quality. "Conservation tillage is increasing in popularity among growers and information gathered through this project will aid in quantifying the regional benefits of adoption of these practices," says Masters. Using remotely sensed land use maps, we can begin to assess trends in carbon sequestration by soil, crop and management practice, calibrate water quality models, and assess the relative impact of conservation practices on water quality and quantity. Most importantly, data will provide policy makers with most accurate information regarding the effects of conservation practices within a southern Coastal Plain watershed.

ON THE GROUND

ON THE MAP

Remotely sensed data are being used as a tool to map land use or cover on a watershed scale. The image presented here was collected using the SpectraView® Multispectral Imaging System. The SpectraView® is an aircraft-mounted sensor used to collect reflectance data in the blue, green, red and near-infrared (NIR) regions of the light spectrum. Each pixel in the image represents an area approximately 3′ x 3′ on the ground.

The image is actually a color composite produced by layering images collected in the blue, green, red and NIR. The imaging software assigns each "layer" to a color gun. In this case, we are looking at a false-color image commonly used to detect vegetation. Because vegetation is highly reflective in the NIR, the NIR was assigned to the red color gun making vegetation stand out in red. You can easily pick out the forested area, which corresponds to the above digital photograph (1). The north end of the image is shown in blue and pink, indicating bare soil with sparse vegetation (2). Finally, ponds show up in a dark blue (3). Water tends to absorb incoming energy, reflecting very little, thus the dark appearance in the image.



Digital photographs collected during a field survey provide ground truth for the land use mapping effort. Photographs represent land cover corresponding to points illustrated on the map below as follows: 1 = forest, 2 = bare soil / sparse vegetation, and 3 = pond.