# **UF/IFAS RESEARCH DISCOVERIES**

### WATER

Water covers 70 percent of the earth's surface, but more than 96 percent of it is salt water that cannot be used for drinking or irrigation; only 1.3 percent is surface water, the main source for human use.

Florida is not only surrounded on three sides by 825 miles of sandy coastline — more than any other state in the contiguous United States — it also has one of the largest concentrations of freshwater springs on Earth, with more than 700 named springs bubbling up in the state's interior from the Floridan aquifer. In addition, the Florida Everglades is one of the most unique ecosystems in the world — there is nothing else like this River of Grass.

Florida has 29 major watersheds, each defined by rivers, streams, springs, lakes, canals, wetlands, bays and other water features. The state's water travels to the Gulf of Mexico, Florida Bay or the Atlantic Ocean and is vulnerable to pollutants from stormwater runoff, faulty septic systems, wastewater and industrial discharges and other sources.

UF/IFAS is the state's leading institution in water research, conservation and education, and is at the forefront of studying and protecting our water systems.

# NATURAL RESOURCES

IFAS Research

### **Ongoing Research**







### FOREST DROUGHT SIMULATIONS

Trees need water to grow, and the threat of climate change means they might have to get along with less rainfall in the future. To determine how drought could impact planted pine, Tim Martin, a professor with the UF/IFAS School of Forest Resources and Conservation, leads a team that conducts studies on simulated drought by placing large wood and plastic troughs between rows of trees to catch rainfall. Their results will be used to update climate-sensitive growth models for planted pine, which covers about 20 million acres in the Southeastern U.S. The research, conducted in Florida, Georgia, Oklahoma and Virginia, helps illustrate that drought conditions can have varying effects on the same tree species, depending on the overall habitat.

### **ASSESSING WATER AVAILABILITY**

In the past, scientists have estimated urban water supplies by assessing rainfall and surface water contained in rivers; they've concluded that up to 47 percent of major U.S. cities are vulnerable to water shortages. Jim Jawitz, a professor with the UF/IFAS Soil and Water Science Department, reasoned that it made more sense to assess supplies by examining all possible sources that contribute to an urban watershed, including lakes, reservoirs and subterranean aquifers. Using this approach, Jawitz and his research team found that only 17 percent of 225 U.S. metropolitan areas are vulnerable to water shortages. His recent work applies the same approach to water supply issues in Africa and South America, where Jawitz hopes to establish standard methods for assessing water availability.

### **PROTECTING FLORIDA SPRINGS**

Author Marjory Stoneman Douglas famously called Florida's springs "bowls of liquid light." To preserve these natural wonders, the St. Johns River Water Management District launched a Springs Protection Initiative in late 2012 that combines science, projects, planning and regulatory programs to reduce nitrate loading and protect spring flows; the agency soon reached out to UF's Water Institute faculty. K. Ramesh Reddy, a graduate research professor and chair of the UF/IFAS Soil and Water Science Department, and numerous UF colleagues are now investigating the function, water flow and water quality of several Florida springs. The collaborative work will help advance the scientific foundation leading to more effective management of water resources and stronger protection for springs, groundwater and surface water resources.

## **UF/IFAS RESEARCH DISCOVERIES**



### **Research with Impact**







### COMPENSATION FOR CONSERVATION

For decades, scientists have been working to reduce nutrient levels in South Florida's Lake Okeechobee. UF/IFAS' Mark Clark helped develop a new approach – paying area ranchers to use their properties as dispersed water storage systems. Under this arrangement, ranchers rehydrate wetlands and create impoundments on their properties, which reduces runoff to Lake Okeechobee, improves surface water quality and provides wildlife habitat. Clark, an associate professor with the Soil and Water Science Department, said the pilot program was a model for environmental services payment programs nationwide; its success led the South Florida Water Management District to begin offering conservation contracts to ranchers on a steady basis. In 2011, the district announced plans to invest \$7 million in conservation contracts over the next decade.

### **IRRIGATION CONTROLLER SUCCESS**

About half of Florida's publicly supplied water is used for landscape irrigation, and if one image symbolizes our state's need to conserve, it's an automated lawn sprinkler watering during a thunderstorm. That scenario bothered Michael Dukes enough that he found a way to stop it. Dukes, a professor with the UF/IFAS Department of Agricultural and Biological Engineering, conducted years of research on sprinkler systems and determined that by using shut-off devices to prevent irrigation during periods of adequate soil moisture, homeowners could cut their lawn irrigation by 50 percent or more. As a result of this research, the Florida Legislature passed a bill that became law in 2009, requiring all newly installed or maintained in-ground sprinkler systems to be equipped with automatic shut-off devices.

### **ALGAE-EATING SNAILS**

North Florida has one of the world's highest concentrations of freshwater springs, but today many of them suffer from excessive algae growth. Scientists often place the blame on the consequences of human activity, particularly nitrate, a compound associated with fertilizer runoff. However, a UF/IFAS research team that includes Matthew Cohen, an associate professor with the School of Forest Resources and Conservation, found that another factor may be in play – decreased populations of algae-eating snails in the genus *Elimia*, sometimes called "the little janitor of the springs." The team assessed populations in 11 springs and found that the springs with fewer snails tended to have more algae. Officials with two state water management districts have indicated they'll increase monitoring efforts related to Elimia to investigate the correlation further.

#### **UNIT LEADERS**

Dorota Haman Chair & Professor Agricultural and Biological Engineering 352-392-1864 • dhaman@ufl.edu

K. Ramesh Reddy Chair & Graduate Research Professor Soil and Water Science 352-294-3154 • krr@ufl.edu

Tim White Director & Professor School of Forest Resources and Conservation 352-846-0850 • tlwhite@ufl.edu

#### **RESEARCHER CONTACTS**

- **Forest Drought** Simulations Tim Martin Professor Forest Resources and Conservation 352-846-0850 tamartin@ufl.edu
- **Assessing Water Availability** Jim Jawitz Professor Soil and Water Science 352-294-3141 jawitz@ufl.edu

#### **Protecting Florida's** Springs K. Ramesh Reddy Chair and Graduate **Besearch Professor** Soil and Water Science 352-294-3154

krr@ufl.edu

**Compensation for** Conservation Mark Clark Associate Professor Soil and Water Science 352-294-3115 clarkmw@ufl.edu

Irrigation Controller Success Algae-Eating Snails Michael Dukes Professor Agricultural and **Biological Engineering** 352-392-1864 mddukes@ufl.edu

Matthew Cohen Associate Professor Forest Resources and Conservation 352-846-0850 mjc@ufl.edu