UF | IFAS Research
UNIVERSITY of FLORIDA

WATER QUALITY

NATURAL RESOURCES

AGRICULTURE

HUMAN SYSTEMS

Florida is known for its abundant freshwater resources, which have not only shaped the state's unique geography but also play a huge role in supporting its two largest industries, tourism and the production of agricultural and natural-resource commodities. Clean water is also vital to the health of Florida's residents and natural environments, and demand for potable water will be a pivotal issue in Florida's future as the state's population expands beyond 20 million.

At the University of Florida Institute of Food and Agricultural Sciences, water has long been a top research priority. Countless studies seek new ways to protect and improve water quality, irrigate landscapes more efficiently, assess the effects of contaminants, and understand how water resources can be managed more effectively and affordably.

Many of these projects are interdisciplinary and involve multiple institutions because Florida's freshwater resources touch upon so many fields of study. Water is also a vital element of many industries, which requires UF/IFAS experts to frequently confer with stakeholders, commodity groups and government agencies in efforts to build consensus on research priorities and long-term goals.

Ongoing Research

PHARMACEUTICALS IN URBAN RIVERS

Surface waters in major metropolitan areas can become contaminated with medicines used to treat a variety of human ailments if local water-treatment systems are unable to completely eliminate the pollutants from discharge water. Gurpal Toor, a soil and water scientist located at the UF/IFAS Gulf Coast Research and Education Center, leads a team researching the presence of pharmaceuticals in Florida's urban waters as part of a larger effort surveying for all classes of organic and inorganic contaminants. They found that two of the most common drugs in Tampa-area rivers were the decongestant pseudoephedrine, and an anti-seizure medication, carbamazepine. After determining which contaminants are routinely found in urban surface waters, Toor and his team plan to investigate the sources of these pollutants, their effects on water quality, and explore solutions to protect water quality.

RESIDENTIAL LANDSCAPES

Lush lawns are a common sight in Florida, but the state's sandy soils do not hold water effectively, leading many homeowners to irrigate. In some communities, two-thirds of domestic water use is devoted to outdoor irrigation, much of it unnecessary or incorrectly applied, according to irrigation expert Michael Dukes, a professor with the UF/IFAS Department of Agricultural and Biological Engineering. To encourage residents to voluntarily reduce water consumption, UF/IFAS partnered with state agencies to offer the Florida-Friendly Landscaping™ (FFL) Program that promotes environmentally sustainable lawn-care practices. A team led by Dukes demonstrated the effectiveness of FFL by analyzing water-billing data for Tampa-area homes. The results showed that homes with FFL-certified yards used one-fourth the volume of irrigation water compared to homes with equivalent high-quality turf but no certification.

CLEAN WATER AND TOURISM

North Florida's surface waters offer impressive opportunities for swimming, diving, fishing and boating, and Kelly Grogan believes that Floridians' enthusiasm for these activities may be one key to ensuring high water quality in the future. Grogan, an assistant professor with the UF/IFAS Department of Food and Resource Economics, leads a team assessing the economic value of high-quality recreational waters to state residents to evaluate the feasibility of creating incentives for local farmers to reduce their environmental impact. Grogan's team is developing models to determine how new production practices might affect the water quality and flow in the Lower Suwannee and Santa Fe River Basin, with the cooperation of farmers who recognize the economic importance of water quality to their communities.

Research with Impact

SALTWATER INTRUSION

Winding through Martin and Palm Beach counties before reaching the Atlantic Ocean, the Loxahatchee River is the southernmost body of water named to the National Wild and Scenic Rivers System. Development has increased demands on local subterranean freshwater reserves and enabled seawater to gradually intrude upstream, killing bald cypress trees and enabling salt-tolerant mangroves to replace them. Rafael Muñoz-Carpena, a professor with the UF/IFAS Department of Agricultural and Biological Engineering, is part of a team that collected data from the Loxahatchee ecosystem and used it to develop a computer model that predicts how coastal floodplain forests will respond to saltwater exposure. The South Florida Water Management District used the team's findings to establish minimum water-flow levels needed in the Loxahatchee to support local ecosystem health.

CONTROLLING COPPER

For more than a century, citrus growers have used copper-based products to protect their groves from fungal and bacterial diseases. However, long-term use of these products can lead to copper accumulation in the soil that can compromise water quality. Growers are eager to remedy the situation, but many options are too costly. However, a research team led by soil chemist Zhenli He, a professor with the UF/IFAS Indian River Research and Education Center, identified a cost-effective remediation method: calcium residue that municipal water-treatment facilities collect as a byproduct of water purification. When applied to soil in groves using a mechanical spreader, the calcium-rich material chemically stabilizes copper, making it less likely to run off into nearby waterways. According to He, local growers have begun adopting the practice.

WETLANDS AS RESERVOIRS

Since 1994, significant efforts have been initiated to reduce the phosphorus content of stormwater departing the Everglades Agricultural Area (EAA), the state's primary source of sugarcane and winter vegetables. As a part of this effort, 57,000 acres of wetlands adjacent to the EAA were constructed to hold runoff while water-soluble phosphorus is absorbed by algae and plants and chemically bound into non-soluble forms and accumulated in soils; ongoing water-quality monitoring proves the effort is succeeding. K. Ramesh Reddy, a graduate research professor with the UF/IFAS Soil and Water Science Department, and his colleagues developed reliable techniques to characterize the stability of stored phosphorus in these wetlands and determine their capacity to retain additional phosphorus that potentially can help managers to determine the long-term performance of these constructed wetlands.

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