CENTER FOR LANDSCAPE CONSERVATION AND ECOLOGY

2008-2012

Program Report

UF UNIVERSITY of FLORIDA
IFAS
Center for Landscape Conservation and Ecology

Program Report

2008-2012

MISSION

To protect and conserve Florida's natural resources through research-based sustainable urban landscape practices.

VISION

To be the leading source of science-based information on horticulture and the urban environment in Florida.

Focusing on social, environmental, and economic issues affecting urban Florida landscapes.

BACKGROUND AND JUSTIFICATION

The UF/IFAS Center for Landscape Conservation and Ecology (CLCE) was established in 2006 by an act of the Florida legislature in response to the green industry's concern for the long-term sustainability of current landscape management practices. With Florida's growing population, water quantity and quality issues were becoming more important. It was recognized that a large focus needed to be placed on landscapes, urban water and fertilizer use, plant choice, and maintenance practices. With that in mind, CLCE was developed with a strong interdisciplinary research and extension focus.

Concerns for Florida's Future

- Many areas of the state suffer regular water shortages.
- Poor water quality is an issue throughout the state and the problem is growing exponentially.
- Exotic pests (insects, diseases, plants, and animals) are significant threats to natural areas, homes gardens, landscapes, and agricultural production.
- Tourism is the state's largest industry, and healthy and beautiful landscapes are a key part of visitors' attraction to and enjoyment of Florida.

We can address these concerns with programs that educate Floridians about sustainable landscape management practices. With research and outreach, we can reduce water use, improve water quality, limit runoff, combat invasive species, and make other inroads to a more sustainable Florida while maintaining aesthetically pleasing landscapes.

Florida's green industry—which encompasses lawn-, landscape-, and grounds-related businesses—impacts all Floridians and generates $15 billion a year. Florida-Friendly landscape practices help ensure that all of us can continue to enjoy Florida's natural beauty and wealth.

Why It Matters

Hundreds of people move to Florida each day, adding to the nearly 19 million people who already live here. The state's rapid population growth means that its natural resources are increasingly taxed, and the responsible management of water, wildlife habitat, and energy are more important than ever. The health, quality of life, and wallets of all Floridians are also at stake.

INTERDISCIPLINARY FOCUS

The Center for Landscape Conservation and Ecology is unique in that it brings together an interdisciplinary team of faculty to conduct cross-cutting research and deliver issues-based extension outreach.

CLCE Faculty

- Steven Arthurs, Entomology & Nematology, Landscape Biological Control
- Michael Dukes, Agricultural & Biological Engineering, Water Conservation & Irrigation
- Gail Hansen, Environmental Horticulture, Sustainable Landscape Design
- Hayk Khachatryan, Food & Resource Economics, Horticultural Economics
- Andrew Koeser, Environmental Horticulture, Landscape Maintenance
- Chris Martinez, Agricultural & Biologial Engineering, Water Resource Management
- Esen Momol, Florida-Friendly Landscaping Program
- Paul Monaghan, Agricultural Education & Communication, Community-Based Social Marketing
- Gurpal Toor, Soil & Water Science, Urban Water Quality
- Tom Wichman, Florida Master Gardener Program

Affiliates

- Lynn Barber*, South Central Green Team, Urban Horticulture
- Eileen Buss*, Entomology & Nematology, Turf and Ornamental IPM
- Zhanao Deng*, Environmental Horticulture, Plant Breeding
- Ed Gilman, Environmental Horticulture, Urban Tree Management
- Kevin Kenworthy*, Agronomy, Turfgrass Breeding
- Jason Kruse*, Environmental Horticulture, Sports Turf Management
- Ramon Leon*, Agronomy, Turfgrass Weed Science
- Matt Orwat*, Northwest Green Team, Urban Horticulture
- Sydney Park Brown, Environmental Horticulture, Consumer Horticulture
- Brian Pearson*, Environmental Horticulture
- Joe Sewards*, Central Green Team, Urban Horticulture
- Laurie Trenholm, Environmental Horticulture, Urban Turfgrass Management
- Wendy Wilber*, Northeast Green Team, Urban Horticulture

*These affiliates were added in December 2012 and their efforts are not included in this report. However, they will be actively involved in CLCE efforts going forward.

RESEARCH ACTIVITIES

Grants

The center has received more than $7.3 million in grant funds since 2008. A majority of that grant funding does come from state sources such as Department of Environmental Protection, Department of Agriculture and Consumer Services, and Water Management Districts. Non-state sources account for $1,515,133 of the grant funds. These sources include US Environmental Protection Agency, US Department of Agriculture, Tampa Bay Water, US Department of Commerce, Florida Nursery, Growers and Landscapers Association, Rain Bird, and other land-grant universities with cooperating faculty.

Internal Mini-Grants

In 2012, CLCE provided faculty with $125,000 through an internal mini-grant program for research or extension projects. Funded projects included:

- Developing a Pilot Platform for Mobile Pest Diagnostics for Landscape Ornamental Plants, Phase 1: Steven Arthurs, Sydney Park Brown
- Developing a Pest Diagnostics Website and Mobile Application for Landscape Ornamental Plants, Phase 2: Steven Arthurs, Sydney Park Brown
- Turfgrass Management Workshop for the Extension Community: Laurie Trenholm, Tom Wichman
- A Tool for Minimizing Residential Landscape Impacts on Urban Water Use and Quality: Chris Martinez
- Engaging Homeowner Associations to Reduce Nutrient Runoff in Stormwater Ponds, Phase 1: Paul Monaghan, Gail Hansen
- Engaging Homeowner Associations to Reduce Nutrient Runoff in Stormwater Ponds, Phase 2: Paul Monaghan, Gail Hansen
- Fertilizer Bans in Florida's Urban Landscapes: Does the Science Support Policy?: Gurpal Toor
- Investigation of Environmental and Economic Incentives for Sustainable Residential Landscaping Practices in Florida: Hayk Khachatryan

Graduate Students

From 2008 to 2012, CLCE faculty have been actively involved with graduate students. This has included serving as chairs of PhD and MS committees and being contributing members of graduate committees.

In 2012, CLCE also provided $60,000 for graduate students through an internal mini-grant program.

- PhD Student (Mentor Gail Hansen) - An investigation of the resource inputs and costs needed to maintain high ecosystem services and visual quality for diverse Florida residential landscapes.
- PhD Student (Mentor Chris Martinez) – Global Sensitivity and Uncertainty Analysis of the Watershed Assessment Model

Faculty	PhD	MS
Alvarez* (not graduate faculty)	0	0
Arthurs	1	3
Dukes	12	9
Gilman	5	5
Hansen	3	6
Khachatryan	1	0
Martinez	12	8
Monaghan	10	14
Momol (not graduate faculty)	1	0
Park Brown	5	1
Shober**	5	13
Toor	8	14
Trenholm	9	8
Wichman (not graduate faculty)	0	0
Total Graduate Students	**72 PhD**	**81 MS**

*Alvarez was a CLCE faculty member from 2008 to December 2012.

**Shober was a CLCE faculty member from 2006 to July 2012.

Publications 2008-2012

Faculty	Refereed Publications	Non-Refereed Publications	Books
Alvarez*	0	5	0
Arthurs	21	17	0
Dukes	29	51	0
Gilman	23	20	3
Hansen	0	30	3
Khachatryan	3	2	0
Martinez	16	14	0
Monaghan	8	2	0
Momol	0	8	0
Park Brown	2	46	2
Shober**	20	44	0
Toor	28	22	0
Trenholm	7	45	0
Wichman	0	11	0
Total Publications	**157**	**317**	**8**

*Alvarez was a CLCE faculty member from 2008 to December 2012.

**Shober was a CLCE faculty member from 2006 to July 2012.

Featured Projects

Smart Controller Water Savings Research

CLCE Involved Faculty: Michael Dukes
Funded by Orange County Utilities

CLCE faculty have been researching irrigation water savings with the use of smart controllers. Using UF/IFAS irrigation time clock recommendations with an expanding disk rain sensor during rainy periods shows a 30% potential water savings and 15% savings during dry periods. Similarly, Smart Controllers have shown savings potential of 70–90% during normal rainfall periods on research plots and up to 40% during dry weather without compromising turfgrass quality. Studies on cooperating homes indicate 65% cumulative irrigation savings over two years.

In earlier research, we found that homeowners in Central Florida irrigated on average 2–3 times per weeks, a conservative estimate of plant needs, which was 5.9 inches per month. If all new homes had advanced irrigation control, ranging from a rain sensor to a Smart Controller, reduction in water use could range from 15% (33,000 gal/yr) to as high as 70% (154,000 gal/yr) per home. If this were extended to all new homes constructed from 2000 to 2005, savings would range from 14.5 billion gal/yr to 67.5 billion gal/yr, using a low-tech rain sensor or more advanced controller, respectively. More conservative irrigators (i.e., homeowners) would be expected to save less than these estimates. For example, we have seen in Southwest Florida that homeowners irrigate much less due to a longer history of enforced day of the week water-use restrictions and higher water costs. However, savings could still be as high as 75,000 gal/yr per home with the use of a SMS irrigation controller.

Shrub Establishment Research

CLCE Involved Faculty: Ed Gilman, Amy Shober
Funded by Florida Department of Agriculture and Consumer Services, St. Johns River Water Management District, Southwest Florida Water Management District, South Florida Water Management District, Florida Nursery Growers and Landscape Association, and Tampa Bay Wholesale Growers Association

CLCE faculty determined how much water typical ornamental shrubs need during and after establishment. Methods included evaluating growth and quality of three shrub species using four irrigation frequencies at three locations. Subsequently, evaluation occurred of 12 additional shrub species at each location (6 native and 6 non-native) using the optimum irrigation frequencies determined in the first phase.

Key findings: Three common shrub species could be established in the landscape with as little as 3 L of water applied every eight days in North and Central Florida and every four days in South Florida. This irrigation strategy was validated for 12 additional shrub species at each location.

Water use for shrub establishment can be reduced by about five gallons per shrub per watering event when high-pressure irrigation is replaced with low-volume microirrigation. This reduction would result in a potential savings of 50 gallons for a 500 ft^2 planting bed of newly installed shrubs in a single watering event. A homeowner with a newly installed 500 ft^2 landscape planting bed composed of primarily shrubs could potentially save 750 gallons of water in the first two months after installation by following our irrigation recommendations.

Water use policy based on these data can reduce plant death and replacement costs. This finding is significant considering the high expenditures required to replace shrubs, trees, and sod during the nursery and

landscape guarantee period. For example, an Orange County landscape firm reported annual replacement costs of approximately $25,000 to $35,000 annually (equivalent to 1 to 1.5% of total income per job).

Engaging homeowner associations to reduce nutrient runoff in stormwater ponds

CLCE Involved Faculty: PI – Paul Monaghan, Co-PI – Gail Hansen, and Michelle Atkinson (Manatee County Extension)
Funded by Florida Nursery, Growers, and Landscapers Association, Southwest Florida Water Management District, Center for Landscape Conservation and Ecology

Homeowners in developed areas of the upper Braden River Watershed are seeking answers to their neighborhood stormwater pond problems. These issues include nutrient loading, algal blooms, invasive plants, fish kills, and shoreline erosion. Finding solutions to these stormwater pond issues in this watershed could provide a model for homeowners facing similar problems around the state. These artificial ponds are designed to remove rainfall from streets and yards but the water is often polluted by excess lawn fertilizer and chemicals. The resulting growth of algae is considered unsightly and has a negative effect on home values. Treatment alternatives are becoming more costly and less effective and there is potential harm for watersheds downstream. Homeowners are partly to blame for these issues because of the way they manage their turfgrass landscapes.

The partnership includes homeowners, landscape contractors, turf industry representatives and property managers. Faculty established two advisory boards in large developments of regional impact. They cover more than 3,000 homes and contain nearly 300 stormwater ponds.

The formation of the advisory boards and the interest by residents in landscape issues is a positive indicator that some residents are engaged and willing to take action on the issues of fertilizer runoff. With neighborhood volunteers, we planted a demonstration garden to show alternative ways to landscape shoreline ponds and reduce the risk of nutrient runoff. Expected impacts will be an increase in the area of planted shorelines and littoral zones of stormwater ponds and a reduction in the amount of fertilizer run-off into the stormwater system. In Phase II of the project in 2013, residents will be surveyed to measure changes in their awareness of stormwater pond function as well as awareness and adoption of specific nutrient BMPs that affect water quality.

Gainesville Regional Utility Soil Moisture Sensor (SMS) Pilot Program

CLCE Involved Faculty: PI – Paul Monaghan, Wendy Wilber (Alachua County Extension)
Funded by St. Johns Water Management District

The Soil Moisture Sensor (SMS) program selected high water use households in Gainesville to receive free soil moisture sensors to be installed in their yards. Faculty from the CLCE were tasked with developing education materials (Wilber) and interviewing households that received the SMS technology (Monaghan). Out of the 38 households that received installations of SMS, the researchers were able to contact and interview 23 residents, some in focus groups and others using an identical survey instrument over the phone. The researchers concluded that households agreed to participate for two reasons—their water bills were too high or because the letter from GRU alerted them that they were high water users. The letter alone without the SMS actually resulted in an average water savings of 33%. Nearly all participants were happy with their SMS technology and saved an average of 52% of water compared with baseline data. While most participants were concerned about the demand on increasingly scarce water resources, they did not join the program out of environmental concerns. Despite their significant savings through the use of this technology, they did not become advocates of SMS among their neighbors and in fact avoided talking to their neighbors about

irrigation even when they saw them wasting water. The researchers recommend that the success of these households that have learned to conserve water be leveraged to motivate their neighbors and homeowners associations (HOAs) to also change their behaviors.

Mobilizing Community Support for Urban Forest Stewardship

CLCE Involved Faculty: PI – Paul Monaghan
Partners: Robert Northrop
Funded by Florida Department of Forestry

Trees account for almost one-third of green industry sales in Florida and are valued at nearly $1 billion. This effort will educate urban residents about the value of trees for the environment, improving property values and residents quality of life while training various stakeholder groups in the proper selection, care and maintenance of trees. This will raise awareness of trees as an amenity in urban areas, which is a first step in establishing a tree stewardship ethic among urban residents.

In 2012, the researchers conducted a review of the available literature and benchmarking of similar community tree planting programs around the country. Center faculty established a partnership with county extension, the Tampa Department of Parks and Recreation and three neighborhood civic associations to increase the number of trees on public right-of-ways and motivate residents to become stewards of these trees in their neighborhoods. These are diverse neighborhoods with a mixture of newer, younger residents and long-time homeowners who have watched their neighborhoods decline and revitalize. In each case they have come together to form neighborhood associations to resolve issues in a part of Tampa that was long in decline and is now improving. Crime rates are declining, property values are increasing and services such as parks are getting improvements. Using a social marketing framework, focus groups were conducted where residents described the barriers to tree stewardship in their neighborhoods and also the benefits they perceive from trees. There is an overwhelming desire for more tree canopy but it is tempered by their realization of the costs from long term-maintenance. In 2013, the research and intervention will be evaluated and results will be reported in the local press, academic journals and industry publications as a model for increasing tree canopy in urban areas.

Springs Protection Stakeholder Research: Designing a Public Outreach Campaign

CLCE Involved Faculty: PI – Paul Monaghan, Wendy Wilber
Partners: Stacie Greco
Funded by The Wildlife Foundation of Florida

The partnership between CLCE and the Alachua County Environmental Protection Department (ACEPD) resulted in qualitative research with stakeholders in the Santa Fe River Springs Basin designed to develop a campaign for influencing landscaping behavior changes that protect the quality and quantity of the water of local springs. The main goal of the research was to find out how various stakeholders feel about the springs, how they connect their behaviors to water quality and quantity, and what it will take to get them to change key behaviors. Five exploratory focus groups were conducted along with 15 one-on-one interviews with homeowners in the region. The focus groups and interviews focused on perceptions and attitudes about water supply, landscapes, springs health, and water conservation. The research results were used to design preliminary creative materials for use in a springs protection public outreach campaign. These materials were then market tested during a final focus group. Phase II of the project has been funded for 2013 and neighborhood “Springs Leaders” will be trained and engaged to help motivate change in selected home owners associations (HOAs).

The Effects of the Consideration of Future Consequences on Willingness to Pay Decisions for Plant Attributes

CLCE Involved Faculty: PI – Hayk Khachatryan
Funded by USDA Federal State Marketing Improvement Program

This study investigated how differences in the consideration of future consequences influence consumers' willingness to pay (WTP) for edible and ornamental plants using data from second-price auction choice experiments conducted in the U.S. and Canada (N = 159). Based on recent empirical and theoretical research linking the consideration of future consequences (CFC) construct to individual pro-environmental behavior, the present study investigates the relationship between auction participants' CFC scores and WTP for plant attributes related to production methods, container types, and product origin. Results from conjoint choice analysis showed that participants scoring high in the CFC scale were willing to pay a higher premium for plants grown using sustainable, energy/water-saving production practices. In contrast, participants scoring low on the CFC scale were not interested in paying price premiums for production related characteristics that are associated with future environmental benefits. Further, the results showed that higher CFC scores were positively associated with preference and WTP for locally produced plants.

Developing Tools to Attenuate Emerging Contaminants in Onsite Wastewater Treatment Systems

CLCE Involved Faculty: PI – Gurpal Toor
Funded by USDA National Institute of Food and Agriculture

Contamination of groundwater with a new class of contaminants known as trace organic compounds (TOrC) is an increasing concern as about 60 billion liters per day or 19% of total groundwater withdrawn is used to supply drinking water for the nation's population. Another 13 billion liters per day of groundwater is used from domestic wells for drinking purposes. Typically, homes with drinking water wells also have a septic tank system (hereafter referred to as onsite wastewater treatment system, OWTS) to dispose of household wastewater. OWTS are a sanitary necessity for rural populations, but they also create pathways for groundwater contamination withTOrC. Many of the TOrC can cause endocrine disruption in wildlife and can adversely affect human health. The impacts of TOrC contributed by OWTS on groundwater are poorly understood. The shallow and porous soils in the US Southeast coastal plains allow rapid percolation of wastewater and potentially TOrC into the groundwater. In these soils, the mechanisms such as sorption, degradation, and volatilization may not effectively attenuate TOrC in the shallow subsurface (vadose zone). As OWTS represent a direct source of TOrC to the shallow subsurface, development of tools to attenuate TOrC will help to protect the nation's well water and drinking water supplies. In this project, we will target 12 TOrC representing pharmaceuticals (carbamazepine, sulfamethoxazole), analgesic (acetaminophen, ibuprofen, salicylic acid) steroids (17β-estradiol, estrone, ethynyl estradiol), antimicrobials (triclosan), artificial sweetener (sucralose), stimulant (caffeine), and plasticizers (bisphenol-A). These compounds cover a wide range of polarity (log Kow from -1 to 5) and degradability. The group of TOrC considered was selected on the basis of their concentration and detection frequencies in OWTS.

Florida Onsite Sewage Nitrogen Reduction Strategies Study: Technology Evaluation, Characterization of Environmental Fate and Transport, and an Assessment of Costs

CLCE Involved Faculty: CO-PI – Gurpal Toor
Funded by Florida Department of Health

Dr. Toor is working with the Florida Department of Health to develop nitrogen reduction strategies for onsite sewage treatment and disposal systems in Florida. The technology evaluation included a total of seven sample events at the passive nitrogen test facility, measuring 14 different analytes at over 40 sampling points in 11 systems, as well as a final report on the pilot passive nitrogen removal study. Test results are encouraging after 12 months of testing, showing a reduction in total nitrogen of over 95%, with a final effluent concentration of 2.6 mg/L or less for several of the systems. In addition, to evaluate nitrogen reduction provided by soils and shallow groundwater, a soil and groundwater test facility has been constructed to show how groundwater fate and transport of nitrogen occurs in multiple soil treatment unit regimes. More information about this project can be found at: http://www.myfloridaeh.com/ostds/research/Nitrogen.html

Fate and Disposition of Nitrogen in Septic System Mounds

CLCE Involved Faculty: PI – Gurpal Toor
Funded by Hazen & Sawyer

Nitrogen (N) is an important concern for water quality and nitrate-N represents perhaps the most common groundwater pollutant. As a result of N impacts on groundwater and surface waters in Florida, the Florida Onsite Sewage Nitrogen Reduction Strategies (FOSNRS) Study was conceived including field testing (Task C) related to N fate and transport in support of model development (Task D). Nitrogen transport in the subsurface is a complex process, especially when considering the N inputs from onsite sewage treatment and disposal systems (OSTDS). Of critical importance is the ultimate disposition of N applied to the soil via shallow subsurface drip dispersal systems designed to optimize N removal through plant uptake thereby reducing the mobile nitrate-N fraction that recharges the groundwater.

Determination of Maximum Acceptable Irrigation Deficit on Turfgrass for Water Conservation

CLCE Involved Faculty: PI - Michael Dukes, Jason Kruse
Funded by Southwest Florida Water Management District

Urban landscape irrigation is one of the largest growing water use sectors in Florida. The state's Water Management Districts (WMD) have been working collectively to find ways to assist urban users to irrigate more efficiently. In May 2008, UF-IFAS hosted a Best Management Practice (BMP) workshop in Apopka with the goal of identifying current knowledge base of BMPs in horticultural crops including turfgrass and landscape plants. During the workshop, it was clear that water use and potential conservation in landscapes (turfgrass and ornamentals) was a high priority for many of the stakeholders. The Southwest Florida Water Management District is funding a five-year study "Investigation and Development Methods to Determine Urban Landscape Irrigation for Planning and Permitting in Central Florida" (P424). It is expected that P424 will identify coefficients for permitting water use in the irrigation of landscapes. However, as water supplies become strained, there may be a future need to permit based on less than well-watered conditions, or to restrict uses during periods of water shortage. While P424 will determine, as a starting point, water needs for optimal landscape aesthetics, this project will determine the absolute minimum irrigation needed to ensure landscape survival.

Needs, Uses, Perceptions, and Attitudes towards Weather and Climate Forecast Information by Water Resource Managers in the Southeastern United States

CLCE Involved Faculty: PI – Chris Martinez
Funded by National Oceanic and Atmospheric Association

This project provides an assessment of the current uses of, needs for, perceptions of, and attitudes towards weather and climate information, forecasts, and derived products by water resource managers in the states of Alabama, Florida, and Georgia. The project also identifies gaps in diagnostic and forecast information currently available.

This project provided an assessment of the current uses of, needs for, perceptions of, and attitudes towards weather and climate information, forecasts, and derived products by water resource managers in the states of Alabama, Florida, and Georgia, as well as to identify gaps in diagnostic and forecast information currently available. Water resource management systems in these three states vary in terms of size, complexity, institutional and regulatory constraints, infrastructure, and water source. This project targeted large and midsized water resource managers in the three states and increased our understanding of the issues and constraints to integrating forecasts into decision making, and the potential opportunities for providing custom-tailored, user-centric tools. Regional- and sector-specific assessment of users of such information is essential for providing custom-tailored information, tools, and decision support in the future. Based on preliminary survey results collected from water resource managers in the region, evaporation forecasts have been cited as one of the most desired products. This project developed 1-14 day and monthly evaporation forecasts (with a forecast horizon of 9 months) using forecast analogs from the reforecast archives currently available for the National Centers for Environmental Prediction (NCEP) Global Forecasting System (GFS) and the Climate Forecast System (CFS). The analog forecasts will be downscaled to a resolution of 32-km using the North American Regional Reanalysis (NARR) dataset. The concurrent assessment of water resource managers and the development of forecast tools in this and other projects will provide an opportunity for feedback between scientists of the Southeast Climate Consortium (SECC) and end-users.

Nitrogen Fertilizer Requirements of Ornamental Landscape Plants Growing in the Landscape

CLCE Involved Faculty: PI - Amy Shober
Funded by Florida Nursery, Growers, and Landscapers Association and Tampa Bay Wholesale Growers Asociation

Emphasis on landscape Best Management Practices has created a demand for increasingly sophisticated fertilizer recommendations. Trees and shrubs may have different fertilization requirements compared with perennials, annuals, vines and groundcovers. The objective of this research was to verify the accuracy of the Florida Green Industries BMP N fertilizer recommendations across a wide range of landscape plants.

Research methods: Warm season annuals, cold season annuals, perennials, groundcovers, vines and woody ornamental plants are being evaluated under five N fertilizer treatments (0, 2, 4, 6, and 12 lbs N 1000 ft^2). Plants were evaluated to determine the N fertilizer requirement for acceptable aesthetic quality when grown in subsoil fill material (common in new residential landscapes).

Nitrogen requirements of ornamental plants fall within the current UF/IFAS recommendations for most landscape plants, but some species of annuals may require up to twice the recommended N rate.

A Tool for Slow-Rate Land Application System Storage Determination

CLCE Involved Faculty: PI - Chris Martinez
Funded by Florida Department of Environmental Protection

This project developed a tool for the permitting and design of slow-rate reclaimed water land application systems in the state of Florida. The tool determined off-line wet-weather storage requirements and provided an estimation of annual nitrate loading to groundwater.

The tool contained a database of precipitation and reference evapotranspiration for the state of Florida that is used for water balance calculations to determine the storage required for a ten-year recurrence interval as required by Florida law. According to Florida law, the tool must use a minimum of 20 years of data to estimate the ten-year recurrence interval. The availability of ground-based solar radiation measurements in the state is relatively sparse and generally does not meet this minimum requirement.

To provide reference evapotranspiration estimates for each weather station in the database, methods that require temperature only were used. These temperature-based calculations were calibrated to reference evapotranspiration estimates provided by the United States Geological Survey (for the period 1995-2004) using solar radiation obtained from Geostationary Operational Environmental Satellites (GOES) to correct bias/error in the temperature-only estimates.

Use of Short- and Medium-Range Weather Forecasts in Regional Public Water Supply Management

CLCE Involved Faculty: PI - Chris Martinez
Funded by Tampa Bay Water

This project evaluated 1–2 week retrospective precipitation forecasts ("reforecasts") produced by the Climate Diagnostic Center of the National Oceanic and Atmospheric Administration. "Reforecasts" are sets of historical forecasts that allow researchers to know and quantify the error of the forecasts compared to historical observations. Quantification of the error allows for bias correction of future forecasts to improve their accuracy. This study evaluated the usability of these 1–2 week reforecasts in generating forecasts of water demand, streamflow, and groundwater levels in operational decision making by Tampa Bay Water. A comparative decision/risk analysis using these operational forecasts and longer term (monthly to annual) climate forecasts was implemented by evaluating alternative scenarios and multi-criteria decision analysis to determine the value, both economic and environmental, and reliability of using these forecasts in making decisions.

EXTENSION ACTIVITIES

CLCE faculty offer two main extension programs—the Florida Master Gardener Program (page 17) and the Florida-Friendly Landscaping Program (page 19). In addition, other successful extension programs include some of the following.

Gardening in a Minute

Since 2006, *Gardening in a Minute* has been providing on-air radio education for Florida's consumers. As a one-minute weekday program, the show covers everything from maintenance issues to plant selection to invasisve pests. It can be heard in Gainesville/Ocala, Inverness, Tallahassee, and Tampa on local NPR stations. In addition, the show is supported by an extensive website.

From 2008 to 2012, the *Gardening in a Minute* website had 442,048 unique visitors with peak months in spring (March, April, or May). In addition, unique visitors have steadily grown with the use of social media and the e-newsletter. In 2012, the website received 7,000 visits directly from the e-newsletter, The Neighborhood Gardener.

Month and Year	**Unique Visitors that Month**
April 2008	2,400
April 2009	6,823
April 2010	7,358
April 2011	11,711
April 2012	27,647

In addition to unique visitors, the website had 884,171 unique pageviews. The most popular pages include

- Confederate Jasmine, which is the top-viewed page of all time, with 28,800 unique pageviews,
- Bulbine with 14,381 unique pageviews,
- Azaleas with 13,345 unique pageviews, and
- Vegetable FAQ with 11,160 unique pageviews.

The Neighborhood Gardener

The Neighborhood Gardener is an e-newsletter that supports general consumers interested in the Florida Master Gardener or Florida-Friendly Landscaping Program content. The newsletter has been published once a month since August 2008 and has more than 4,000 emails subscribed. Every month, it features a plant of the month, landscape "friend or foe", gardening calendar for the month, and success stories.

Smithsonian Folklife Festival & Florida Museum of Natural History Exhibit

In June and July 2012, UF and twenty other land-grant universities participated in the 2012 Smithsonian Folklife Festival. The festival celebrated the 150th anniversary of the Morrill Act, a key piece of legislation signed in 1862 that laid the groundwork for Extension programs like Master Gardeners. The celebration included the program "Campus and Community: Public and Land-grant Universities and the USDA at 150" which focused on four themes that reflect the current work of public and land-grant universities and the USDA: reinventing agriculture, sustainable solutions, transforming communities, and building on tradition.The Center for Landscape Conservation and Ecology focused its programming efforts on efficient irrigation and landscaping techniques. You can learn more at the program's website, Water: Discovering and Sharing Solutions. More than 5,000 people visited the exhibit during the 10 days it was on the National Mall.

The exhibit was on display at the Florida Museum of Natural History from September through December 2012 and averaged approximately 14,000 visitors per month for a total of 56,000.

FLORIDA MASTER GARDENER PROGRAM

The Florida Master Gardener Program is a volunteer-driven program that benefits the citizens of Florida by extending gardening knowledge from the university into communities. The program relies on dedicated volunteers who have an interest in gardening and in giving back to their communities.

In 2012, 4,750 Florida Master Gardeners provided $6.72 million in volunteer time to Florida's economy.

Throughout the year, Florida Master Gardeners participate in a variety of statewide activities and partnerships including

- **Epcot International Flower & Garden Festival**
  Every year, Master Gardeners work for 75 days at Epcot's festival. Since 2008, more than 26,047 contacts have been made.

- **Junior Master Gardener Program**
  There are 28 registered leaders and 57 registered programs with the Florida Junior Master Gardener Programs. This program creates excitement for gardening in children at very young age.

- **Florida School Garden Competition**
  Between 2008 and 2012, 180 schools and more than 10,085 students participated. There was no competition in 2010 due to budgetary issues. Schools incorporate gardening and horticulture techniques into their curriculum and enter outstanding portfolios of their school gardens.

- **Plant Identification and Judging Competition**
  Many Master Gardeners increase their plant knowledge by participating in the plant identification and judging competition. Since 2008, 169 Master Gardeners have participated. This competition increases Master Gardeners plant knowledge and increases their identification skills when helping clients.

- **Florida Master Gardener Leadership School**
  The leadership school began in 2012 with 115 participants. The school provided leadership curriculum to key or potential leaders for each county program.

- **Florida Master Gardener Continued Training Conference**
  Between 2008 and 2012, 1,542 Master Gardeners received advanced training through the annual conference. Every year, Master Gardeners learn about the newest techniques, the latest research, and leadership opportunities.

While each county program is unique, most Master Gardeners participate in walk-in or phone plant clinics, school and community garden development, demonstration garden installation and maintenance, and public speaking.

In 2012, Master Gardeners interacted with more than 589,000 people across the state of Florida. Master Gardener programs operate in 60 of Florida's 67 counties and assist with extending the land-grant mission to the general public.

The Florida Master Gardener state office also conducts a robust social media campaign. This includes a Facebook page with more than 1,800 likes and managed accounts with Twitter, Flickr, Pinterest, and YouTube.

FLORIDA-FRIENDLY LANDSCAPING™

The Florida-Friendly Landscaping™ Program (FFL) includes programs for the homeowner, builder and developer, and landscape maintenance industry. In 2011, the Florida-Friendly Landscaping Program, along with the Florida Master Gardener program, were administratively structured into CLCE to provide better interdisciplinary research efforts and extension outreach opportunities.

The Florida-Friendly Landscaping Program has nine principles:

1. Right Plant, Right Place
2. Water Efficiently
3. Fertilize Appropriately
4. Mulch
5. Attract Wildlife
6. Manage Yard Pests Responsibly
7. Recycle Yard Waste
8. Reduce Stormwater Runoff
9. Protect the Waterfront

Since 2006, the Florida-Friendly Landscaping Program has been working within a majority of Florida's counties. Currently, FFL programming is offered in 48 of 67 counties. But the 2010 Florida extension reports of accomplishment show that more than 80 extension agents participated in some aspect of FFL outreach. Actual outreach is likely higher than these numbers below indicate. Between 2006 and 2012, more than 500,000 people have received in-person educational contact. The FFL agents have completed and documented over 700 site visits, presented 191 workshops on FFL principles, and reached more than 20,000,000 people with mass media outreach.

In addition, FFL agents work closely with trained Master Gardeners to develop and implement outreach programs. Extension agents and Master Gardeners provide the majority of FFL programming.

Outreach Mechanism	Contact Numbers
In-Person	502,700
Mass Media	20,231,548
Workshops Delivered	191
Site Visits	759

FLORIDA-FRIENDLY LANDCAPING SUB-PROGRAMS

The Florida Yards and Neighborhoods (FYN) Homeowner and Builder and Developer programs were merged with the Green Industries Best Management Practices (GI-BMP) program for landscape and lawn care professionals under the umbrella of the FFL program in 2008.

The GI-BMP and the FYN programs are consistent in their science-based recommendations of irrigation and fertilizer application rates; only the level of detail is different and customized to the audience.

Florida Yards & Neighborhoods Homeowner	The Florida Yards & Neighborhoods Homeowner program educates homeowners about how to design, install, and maintain healthy landscapes that use a minimum of water, fertilizer, and pesticides.
Florida Yards & Neighborhoods Builder & Developer	The FYN builder/developer program targets professionals involved in new construction, redevelopment, homeowners' associations (HOA) and community associations, which are a key component in influencing major changes in landscape design and maintenance behaviors.
Green Industry Best Management Practices (GI-BMP)	The GI-BMP program was developed to provide training in the Best Management Practices for lawn and landscape to Green Industry Professionals, governmental/institutional workers, and other environmental and landscaping personnel.

The Green Industries-Best Management Practices (GI-BMP) training program was developed by the Florida Department of Environmental Protection and endorsed by the pest control industry. The training is a product of the UF/IFAS Florida-Friendly Landscaping program with partial funding by FDEP through a Nonpoint Source Management (Section 319h) grant from USEPA. To date, the GI-BMP program has trained 22,548 unique individuals and certified 19,189 unique individuals.

In 2012, 182 GI-BMP in-person classes were given with an average class size of 21. More than 3,800 people attended in-person classes and 3,122 were certified from this method. Combination in-person and online classes resulted in 4,291 attending and 3,505 certified. Finally, online-only classes resulted in 365 certified. The GI-BMP program developed a follow-up survey that is administered annually to track reported behavior change. The GI-BMP program has been approved as CEU providers for FDACS pesticide licenses, the Community Association Management Association, and FNGLA.

Additionally, surveys were provided to GI-BMP trainees to highlight behavior change. Below are 2011's survey results. 2012 results are still being compiled.

GI-BMP – 2011 (408 respondents) – survey highlights of behavior change		
Always take this action	Before training	After training
Reset irrigation controller timers seasonally	33.9%	61.4%
Calibrated rain shut-off devices	24.4%	52.4%
Ensured irrigation rates to prevent leaching and runoff	24.9%	57.3%
Used soil moisture or other sensing devices	12.6%	37.4%
Applied no more than ½ to ¾ inches of water per irrigation event	27.3%	58.8%
Considered over-irrigation harmful to plant and environment	50.7%	77%

Florida-Friendly Landscaping Program Success Stories

St. Augustine Beach Community Saves More Than 10 Million Gallons in Two Years

Ocean Gallery is a 42-acre community with 439 condominiums in St. Augustine Beach. Between 2006 and 2008, Florida-Friendly Landscaping practices were implemented and low-volume irrigation and soil moisture sensors were installed. The community realized a water savings of 10 million gallons in those two years. In addition, Ocean Gallery's maintenance contracts contain Florida-Friendly Landscaping™ Best Management Practices for pest management and fertilizer use, which produced a savings of $6,500 in one year. In one of the three villages in Ocean Gallery, the Village Las Palmas community realized a 50 percent decline in water use in six months at one well that supplies common areas around four of its nine buildings as a result of installing low volume irrigation.

Flagler County Community is Saving $50,000

Ocean Hammock, a 1,000-acre beachside gated community in Flagler County, saved thousands of dollars through a common-sense, hands-on approach in a major landscape retrofit during the last four years, and credits the University of Florida/IFAS Master Gardener program as a major catalyst for its improvements. The community is saving $50,000 a year on annuals and they reduced the cost of the retrofit by $135,000.

Marion County Community Cuts Per Person Water Use from 471 Gallons to 139 Gallons

Spruce Creek Golf and Country Club in Marion County is a great example of a collaborative effort to conserve water. A team effort among the homeowners' association, the utility, the St. Johns River Water Management District, UF/IFAS Extension, the garden club, and the residents, resulted in a 40 percent water savings in two years. The association changed its covenants to allow less turf—a minimum of 50 percent in the yard, and they began to allow rain barrels. The utility moved to a one-day per week watering rotation and ran an aggressive water conservation education program. The garden club distributed stickers as reminders about the watering days to roughly half of the 3,600 households and helped residents set irrigation controllers. The garden club also established a Florida-Friendly demonstration garden. The FFL extension agent continues to conduct education classes each month. The utility is pursuing use of reclaimed water for irrigation. This has reduced per person water usage from 471 gallons to 139 gallons annually.

Faculty

DR. MICHAEL DUKES, INTERIM DIRECTOR

Specialty Area: **Water Conservation & Irrigation**

60% Extension, 40% Research

Gainesville

Primary Responsibilities:

- Irrigation efficiency and plant water requirements
- Water conservation in irrigated systems

Dr. Dukes evaluates smart irrigation technology, develops training for use of irrigation technology, and assists landowners, decision makers, and government agencies with implementation of smart technology.

Highlighted Publications:

- ☐ Meeks, L., Dukes, M., Migliaccio, K., and Cardenas-Lailhacar, B. 2012. Expanding-Disk Rain Sensor Dry-Out and Potential Irrigation Savings. J. Irrigation and Drainage Eng. 138(11): 972–977.
- ☐ Rutland, D. and Dukes, M. 2012. Performance of Rain Delay Features on Signal-Based Evapotranspiration Irrigation Controllers. J. Irrigation and Drainage Eng. 138(11): 978–983.
- ☐ Romero, C. C., M. D. Dukes. 2011. Are landscapes over-irrigated in Southwest Florida? A spatial-temporal analysis of observed data (PDF). Irrigation Science.
- ☐ McCready, M. S. and M. D. Dukes. 2010. Landscape Irrigation Scheduling Efficiency and Adequacy by Various Control Technologies (PDF). Agricultural Water Management.

Awards:

- ☐ 2011 Young Extension Worker Award, American Society of Agricultural and Biological Engineers
- ☐ University of Florida Dean for Extension, 2007–2008, LEAD21 Leadership Development Program and Leadership Internship.
- ☐ American Society of Agricultural and Biological Engineers, 2007, Outstanding Reviewer Award.
- ☐ University of Florida Research Foundation Professorship, 2010–2012.
- ☐ Soil and Water Conservation Society, 2010 Best Paper Research Award for Impact

DR. STEPHEN ARTHURS

Specialty Area: **Landscape Biological Control**

70% Research, 30% Extension

Mid-Florida Research and Education Center

Primary Responsibilities:

- Improve IPM for arthropod pests of ornamental plants, trees, and shrubs
- Evaluation of insect pathogens as microbial pesticides
- Tools for conservation biological control, e.g., banker plants and beneficial attractants

Dr. Arthurs focuses on improving integrated pest management (IPM) for arthropod pests of ornamental plants, trees and shrubs in both nursery and outdoor landscapes.

Highlighted Publications:

- ☐ Arthurs, S., Stauderman, K. 2010. How accurately do homeowners apply lawn fertilizers? Proceedings of the Florida State Horticultural Society Meeting, 123: 344-347.
- ☐ Arthurs, S., Tofangsazi1, N., Meagher. R.L., Cherry, R. 2012. Attraction of Plecia nearctica (Diptera: Bibionidae) to floral lures containing phenylacetaldehyde. Florida Entomologist: 95: 199-201
- ☐ Arthurs, S., Chen, J., Doğramaci, M., Ali, A.D., Mannion, M. 2011. Evaluation of Montandoniola confusa Streito and Matocq sp. nov. and Orius insidiosus Say (Heteroptera: Anthocoridae), for control of Gynaikothrips uzeli Zimmerman (Thysanoptera: Phlaeothripidae) on Ficus benjamina. Biological Control 57: 202-207.

Awards:

- ☐ Pacific Branch of the Entomological Society America, IPM team award 2011
- ☐ Potato Association of America, 2010 Outstanding Extension Project Team Award

DR. GAIL HANSEN

Specialty Area: **Sustainable Landscape Design**

60% Extension, 40% Teaching

Gainesville

Primary Responsibilities:

- Landscape Design—Sustainable urban residential landscape design practices
- Design and development of demonstration and learning landscapes
- Policy, codes, and regulation for sustainable landscape design
- Scholarship of landscape design- teaching methodologies and student development in landscape design pedagogy

Dr. Hansen designs and installs research and extension demonstration landscapes, investigates aesthetic landscape preferences, and develops Florida-Friendly codes for homeowners' associations.

Highlighted Publications:

- ☐ Hansen, G. When Students Design Learning Landscapes: Designing for Experiential Learning through Experiential Learning. NACTA/DOCE Journal. December 2012
- ☐ Hansen, G. 2012. A Smart Phone Application for Landscape Plants: A Case Study and Guide to Developing a Decision-Making Application. Journal of Extension. December 2012, Volume 50, Number 6
- ☐ Hansen G. 2012. What's in Your Garden? The Designer, Journal of the Association of Landscape Professionals. Summer 2012. Pg. 30

DR. HAYK KHACHATRYAN

Specialty Area: **Horticultural Economics**

60% Research, 40% Extension

Mid-Florida Research and Education Center

Specialty Areas:

- Horticultural Economics
- Economic Impact Analysis
- Consumer Economics (consumer preferences, choice behavior analysis, demand analysis, discrete choice modeling)
- Applied Econometrics

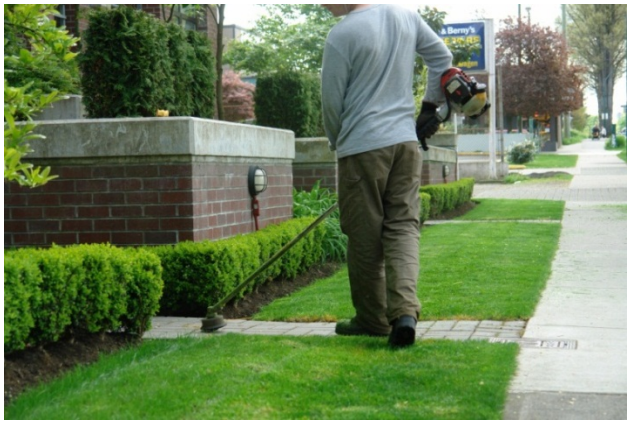
Dr. Khachatryan educates the public about the economic, health and well-being benefits of plants. Dr. Khachatryan conducts consumer surveys and choice experiments to analyze consumers' preferences and demand for horticultural products, including household-level irrigation and fertilization practices. Dr. Khachatryan works with the environmental horticultural industry to promote financially feasible and environmentally sustainable production practices.

Highlighted Publications:

- ☐ Palma, M., C. Hall, B. Campbell, H. Khachatryan, B. Behe, and S. Barton. (2012) "Measuring the Effects of Firm Promotion Expenditures on Green Industry Sales." Journal of Environmental Horticulture, 30(2), 83-88.
- ☐ Khachatryan, H., J. Joireman, and K. Casavant. (In Press). Relating Values and Consideration of Future and Immediate Consequences to Consumer Preference for Biofuels: A Three-Dimensional Social Dilemma Analysis. Journal of Environmental Psychology.
- ☐ Behe, B., B. Campbell, H. Khachatryan, C. Hall, J. Dennis, and C. Yue. (In Press). Consumer Preferences for Local and Sustainable Plant Production Characteristics. HortScience.
- ☐ Behe, B., C. Hall, B. Campbell, H. Khachatryan, J. Dennis, and C. Yue. (In Press). Smartphone Use and Online Search and Purchase Behavior of North Americans: Gardening and Non-Gardening Information and Products. HortScience.

DR. ANDREW KOESER

Specialty Area: **Landscape Maintenance**



70% Research, 30% Extension

Gulf Coast Research and Education Center

Primary Responsibilities:

- Homeowner and commercial landscape management practices
- Pursue research and extension activities in environmental horticulture, particularly commercial production, evaluation, and management of plants for human-dominated landscapes

Dr. Koeser will begin his position with the University of Florida in April 2013.

DR. CHRIS MARTINEZ

Specialty Area: **Water Resource Management**

60% Research, 40% Extension

Gainesville

Primary Responsibilities:

- Regional water management
- Effects of climate variability and climate/land use change on water supply and water quality
- Urban landscape water quality and low-impact development

Dr. Martinez works to improve drought forecasting and to improve water quality impacts of the urban environment.

Highlighted Publications:

- ☐ Khare, Y.P., Martinez, C.J., and G.S. Toor. Water quality trends and land use changes in the Alafia and Hillsborough River Watersheds, Florida, USA. Journal of the American Water Resources Association, 48(6): 1276-1293.
- ☐ Martinez, C.J., Maleski, J.J., and M.F. Miller. 2012. Trends in precipitation and temperature in Florida, USA. Journal of Hydrology, 452-453: 259-281.
- ☐ Carey, R.O., Hochmuth, G.J., Martinez, C.J., Boyer, T.H., Nair, V.D., Dukes, M.D., Toor, G.S., Shober, A.L., Cisar, J.L., Trenholm, L.E., and JB. Sartain. 2012. Regulatory and resource management for urban watersheds: The Florida experience. HortTechnology, 22(4): 418-429.
- ☐ Martinez, C.J. and M. Thepadia. 2010. Estimating reference evapotranspiration with minimum data in Florida. Journal of Irrigation and Drainage Engineering, 136(7): 494-501.

Awards:

- ☐ 2012 Florida Sea Grant scholar, Yogesh Khare (student)
- ☐ 2011 John and Martha Woeste Professional Development Award, UF/IFAS
- ☐ 2010 Outstanding Paper Award from the Hydrology Section of the American Geophysical Union, Sywoon Hwang (student)
- ☐ 2010 Young Extension Worker Award, American Society of Agricultural and Biological Engineers, Florida Section

DR. ESEN MOMOL, FLORIDA-FRIENDLY LANDSCAPING™ PROGRAM STATE DIRECTOR

100% Extension

Gainesville

Primary Responsibilities:

- Provide program direction for the Florida-Friendly Landscaping™ program
- Develop curriculum related to urban landscape issues
- Maintain partnerships with granting agencies

Dr. Momol provides statewide programmatic direction for the Florida-Friendly Landscaping™ program. This includes coordinating the curriculum and training activities for the Green Industry-Best Management Practices certification; educational program delivery to builders, developers, and homeowners; and maintaining partnerships with funding agencies and governmental organizations.

Staff:

- Brian Niemann, FYN Coordinator
- Claire Lewis, Information Specialist
- Don Rainey, GI-BMP Coordinator
- Jen Marvel, GI-BMP Program Assistant
- CJ Bain, GI-BMP Data Manager

Highlighted Publications:

☐ Green Industries-Best Management Practices brochures in English

☐ Green Industries-Best Management Practices brochures in Spanish

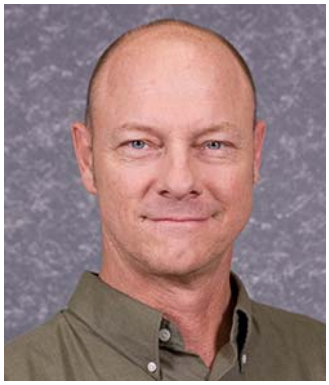
☐ Team Member, (2010) Florida-Friendly Landscaping Guide to Plant Selection & Landscape Design

Awards:

☐ 2011 FACAA Bound Book Category Winner:
The Florida-Friendly Landscaping™ Guide to Plant Selection and Landscape Design

DR. PAUL MONAGHAN

Specialty Area: **Community-Based Social Marketing**



65% Extension, 30% Research, 5% Teaching

Gainesville

Primary Responsibilities:

- Community based social marketing as a tool for environmental behavior change
- Residential behavior in landscaping and the impact on natural resource sustainability

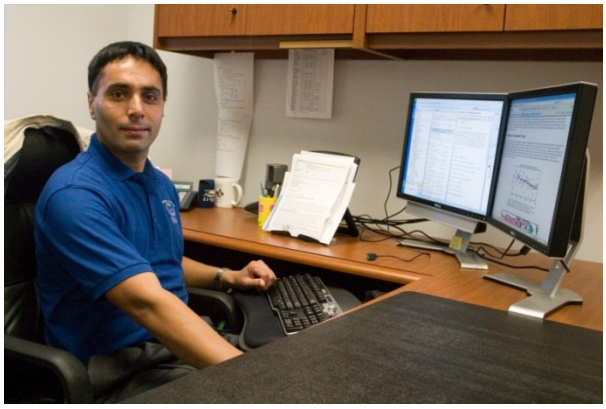
Dr. Monaghan works with communities, homeowners, and homeowner associations on water use and landscape preference behavior change.

Highlighted Publications:

- ☐ Marriott, J.M., A.L. Shober, P. Monaghan, and C. Wiese. (2012). Equine Owner Knowledge and Implementation of Conservation Practices. Journal of Extension. In Press.
- ☐ Monaghan, P., Bryant, C., McDermott, R., Forst, L., Luque, J., Contreras, R. (2012). Adoption of Safety Eyewear among Citrus Harvesters in Rural Florida. Journal of Immigrant and Minority Health. Vol. 14, 460-466.
- ☐ Telg, R., Irani, T., Monaghan, P., Chiarelli, C., Scicchitano, M., and Johns, T. (2012) Preferred Information Channels and Source Trustworthiness: Assessing Communication Methods Used in Florida's Battle Against Citrus Greening. Journal of Applied Communications. Vol. 96 (1)

DR. GURPAL TOOR

Specialty Area: **Urban Water Quality**



70% Research, 30% Extension

Gulf Coast Research and Education Center

Primary Responsibilities:

- Investigate processes and mechanisms controlling the fate and transport of pollutants (nutrients, metals, pesticides, emerging contaminants) in urban landscapes
- Develop innovative management practices to minimize losses of pollutants to surface and subsurface waters in urbanized and rapidly urbanizing watersheds

Dr. Toor investigates mechanisms controlling release and transport of nitrogen, phosphorus, and organic contaminants from urban landscapes to water bodies.

Highlighted Publications:

- ☐ Toor, G.S., L. Han, & C.D. Stanley. 2012. Temporal variability in water quality parameters—a case study of drinking water reservoir in Florida, USA. Environmental Monitoring and Assessment. 10.1007/s10661-012-2870-z
- ☐ Hagan, D. C. Dobbs, N. Timilsina, F. Escobedo, G.S.Toor, & Andreu, M. 2012. Anthropogenic effects on the physical and chemical properties of subtropical coastal urban soils. Soil Use and Management. 28:78-88.
- ☐ Khare, Y.P., C.J. Martinez, & G.S. Toor. 2012. Water quality and land use changes in the Alafia and Hillsborough river watersheds, Florida, USA. Journal of American Water Resources Association. 48:1276-1293.
- ☐ Pannu, M.W., G.S. Toor, G.A. O'Connor, & P.C. Wilson. 2012. Toxicity and bioaccumulation of biosolids-borne triclosan in food crops. Environmental Toxicology & Chemistry. 31: 2130-2137.

Awards

- ☐ UF Alumni Fellowship, Mary Lusk for 2011–2015 (student)
- ☐ 2012 Outstanding Paper Award at the 3rd University of Florida Water Institute Symposium, Ignacio Rodriquez (student)
- ☐ CONICYT Bicentennial Becas-Chile Scholarship Ignacio Rodriguez for 2010–2014 (student)

MR. TOM WICHMAN, FLORIDA MASTER GARDENER PROGRAM STATE COORDINATOR

100% Extension

Gainesville

Primary Responsibilities:

- Provide program direction for the Florida Master Gardener program
- Develop curriculum related to urban landscape issues
- Maintain partnerships with cooperating agencies
- Coordinate youth gardening activities

Mr. Wichman coordinates the 4,750 member Florida Master Gardener program which includes 60 of Florida's 67 counties. He also implements the Junior Master Gardener program, the Florida School Garden Competition, coordinates IFAS's involvement in the Epcot International Flower & Garden Festival and is the voice of the *Gardening in a Minute* radio show.

Staff:

- Crystal Sutherland, School Garden Coordinator

Highlighted Publications:

- ☐ Park Brown, S.G., Williamson, J. G. and Wichman, T. (2009) EDIS 4HPSJ20 Florida 4-H Horticulture Identification and Judging: Contest Rules and Glossary
- ☐ Team Member, (2010) Florida-Friendly Landscaping Guide to Plant Selection & Landscape Design
- ☐ Narrated the FFL GI-BMP Electronic Training Modules (2012)

Awards:

- ☐ 2012 National Garden Writers Association Silver Award for Best On-Air Talent for Radio or TV for work with *Gardening in a Minute*.
- ☐ 2011 NACAA Communications Award National Winner for Bound Book: Florida-Friendly Landscaping™ Guide to Plant Selection & Landscape Design (Team Entry)
- ☐ 2010 Gold Awards for Association for Communication Excellence Electronic Video Programs: Your Southern Garden television program
- ☐ 2009 NACAA National Winner, Audio Recordings: *Gardening in a Minute* radio program

DR. ED GILMAN, AFFILIATE FACULTY

Specialty Area: **Urban Tree Management**

50% Research, 40% Extension, 10% Teaching

Gainesville

Primary Responsibilities:

- Effects of nursery production methods on tree quality, tree establishment rate and water and nutrient requirements after transplanting.
- Training for arborists, landscape architects, plant growers, landscape design and installation firms, landscape management companies, municipal parks and recreation departments, urban foresters, landscape inspectors, and others.

Highlighted Publications:

- ☐ Gilman, E.F., R.C. Beeson, and C. Harchick. 2012. Mulch impact on evaporation from recently planted root balls in a simulated landscape. Arboriculture and Urban Forestry 38:18-23.
- ☐ Gilman, E.F., and J.C. Grabosky. 2011. Quercus virginiana root attributes and lateral stability after planting at different depths. Urban Forestry Urban Greening. 11:3-9.
- ☐ Gilman, E.F., C. Harchick, and M. Paz. 2010. Planting depth affects root form of three shade tree cultivars in containers. Arboriculture and Urban Forestry 36:132-139.

Awards:

- ☐ 2011, Stephan Spurr Award, Florida Division, Society of American Foresters.
- ☐ 2009, Bok Award, Florida Chapter International Society of Arboriculture.
- ☐ 2008, Outstanding Arboriculture Researcher, Southern Chapter International Society of Arboriculture.
- ☐ 2007, Richard Harris Research Award, International Society of Arboriculture, Champaign IL.
- ☐ 2005, Author Citation Award, International Society of Arboriculture, Champaign IL.

DR. SYDNEY PARK BROWN, AFFILIATE FACULTY

Specialty Area: **Consumer Horticulture**

60% Extension, 40% Teaching

Plant City Teaching Campus

Primary Responsibilities:

- Provide horticulture expertise for statewide programs
- Conduct trainings for extension agents and Master Gardeners
- Coordinate the Environmental Horticulture teaching program - Plant City campus.

As a state Extension specialist, Dr. Park Brown provides educational resources to the gardening public at large and, specifically, to county Extension Agents, FYN Coordinators, Master Gardeners and horticulture professionals who interact with this audience on a day-to-day basis. She also teaches and advises undergraduate and graduate students seeking degrees in Environmental Horticulture.

Books:

- ☐ Gilman, E., Black, R. and Park Brown, S. G. (revision – 2011). Your Florida Guide to Shrubs. University Press of Florida. Gainesville, FL. 35 new shrubs and 2 appendices added; 29 taxonomic changes; invasive plant, fertilizer, mulch, plant establishment info updated.
- ☐ Park Brown, S. G. and Schellhorn. R. 2006. Your Florida Guide to Perennials. University Press of Florida, Gainesville, FL.

Highlighted Publications:

- ☐ Henry, Mary E., Park Brown, Sydney, Arthurs, Steven & Osborne, Lance S. 2012. "Evaluation of Ten Groundcovers as a Landscape Banker Plant for Amblyseius swirskii." Florida State Horticulture Society. Volume 124.
- ☐ Mangandi, Jozer A. and Park Brown, Sydney. 2011. "Performance of Low-maintenance Roses in Central Florida." Florida State Horticulture Society. Volume 123.
- ☐ Park Brown, S. G. 2009. "Adoption of Environmental Landscape Practices: Characteristics and Perceptions of Extension Clientele." Journal of Extension. Volume 47(4). Aug 2009
- ☐ Shober, A. L., Davis, S. Dukes, M. D., Denny, G. C., Park Brown, S. & Vyapari, S. 2009. "Evapotranspiration based irrigation controllers provide comparable growth and quality of ornamentals grown in Florida landscapes. J. Environ. Hort. 27(4):251–256. December 2009

DR. LAURIE TRENHOLM, AFFILIATE FACULTY

Specialty Area: **Urban Turfgrass Management**

70% Extension, 30% Research

Gainesville

Primary Responsibilities:

- Responsible for development of the GI-BMP Educational Program and provides ongoing advisement for the program.
- Work with the commercial lawn care industry on problems relating to lawn grass cultural management, stress physiology, and Best Management Practices.
- Lead Investigator for the statewide research project on Nitrate and Phosphorus Leaching Losses from Urban Turfgrass. This was an 8-year project funded by the FDEP.

Dr. Trenholm provides expertise on the management and science of turfgrass. She researches nitrate leaching and water use for Florida residential turfgrasses.

Highlighted Publications:

- ☐ Trenholm, L.E., J. Bryan Unruh, and Jerry B. Sartain. 2012. Nitrate leaching and turf quality in established 'Floratam' St. Augustinegrass and 'Empire' Zoysiagrass. J. Envir. Quality. 41:793-799.
- ☐ Cai, Xiaoya, L.E. Trenholm, J.K. Kruse, and J.B. Sartain. 2011. Response of 'Captiva' St. Augustinegrass to Shade and Potassium. Hort Sci. 46:1400-1403.
- ☐ Trenholm, L.E., J.B. Unruh and J.B. Sartain. 2012. Nitrate leaching and turf quality in newly sodded St. Augustinegrass. J. Plant Nutr. In press.
- ☐ Trenholm, L.E. and J.B. Sartain. 2010. Turf nutrient leaching and best management practices in Florida. Hort Tech. 20(1):107-110.
- ☐ Liu, Min, J. B. Sartain, L. E. Trenholm, and G. L. Miller. 2008. Phosphorus requirements of St. Augustinegrass grown in sandy soils. Crop Sci. 48:1178-1186.

Awards:

- ☐ 2008 Turfgrass Producers International Turfgrass Educator of the Year

EVALUATION SPECIALIST (VACANT)

Specialty Area: **Social Marketing**

70% Research, 30% Extension

Gainesville

Primary Responsibilities:

- Formative and summative evaluation of landscape maintenance preference and awareness
- Developing and implementing programs to enhance awareness and implementation of sustainable landscape management practices through application of social marketing strategies

Staff

Emily Eubanks, Communications Coordinator

Emily has been with CLCE since 2006 and coordinates strategic communication efforts of the center. She also provides communication training to faculty and horticulture agents throughout the state. Emily is also the primary position for social media efforts within the center.

Kim Kruse, Research Coordinator

Kim started with CLCE in 2007 and served as the senior information specialist until 2012 where she produced, managed, and wrote the *Gardening in a Minute* radio program. In 2012, she transitioned into the research coordinator position where she will assist faculty with grants identification and writing.

Jennifer Sykes, Web Coordinator

Jennifer has been with CLCE since 2007 and provides all of the strategic efforts and detail work of the center's various websites. She manages more than 1,500 pages of content and provides in-depth analytics that help direct content management.