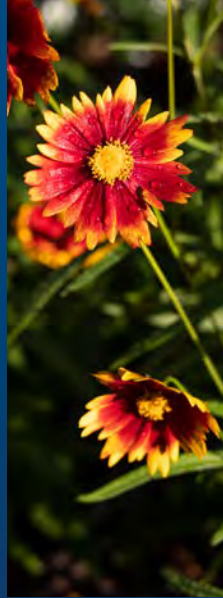


CENTER FOR LAND USE EFFICIENCY



2022

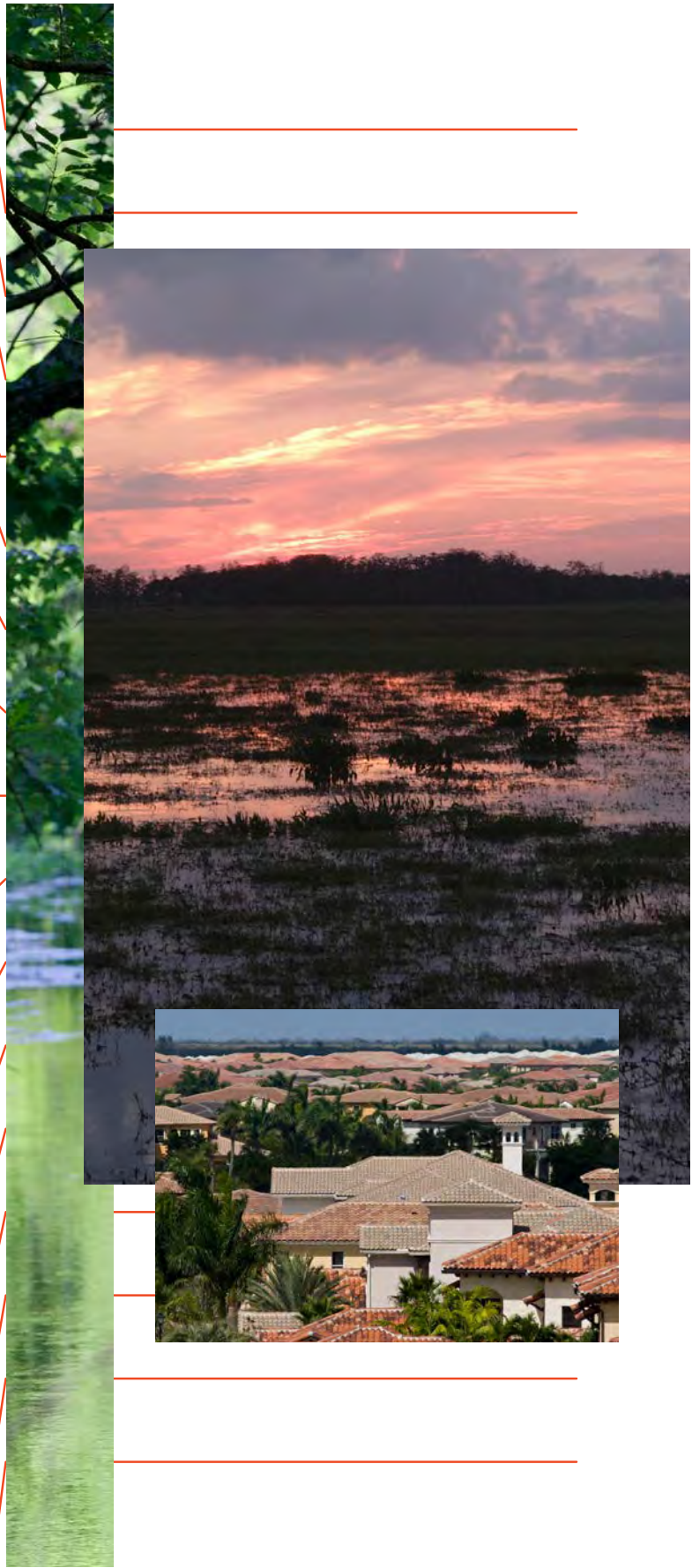
Annual Report

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

UF|IFAS
UNIVERSITY of FLORIDA



CLUE | CENTER FOR LAND USE EFFICIENCY



Mission

Promote the adoption of science-based policies and practices that measurably create an environmentally, economically, and socially vibrant life for Florida’s citizens.

Our work is *focused* on three areas:

- Agriculture,
- Urban and suburban landscapes,
- Large-scale development,

And is largely related to water *quality* and *quantity* and various best management practices (BMPs).

2022 By the Numbers

\$4,091,812

Total active external funding in 2022
resulting from CLUE seed funding

\$266,994

Internal Funding

\$12,490,249

Active External Funding

26

Interdisciplinary faculty

16

Affiliate faculty

21

Staff

29

Chaired MS

33

Chaired PhD

61

Refereed publications produced

21

Proceedings contributed to

481

EDIS

2

Book contributions

88

Non-refereed publications

460

Trainings & Workshops with
23,241 participants

9,007

E-newsletter subscribers

82

Webinars with more than
18,565 live and
recorded views

4.1 million

Unique website views

31,545

Facebook followers and
540,746 reached

89,679

Instagram accounts reached and
10,679 followers

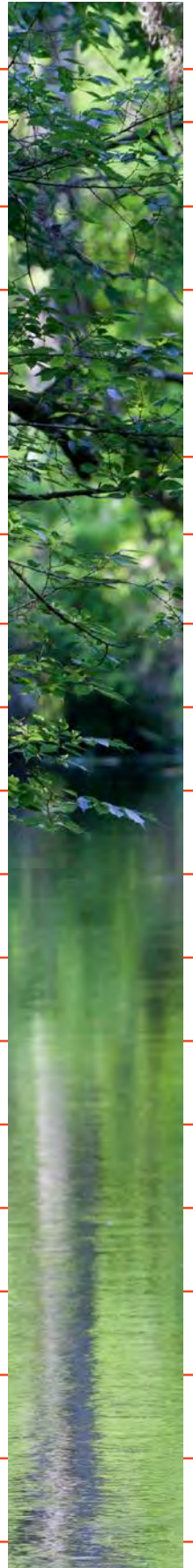
1,285

YouTube channel subscribers with
36,292 views

Behavior change brought about
by UF/IFAS Extension programs
in 2021 led to an estimated
359,449,792 gallons of
water saved annually in Florida, a direct
impact through the Center's major
Extension programs. This savings is
valued at **\$1,549,229** on
Floridians' utility bills and is enough water
to supply the annual indoor water needs
of **4,085** households

Major Extension Programs

Florida Master Gardener Volunteer
Program, Florida-Friendly Landscaping™
Program, Program for Resource Efficient
Communities, H₂OSAV, Sustainable
FloridiansSM, Florida Agricultural Best
Management Practices



Message from the Director



This year the UF/IFAS Center for Land Use Efficiency (CLUE) increased the knowledge gained, number of partnerships created and the impact it is making on Florida. From the residents to industries and from farmlands to front yards, CLUE faculty delivered on their

mission through research and Extension programs to educate and conduct the research necessary to address urban and agricultural land use issues in the state and beyond.

CLUE faculty and staff traveled the world attended conferences, trade shows and other events virtually and in person. The first example of embracing the hybrid format for a conference was the 2022 Landscape Summit. This time the conference offered in-person presentations and streamed the talks for remote attendees. This event was well received with positive comments, which culminated in research and Extension talks centered around the Future Urban Landscapes (FUL) topic that we have been facilitating for several years. Municipal water demand, such as landscape irrigation, is projected to double in the next 50 years. In some of the most intensely developed areas of the state, water supplies are almost fully allocated. Thus, reducing landscape irrigation is a primary approach to address the problem.

We are working with the development industry make significant landscape changes such as unirrigated back yards and adopting Florida-Friendly Landscaping practices. Our CLUE faculty are central to many of these efforts to change conventional landscaping to less resource intensive and more ecologically minded

outcomes. In this annual report you'll read about the many efforts tackling this problem.

Other areas of research and Extension education programs highlighted this year includes training for both citizen science and professionals, hosting an urban forestry conference in Florida for the first time, a National Science Foundation funded project to understand and educate on water quality dynamics of the ubiquitous stormwater ponds in urban developments, and a new agricultural education program that engages growers with a competition to see who can be the most efficient and/or most profitable with the implementation of water quantity and quality Best Management Practices.

Our UF/IFAS Extension Florida Master Gardener Volunteer (MGV) program hosted its 38th Advanced Training Conference and early in the planning phase we decided to offer a virtual option. While this option is not easy and carries additional expense, it was popular with half the attendees selecting it. In addition to the in-person education, CLUE had more than 7,700 MGV, FFL and BMP webinar attendees this year which was part of the more than 23,000 people educated through various CLUE programs this year.

Finally, the Florida-Friendly Landscaping program increased marketing of the program via the popular Flip my Florida Yard TV show. This program celebrates its 30-year anniversary this year designed to promote ecologically minded landscapes that conserve water, protect water quality and promote biodiversity.

CLUE has achieved much this year, but more hard work is needed. Luckily, here at CLUE no one is afraid of getting their hands dirty in order to find a solution.

A handwritten signature in blue ink, appearing to read "Michael D. Dukes". The signature is fluid and cursive, with a long horizontal stroke at the end.

Michael D. Dukes
Director

Message from the SVP



Just before the UF/IFAS Center for Land Use Efficiency's first in-person Future Urban Landscapes meeting since 2019, the headlines reported that Florida is the nation's fastest growing state and had added more than 1,000 people a day in the past year.

If the Center's mission weren't already urgent enough, the news helped focus the meeting on the challenge that CLUE was formed to address: How do we accommodate millions more people on the same amount of land and with limited water resources?

That's not a single specialist's job. But specialists are what we start with. We differ from one another by department, discipline, and geography. When I sat with CLUE affiliate Bryan Unruh at the end of the first day of the meeting, he even talked about the arbitrary lines we draw to carve Florida into regions for the purpose of soil testing.

And that's just us in academia. CLUE faculty member Basil Iannone spoke at the meeting of the other numerous and sundry players

who influence what our yards look like: homeowners, HOAs, government agencies, trade associations, non-profit organizations, businesses and more.

CLUE assembles researchers and Extension faculty with the multidisciplinary expertise needed to address the complexity of creating a more sustainable future. Its diverse affiliate faculty unite around the state to collaborate on publishing papers, seeking grants, securing personnel, and generating educational resources. Throughout the year the Center also interfaces with the agencies and industry for reality checks that keep scientists' work relevant. It's a bridge from academia to the real world.

You'll find in these pages example after example of ways the Center brought together scientists and other players in the lawn-and-landscape-focused community as well as the agricultural industry to try to improve not just present-day Florida but how to make life better for millions more future Floridians.

A handwritten signature in black ink that reads "J. Scott Angle". The signature is written in a cursive, flowing style.

J. Scott Angle

Senior Vice President of Agriculture and Natural Resources

CLUE Faculty, Affiliates, and Staff: Interdisciplinary, Collaborative, and Innovative

CLUE Faculty

Michael **DUKES**

CLUE Director, Agricultural & Biological Engineering,
Water Conservation & Irrigation

Andrea **ALBERTIN**

Water Resources Regional Specialized Agent

Eban **BEAN***

Agricultural & Biological Engineering, Urban Water
Resources Engineer

Catherine **CAMPBELL**

Family, Youth & Community Sciences, Community
Food Systems

Gail **HANSEN***

Environmental Horticulture, Sustainable Landscape Design

Basil **IANNONE***

Forest, Fisheries and Geomatic Sciences, Geospatial

Pierce **JONES**

Director, Program for Resource Efficient Communities

Hayk **KHACHATRYAN**

Food & Resource Economics, Horticulture Economics

Ryan **KLEIN***

Environmental Horticulture, Arboriculture

Andrew **KOESER**

Environmental Horticulture, Landscape Management

Lisa **KRIMSKY**

Water Resources Regional Specialized Agent

AJ **LINDSEY**

Environmental Horticulture, Urban Turfgrass Management

Mary **LUSK**

Soil & Water Sciences, Urban Water Quality

Chris **MARBLE**

Environmental Horticulture, Invasive Weed Management

Chris **MARTINEZ**

Agricultural & Biological Engineering, Water
Resource Management

Craig **MILLER**

Program for Resource Efficient Communities, Energy &
Water Efficiency

Esen **MOMOL**

Director, Florida-Friendly Landscaping™ Program

Paul **MONAGHAN**

Agricultural Education & Communication, Community Based
Social Marketing

Don **RAINEY**

Water Resources Regional Specialized Agent

AJ **REISINGER***

Soil & Water Sciences, Urban Soil & Water Quality

Jennison **SEARCY KIPP**

Sustainable Floridians(SM) Program, Communities State
Specialized Agent

Lakesh **SHARMA***

Soil & Water Sciences, Director, Agricultural BMP Program

Sudeep **SIDHU**

Water resource Regional Specialized Agent

Nick **TAYLOR**

Program for Resource Efficient Communities, H₂OSAV State
Specialized Agent

Laura **WARNER**

Agricultural Education & Communication, Social Marketing &
Program Evaluation

Wendy **WILBER**

Florida Master Gardener Volunteer Program State
Specialized Agent

Yilin **ZHUANG**

Water Resources Regional Specialized Agent

*Indicates the Principal Investigator for one of the projects featured in
this year's Annual Report.

Affiliated Faculty

Michelle **ATKINSON**

Manatee County, Urban Horticulture

Lynn **BARBER**

Hillsborough County, Urban Horticulture

Haimanote **BAYABIL**

Agricultural & Biological Engineering, Hydrology

Taylor **CLEM**

Nassau County, Landscape Design

Adam **DALE**

Entomology & Nematology, Landscape Entomology

Zhanao **DENG**

Environmental Horticulture, Plant Breeding

Erin **HARLOW**

Columbia County, Environmental Horticulture

Mark **HOSTETLER**

Wildlife Ecology & Conservation, Biodiversity

Kevin **KENWORTHY**

Agronomy, Turfgrass Breeding

Jason **KRUSE**

Environmental Horticulture, Sports Turf Management

Emma **MATCHAM**

Agronomy, Nutrient-Cycling Agroecologist

Tina **MCINTYRE**

Seminole County, Florida-Friendly Landscaping™

Matthew **ORWAT**

Washington County, Urban Horticulture

Brian **PEARSON**

Environmental Horticulture, Landscape Management

Vivek **SHARMA**

Agricultural and Biological Engineering, Precision Water Management

Bryan **UNRUH***

Environmental Horticulture, Urban Turfgrass Management

Sandy **WILSON**

Environmental Horticulture, Ornamental & Invasive Plants

CLUE Staff

Rebecca **CLAPP**

Communications Manager

Melissa **FRIEDMAN**

Research Coordinator

Natasha **ROBERTS**

Science Communicator

Jennifer **SYKES**

Communications Manager, Digital Platform

Florida-Friendly Landscaping™ Staff

CJ **BAIN**

FFL Website & Information Tech Coordinator

John **BOSSART**

FFL Extension Program Manager

Marc **CELESTIN**

GI-BMP Regional Coordinator

Carol **KAVALAN**

IT Architect

Claire **LEWIS**

Florida-Friendly Communities Statewide Coordinator

Jen **MARVIN**

FFL/FYN Statewide Coordinator

Cesar **PERALTA**

GI-BMP Regional Coordinator

Barry **SAWICKI**

FFL/GI-BMP Program Assistant

Lyn **WARD**

FFL/GI-BMP Program Assistant

Tom **WICHMAN**

FFL Assistant Director and GI-BMP Statewide Coordinator

Program for Resource Efficient Communities Staff

David **BEARL**

Chef, Local Food Systems and Culinary Educator

Lynn **JARRETT**

Water Resources Engineer

Lesly **JEROME**

Energy Programs Research Assistant

Kaitlin **ROBB PRICE**

H₂OSAV Project Manager

Bradley **SPATZ**

H₂OSAV Computer Scientist

Graduate Students: Working on CLUE Research



2 MS **10** PhD
Agricultural and
Biological Engineering

+

4 MS **7** PhD
Agricultural Education
and Communications

+

1 MS **1** PhD
Agronomy

+

1 PhD
Biological and Agricultural
Engineering, North Carolina
State University

+

1 MS **1** PhD
Design, Construction,
and Planning

+

1 PhD
Entomology

+

8 MS **14** PhD
Environmental Horticulture

+

1 PhD

Food and Resource Economics

+

1 MS

Food Science and Human Nutrition

+

3 MS **5** PhD

Forest, Fisheries and
Geomatics Sciences

+

2 MS **1** PhD

Interdisciplinary Ecology

+

8 PhD

Natural Resources and Environment

+

23 MS **15** PhD

Soil, Water, and Ecosystem Sciences

+

1 MS

Wildlife Ecology and Conservation



45 MS **65** PhD
TOTAL Graduate Students

Landscapes Reimagined: Private-Academic-NGO Collaboration Driving More Environmentally Responsible Land Development Practices

In 2020 Tavistock Development Company approached the Program for Resource Efficient Communities seeking strategies to protect lakes and conserve water in Sunbridge, a 33,000-home, multi-decadal development project. What has emerged are two living laboratory studies aimed at testing the costs and benefits of no-mow, native plant-dominated landscapes as a proposed strategy for protecting water resources. Collaborators include, UF/IFAS, Lake and Osceola County Extension, University of Central Florida, Cherrylake, LifeSoils, the Sunbridge Stewardship District, and The Nature Conservancy Florida Chapter.

Native plant species generally do not require fertilizers or irrigation beyond establishment. However, establishing these species in degraded, compact development soils is difficult. The first living laboratory study is integrated into an ornamental native plant Boundary Planting at the entrance to Sunbridge. This study aims to

identify irrigation and soil compost strategies to overcome establishment barriers. This experimental site is well suited for educating visitors about native plant landscaping.

Tavistock liked the Boundary Planting so much that they persuaded builders to install native plant dominant landscapes in 12 model homes in Sunbridge's first neighborhood, Weslyn Park. This neighborhood is located near to both Del Webb, a community with turf-dominated landscaping, and the Split Oak Nature Preserve, providing an opportunity for a second living laboratory study- a comparison among these land covers.

These studies feature the work of five graduate and undergraduate students. Their work is looking at the effects of these landscapes on pollinators, soil health, food webs, irrigation, chemical inputs, and labor. One student project will also use the findings from these studied

to educate UF/IFAS Extension Clientele from across the state. The proposed next step for this research is field data collection and hydrological modeling to quantify the effects of these landscapes on watershed-level nutrient loading. Project collaborators Cherrylake and LifeSoils are helping to collect the data on irrigation, soils, and landscape maintenance.



These collaborations have yielded many impacts. Project partners noted many pollinators and arthropods in the native-dominated landscapes, but further study is needed. They also found soil compost amendments triggered multi-trophic effects, leading to improved plant health, flower production, and increased pollinator diversity and abundance. The

developer now uses compost in all common areas and in verges between yards and roads. CLUE researchers estimate a \$52 a month reduction in water bills for homeowners having native-dominated landscaping. TOHO Water Authority, seeing these benefits, funded replacement of irrigated turf in verges with more drought-tolerant, ground covers. Developers also adopted drought-tolerant Bahiagrass-mowable ground cover mixtures in common areas and turf-free and mostly native landscaping in the yards of the first development phases.

These living laboratory studies were the focus of the 2022 OUTSIDE Collab. This annual event brought together over 100 leaders in urban planning, landscape architecture, land development, government, and green industry. All of these groups are eager for feasible strategies to mitigate the environmental impacts of expanding urban landscapes. The Extension Agents who attended this event convinced Sunbridge of the need both to master manage landscaping in future neighborhoods and for HOA codes that prevent



homeowners from replacing landscapes with more resource intensive options. These actions will facilitate the development of effective landscape management practices while minimizing landscaping mistakes by homeowners.

Based on UF/IFAS irrigation and fertilization recommendations for common turfgrass varieties and average landscaped areas of Weslyn Park lots, this alternative landscaping style in the first 300 homes will decrease nitrogen inputs by 3,000 to 9,100 lbs. per year, irrigation by 39,000 to 146,300 gal per day, and atmospheric carbon dioxide inputs by 93,800 lbs. per year. These impacts will be 100 times greater should full buildout occur.

By quantifying the costs versus benefits of reduced impact landscaping strategies, these living laboratory studies are providing the data needed to build the business case for shifting the landscaping paradigm in future developments.

Mixing It Up: Alternative Landscaping Research Shows Promise

Projections indicate that by the year 2070, more than one-third of Florida's land will be developed. Development brings additional impervious surfaces, like roads and parking lots, and their negative impacts. It also brings more turf-dominated landscapes that can have potential environmental implications like increased water use for irrigation, increased pesticide and fertilizer inputs, and increased maintenance. Yet, eliminating turfgrass from the landscape may adversely impact water filtration, nutrient cycling, and carbon storage.

Researchers in CLUE believe a solution to this challenge could be the development of

alternative landscaping. They're working to create landscape alternatives that integrate improved legumes such as mimosa and peanuts species into turfgrass and native forb systems. These new landscapes have the potential to reduce input requirements while increasing ecosystem services like water filtration, nutrient cycling, carbon storage, biodiversity conservation, and biological pest regulation.

The performance of these mixed-species landscape plantings is under evaluation at the UF/IFAS West Florida Research and Education Center near Pensacola. CLUE faculty are conducting experiments with variety of goals

including maximizing the aesthetics while minimizing water and fertilizer inputs, reducing nutrient runoff into groundwater, determining the benefits to wildlife, and assessing the likelihood of the industry to utilize this new approach. (See graphic for more details).

Early results are promising and suggests that a combination of turf and peanut species can better conserve irrigation water and that using living groundcover can increase the soil organic matter after a year. (See full early results below) However, these results do not suggest how accepting people will be of alternative landscaping. That will likely depend on the performance of the landscape, the aesthetic value, and the willingness of people to cross social norms.



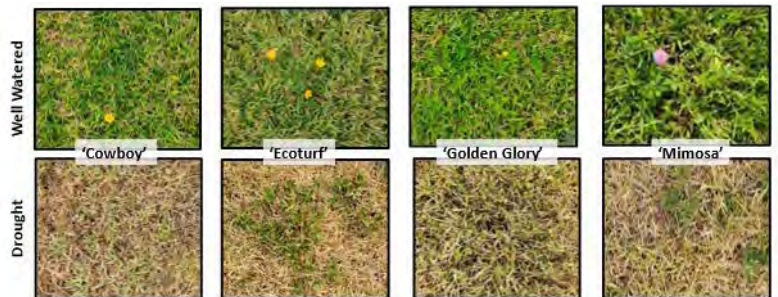


Alternative Landscaping Research Goals:

- Maximize aesthetics and minimize water and fertilizer inputs
- Quantify the groundwater impact via nutrient leaching of turfgrass removal and conversion to mixed-species landscapes
- Determining the correlation between water use and temperature abatement, soil volumetric water content, and leaching volumes (i.e., ground water recharge)
- Assess mixed-species landscape acceptance by professional landscapers, gardening enthusiasts, and consumers
- Quantify pollinator activity and crawling arthropod community
- Document the effect of lawn conversion on soil bulk density, soil carbon, soil organic matter, and soil nitrogen

Early Results Suggest the Following:

- Due to the lower winter tolerance, drought response, and mix stability of the stoloniferous legumes, the rhizomatous types appear to be a better option for conserving irrigation water.
- The non-living groundcover (i.e., mulch) has the highest leaching volumes whereas the forb mixture had the lowest.
- The higher leachate volumes and nitrogen concentrations in the mulch resulted in higher nitrogen leaching loads.
- Total carbon was greatest in the Peanut + Turf mix, followed by the forb mixture. After one year, soil organic matter increased in plots with living ground covers but not in the mulched plots.



- In a greenhouse study, the forb mixture had the highest water use followed by the Peanut + Turf and Turf only which did not differ from each other.
- The traditional turfgrass lawn had the least variability in visual quality over time compared to the forb mixture and the peanut + bahiagrass.
- The forb mixture had the greatest pollinator visits and biodiversity. However, various pollinators and beneficial insects were observed in the turfgrass and peanut + turfgrass plots including syrphid flies, bumble bees, and damselflies.

The People and Ponds Project: Understanding How Perception Can Impact Management and Function for Stormwater Ponds

Florida is full of stormwater ponds. From the Panhandle to the Keys, UF/IFAS CLUE researchers estimate that more than 76,000 stormwater ponds dot the Florida landscape. According to CLUE social scientist Dr. Laura Warner, Florida residents who use fertilizer are more commonly exposed to stormwater retention ponds than any other body of water.

These ponds serve a variety of functions. They play a key role in helping to control flooding and reducing sediment and nutrient export from urban areas. Although not their intended purpose. Ponds are also often designed and maintained to provide aesthetic appeal to the neighborhood. The economic value often associated with the property around stormwater ponds could be contributing to these aesthetic expectations. These

expectations can be a cause for concern if they impact how the stormwater ponds function in the environment.

Beginning in May 2023, the People and Ponds project will bring together a team of CLUE researchers to investigate how communities and state agencies view stormwater ponds in an effort to understand how the perceptions of these various groups can influence pond management and function. The goal is to gain a better understanding of the natural processes occurring within these ponds and how these processes affect and are affected by community perceptions. Through this work, the project team will develop new strategies, tools, and approaches for managing ponds, and the people who live near them, to optimize the benefits these ponds provide to people.



The team will focus on two specific Florida communities with 10 ponds in each community. These 20 ponds will be the focus for in-depth research, but the project will also conduct statewide surveys to expand these results throughout Florida. In each community, the team aims to partner with a local K-12 educator and local Extension connections to incorporate community science opportunities into the project. This aspect of the project will expose youth to scientific research happening, sometimes literally, in their back yards. Using what they learn through this work, the team will update the *Florida-Friendly Ponds* program and will develop multiple Extension products related to stormwater pond functioning, social marketing, algal management, and other relevant topics.

The project is funded by the Dynamics of Integrated Socioenvironmental Systems (DISES) program within the National Science Foundation (NSF) and CLUE was fundamental in the success of this proposal. The supportive community within CLUE led to the formation of the interdisciplinary

team on this project. CLUE has also provided resources to conduct pilot studies of stormwater pond water quality benefits and is supporting the research and extension missions of the project team. In particular, CLUE Research Coordinator Melissa Friedman served as a facilitator by helping to shepherd this proposal to submission at various points in the process. She was instrumental in getting this project off the ground.

The project team is looking to add multiple graduate students, postdoctoral researchers, and local partners across the state. These partners will facilitate and coordinate sampling of local stormwater ponds, connections with local communities, and advising on Extension needs regarding stormwater pond management.

To get involved in the People and Ponds Program, contact Dr. AJ Reisinger at reisingera@ufl.edu



UF/IFAS Research estimates there are more than **76,000** stormwater ponds in Florida

Making It Easier to Maintain Green Stormwater Infrastructure

Green Stormwater Infrastructure (GSI) are structures or vegetated areas that are integrated into developed landscapes to manage increased runoff volumes and pollutants that result from urban development. These structures include bioretention or rain gardens, cisterns or rain barrels, pervious pavements, tree boxes, swales, and greenroofs. These practices are generally smaller and more abundant than conventional stormwater ponds and can do a better job at treating the effects of runoff. While these practices have been around for decades or longer, they are still considered novel for managing stormwater in Florida. One of the main obstacles to broader implementation of GSI has been a lack of maintenance capacity, which comes down to the right personnel with right knowledge.

In 2022, CLUE faculty member Dr. Eban Bean teamed up with Claire Lewis from the Florida-Friendly Landscaping program to

develop a training program for GSI Maintenance. This training program is funded through the Florida Department of Environmental Protection and intended for the landscape industry. As GSI are part of the urban landscape, the goal of the program is to enable professionals that are already in these landscapes to be able to inspect and maintain stormwater infrastructures that will become more common.

Unlike the rest of the landscape, plants in GSI must be able to tolerate a wider range of conditions. For example, they need to be able to survive being flooded for a few days, while also enduring long periods without water during dry parts of the year. As a result, Bean and Lewis worked with CLUE faculty experts to develop a list of plants for use in each type of GSI practice based on the unique GSI conditions. This provides a range of options for designers to select plants that meet both the aesthetic and functional goals of a site.



Example of Potential Issues



5, 8 Inlet debris



10 Inlet vegetation



17-21 Veg. maintenance



12, 14 Erosion & mulch



Well Maintained



28 Trash & debris



12 Mulch



25, 28 Trash & debris



20, 30 Replanting



20, 30 Replant



25 Outlet debris



11, 26 Extended ponding



25, 26 Outlet ponding

These plant lists are part of a manual, “GSI Maintenance and Plant Manual”, that was also developed to introduce the different types of GSI, guide plant selection, planting, and maintenance of vegetation within GSI. An inspection checklist was also developed for each type of GSI, with a detailed list of questions to evaluate whether maintenance is needed along with example photos to help the user. (See graphic for additional details) These are being converted over to a mobile app based so professionals can complete inspections on a tablet or smart phone to track past inspections. The manual also includes an appendix for plant selection and comparison with information on over 100 plants and GSI suited for them, along with a wide range of selection considerations, including spacing, size, and planting regions.

The training for this program is one day, consisting of a morning classroom portion and an afternoon

field module. The classroom portion includes seven modules that introduces attendees to the different types of GSI, their functions, inspection steps and resources, maintenance practices, and general field safety. The field module is a hands-on training where trainees apply their knowledge and resources, such as the GSI inspection sheet, to inspect and evaluate multiple types of GSI in the field.

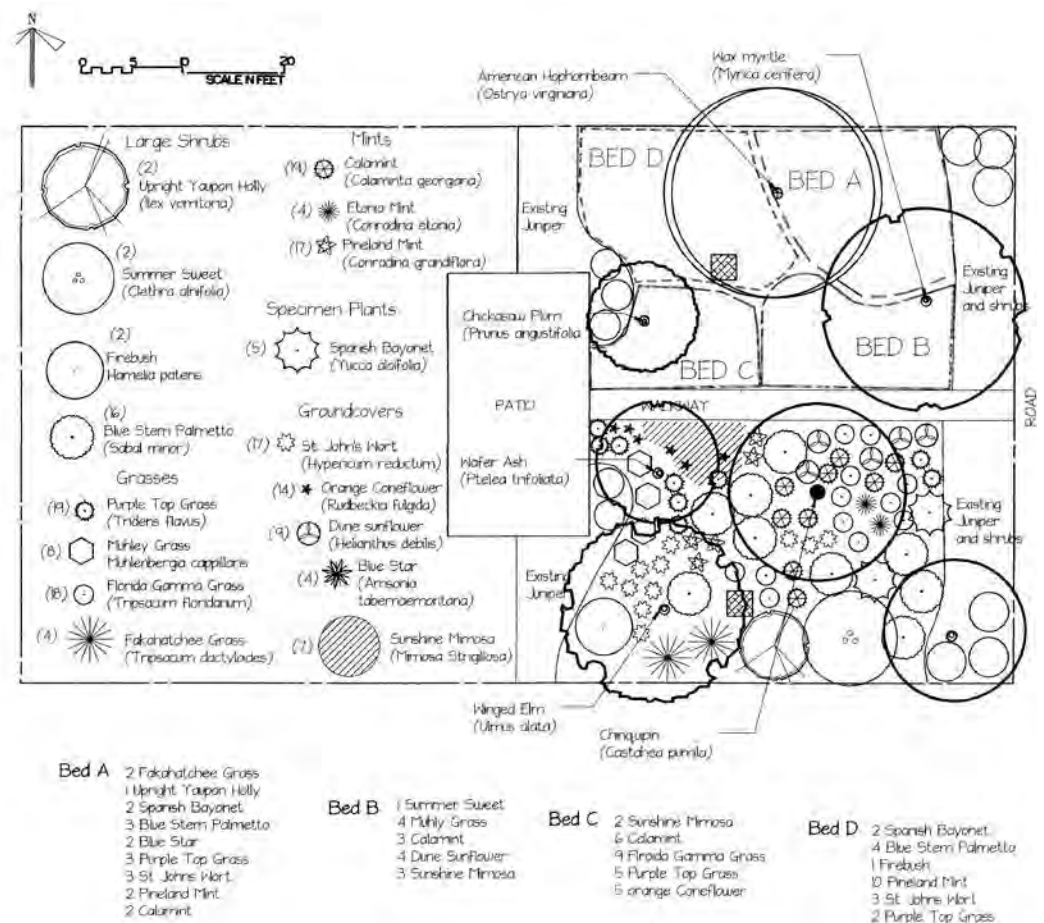
Two pilot trainings for the GSI Maintenance program were held during the project. One was held on July 15, 2022, in Deland, FL, and on August 30, 2022, at in Plant City, FL. It is expected that the program will expand to become available statewide in 2023 as UF/IFAS Extension agents are trained to deliver this training.

Naturally Designed Landscapes: Investigating Alternative Approaches for Designing and Installing Ecology-Based Landscapes for Urban Residential Lots

Landscape designs that draw from natural ecology can have benefits for both humans and the environment. These non-traditional designs can evolve and thrive with fewer inputs, while providing ecosystem services to people and wildlife.

Ecology-based designs that mimic nature often have complex plant arrangements and varied plant palettes which are more challenging to design, draw and install than traditional designs. The goal for Phase I of this project was to develop a simple method for drawing complex plans to encourage more developers to use ecological designs by reducing their design and installations costs. In Phase I the project team

developed non-traditional or alternative graphic plans for three research plots. In Phase II, the team hired three different landscape contractors to install the plans. The contractors were interviewed after installation to learn about the ease and/or difficulty of installation when using the non-traditional plans. These open-ended interview questions revealed a variety of issues. Discussions included the supervisors and crews' familiarity and experiences with using planting plans that don't specify exact plant placement. Those individuals with design experience were more comfortable with the plans, while others compared it to making field adjustments. Respondents also provided suggestions



to facilitate the use of alternative plans and discussed their familiarity with native plants and their use of natives in their own landscape practices. They also mentioned concern about the availability of native plants along with their views on their customers' preferences, and the concerns and preferences of developers regarding ecological landscape design in new subdivisions. The native plants in the plots have thrived except for some damage from deer scraping their antlers on trees and lying in the grasses. To address some of these concerns, the project team developed a project deliverable in the form of a comprehensive database with native and FFL plant information, including availability, habitat needs, companion plants, and wildlife benefits.

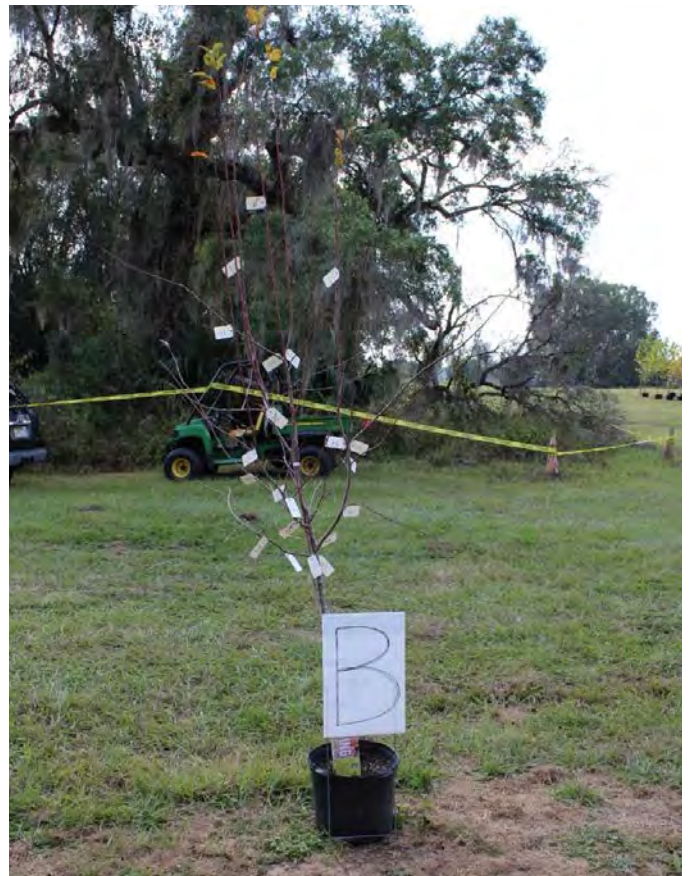
In Phase III, students from a landscape design course were taught the alternative method and interviewed about the challenges of drawing plans that differ from the traditional method they were previously taught. The student plans and interview data will be analyzed, and there are plans to repeat Phase III with a class of advanced students. By working these students, the team hopes to be able to expose the next generation of landscape designers to ecology-based designs so they will be better prepared and more likely to use them in the future.



Making the Correct Cut: Urban Forestry Stewardship Program Teaches Volunteers How to Prune Properly

In the fall of 2021, Hunter Goan began working on a project with UF CLUE faculty Dr. Ryan Klein, Assistant Professor of Arboriculture aimed at training volunteers how to structurally prune young trees. As a master's student in the Klein Arboriculture Lab, his goal was to develop a local urban forestry stewardship program with the hopes of taking it statewide. Klein knew a program to ensure that newly planted trees are maintained while establishing in the landscape could benefit public health and safety as well as local municipalities. Similar volunteer efforts have focused on conducting tree inventories, planting trees, and documenting invasive species. Yet, little is known about the ability of untrained people to structurally prune young trees.

On November 3, 2022, a pruning workshop was held at the Arboriculture Lab in Gainesville, with 28 participants in attendance. The volunteers were given a pre-test with test trees and sketches, along with a survey prior to the classroom/outdoor training. To standardize the exams, the branches of two young trees were numbered and participants were asked to write down the numbers of all the branches they would like to prune. This way, participants could be tested on the same trees and the results could be compared. After the pretest, participants were interviewed to gain a better understanding of the logic behind their pruning strategy. Additionally, they were provided with two different tree sketches and asked to draw lines on the branches they would prune. Lastly,



they filled out a survey which was aimed at better understanding their previous pruning knowledge. Following the training session, the participants were given another survey and post-test as well as interviewed to assess the knowledge gained from attending the workshop.

Prior to the training, participants scored an average of 61-percent on the exam. After the training, the scores improved to 82-percent. Similarly, when participants were interviewed following the second training session, their pruning strategies were more in line with structural pruning objectives, and they had a better understanding of the associated terminology. As part of the project, the lab has partnered with the City of Gainesville's Urban Forestry Department and are planning on having several pruning events in 2023. The volunteers that attended these workshops will be able to help the city maintain young trees planed around the community. Programs such as these can be a way of bringing community members together to assist with the pruning needs of a municipality. Klein and Goan hope to partner with other cities in the future and looks forward to educating more Florida citizens on how they can help protect the young trees in their community.



In a pre-test,
31%
of participants thought that
topping a tree was
an appropriate form of
structural pruning.

After the training,
0%
of participants viewed
this as acceptable pruning.

Master Gardener Volunteer Advanced Training Conference Attend by More Than 400 Gardening Volunteers

Every two years, the UF/IFAS Extension Florida Master Gardener Volunteers (MGV) are invited to attend a statewide conference and advanced training. Prior to the pandemic, the conference was usually attended by 400 Master Gardener Volunteers wanting to network and learn about the latest horticulture advances. For the first MGV state conference since the pandemic, organizers knew they would need to add an online learning option for the volunteers who would prefer not to be in large crowds or not travel. During the pandemic the Florida Master Gardener Volunteers adapted very quickly to learning through Zoom and streaming presentations, so many were expected to opt for the online option. What no one expected was for 50-percent of conference attendees to choose the online option, but organizers were thrilled that the Master Gardener Volunteers did.



Over 400 volunteers attended the 38th Advanced Training Conference held in Kissimmee, Florida on October 17-20. The hybrid format of the conference allowed attendees to learn in person or online via the live streaming option for the sessions. All the Master Gardener Volunteers responding to the exit survey reported gaining a high level of new knowledge.

The opening session featured Mississippi State University horticulture specialist Gary Bachman. His presentation on backyard food production wowed the crowd with how productive a backyard vegetable garden using containers could be. Bachman was available to sign his new book “Southern Gardening All Year Long”, following his inspirational talk. The closing session featured stars of the PBS television show called “Garden Fit”. The hosts Madeline Hooper and Jeff Hughes taught the group how to take care of their bodies while taking care of their gardens.



The Dean of Extension, Dr. Andra Johnson, presented at his first Florida Master Gardener Volunteer conference to address and inspire the volunteers. Johnson also presented the 11 Awards of Excellence and the Master Gardener Volunteer Legacy Award.

The conference committee was made up of UF/IFAS Extension agents David Austin, Anne Yasalonis, David Outerbridge, Sally Scalera, Eva Pabon, Lisa Sanderson, Kaydie McCormick, Jeremy Rhoden. They planned three concurrent tracks focusing on food systems, Florida-Friendly Landscaping™, and advanced diagnostic topics.

One of the highlights of the conference was the hands-on workshops. Participants made a shiitake mushroom log or a kokedama planter or learned garden yoga. They also drank tea and learned about its production from the Yaupon Brothers tea company. The silent auction hosted by UF/IFAS Extension Highlands County helped to raise funds for the Master Gardener Volunteer awards. This year the conference was sponsored by Florida-Friendly Landscaping™, CLUE, Black Kow, Scotts Miracle Grow, Mister Landscaper, and the UF/IFAS Extension Bookstore. The next Master Gardener Volunteer conference is planned for fall of 2024.



Welcoming New Center Faculty

Dr. Sudeep Sidhu



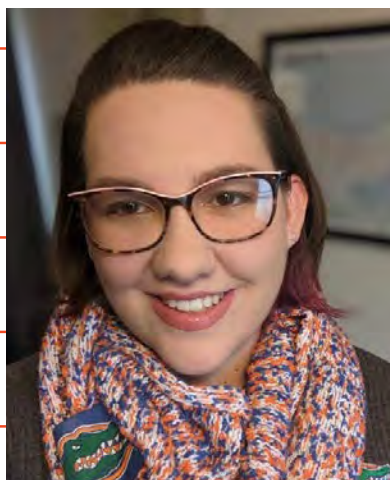
Dr. Sudeep Sidhu joins CLUE as a UF/IFAS Extension Regional Specialized Agent in Agricultural Water Management.

Dr. Sidhu works out of the North Florida Research and Education Center Suwannee Valley where he

focuses on developing BMPs for farmers to optimize nutrient and irrigation water use. His research team maintains a rotational crop study demonstration farm where they study the impacts of different cropping systems on

groundwater quality, nutrient cycling, and nitrate leaching. The goal is to use technology like drain gauge lysimeters and deep core soil sampling to show farmers the benefits of integrated crop-livestock and alternative cropping systems that use cattle, bahiagrass, row crops, and vegetables. He is developing on-farm tools and to give growers the power to help protect water quality and quantity. Sidhu says he joined CLUE to share the impacts of precision ag. techniques and resilient cropping systems on nutrient and water use efficiency in FL. He is excited about working with IFAS faculty, regulatory agencies, and local commodity groups to help Florida farmers find solutions that keep them in business while protecting and conserving the state's natural resources.

Dr. Emma Matcham



For Dr. Emma Matcham, the goal of her work is to improve the resiliency of agronomic crop production systems while reducing environmental risk as the climate changes. Matcham is an assistant professor in the

Agronomy department and a new member of CLUE. Her current research is studying how nutrient cycling within agroecosystems can improve fertilizer management and

protect water quality across both farm- and watershed-scales. Two of her current research projects are using machine learning to analyze big data to study the relationship between potassium fertility and soybean yield and addressing manganese deficiency in peanut



through foliar fertilizer application. She also prioritizes working with growers on their farms to accelerate the rate of agronomic research and to improve stakeholder confidence in new management recommendations. Matcham says working with CLUE gives her the opportunity to

do one of her favorite things-working as part of a collaborative and dynamic team to find solutions. She is excited to share the knowledge generated from her research with farmers and future generations.

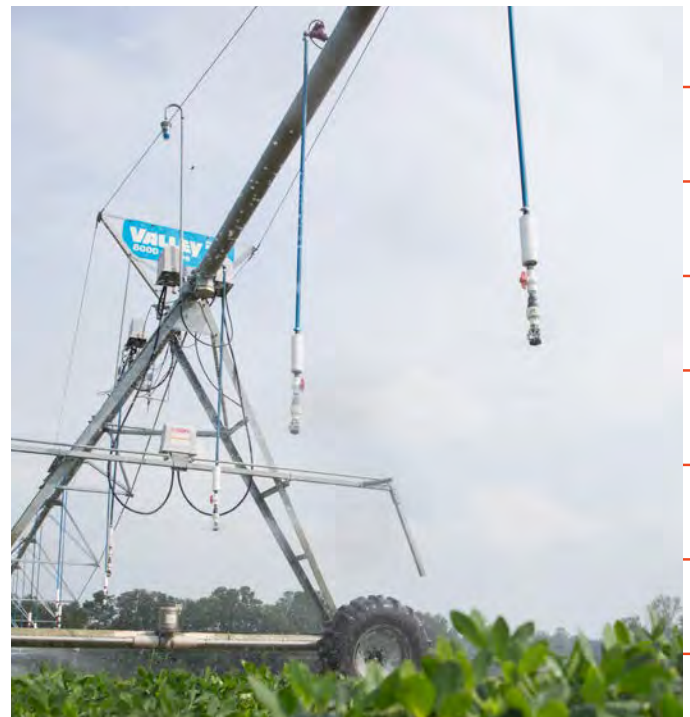
Dr. Vivek Sharma



Dr. Vivek Sharma comes to CLUE from the Agricultural and Biological Engineering Department where he is an assistant professor and precision water management specialist.

Sharma works to improve water use efficiency, reduce agricultural water use and reduce the impact of agricultural management practices on downstream water resources, quality, and users. His research ultimately considers the long-term water resources and agricultural sustainability and the balance between environmental impacts and BMPs. Emphasis is being given on agricultural water management at a systems level that includes spatial and temporal analysis and evaluation of integrated irrigation and fertilizer management, water demand and supply. The study area of precision water and nutrient management holds enormous potential in terms of quality research to address several

water quality and quantity issues. Sharma believes that the agricultural water and nutrient management is a collaborative endeavor and is becoming increasingly crucial as agricultural community faces demographic, economic, land-use, and climate changes manifesting. The Center of Land-use Efficiency (CLUE) provide a great collaborative multidisciplinary platform to address these issues and he is excited to get the opportunity to work with CLUE members while he works bring the latest information to the agriculture community.



Protecting Florida One Landscape at a Time: Florida-Friendly Landscaping™ Celebrates 30 Years



This new year of 2023 signals the beginning of a year of celebration for the UF/IFAS Florida-Friendly Landscaping™ (FFL) Program. For 30 years, the FFL program has been the premier Extension program

for ecologically sustainable, science-based landscape practices that conserve water, protect water quality, and promote biodiversity. To mark this milestone year, FFL and its longstanding program partner, the Florida Department of Environmental Protection (FDEP), are kicking off a year-long anniversary celebration to inspire continued FFL public outreach to engage with an ever-expanding target audience.

Since its start in 1993 in the Tampa Bay area, FFL has grown and evolved into a statewide program that is active in most of Florida's 67 counties. The program has been continuously funded by FDEP throughout these 30 years and remains a valued partner as the FFL program works to provide water resource protection. FFL focuses on both water conservation or water savings and reducing non-point source pollutants by reducing the use of fertilizer and pesticides. These inputs may otherwise be carried into the state's water bodies via runoff and/or leaching into groundwater, including groundwater that feeds springs.

Originally named Florida Yards & Neighborhoods (FYN), FFL is now the umbrella for three programs with diverse target audiences: the FYN, Florida-Friendly Communities (FFC), and Green Industries Best Management Practices (GI-BMP). The FYN program continues to serve homeowners by providing guidance on residential landscape design, plant selection, and sustainable maintenance practices that minimize water, fertilizer, and pesticide use.

The FFC program targets homeowner associations, home builders and developers, and professionals such as landscape architects and community planners. By coordinating with these groups, FFC promotes bigger picture FFL

Florida-Friendly Landscape Program 2021-22 Impacts:

359,449,792
gallons of water saved.

Enough water to supply
4,085 households
with water for one year.

\$1,549,229
saved on utility bills.

applications and works to incorporate FFL design concepts into projects during the early planning stages. In addition, FFC works with homeowner associations to accommodate FFL in their landscaping covenants.

In addition to the target audiences of the FYN and FFC programs, the GI-BMP program serves as the outreach mechanism to landscaping professionals. The Florida legislature mandates GI-BMP training and certification for all professional landscapers who apply fertilizer commercially. Implemented through UF/IFAS Extension, courses are provided through in-person classes, online, or by DVD, with training available in English, Spanish, and Haitian Creole. Follow-up surveys conducted six and twelve months after course completion indicated most of these professionals incorporated the BMP methodologies into their standard procedures. Currently, UF/IFAS coordinates with some 260 active GI-BMP instructors and from October 1, 2021, through September 30, 2022, the program trained 4,727 persons through a combination of in-person classes and online and DVD-based formats. Of those people trained during that time, 4,036 received their GI-BMP certification. Since the inception of the GI-BMP training and certification program in 2006 and through September of 2022, 75,654 landscaping professionals have attended GI-BMP training and 63,861 received their GI-BMP certification.

The FDEP Total Maximum Daily Load (TMDL) Program provides a way to estimate FFL effectiveness in facilitating nitrogen removal from

nonpoint source pollutant loads to surface and ground waters. For 2021, FDEP estimated that FFL-related nitrogen reduction projects removed 119,564 pounds of nitrogen per year of pollutant loading to Florida's waters.

As the FFL program continues to grow, it is continuing its collaboration with FDEP and the television production company Crawford Entertainment to produce the third season of Flip My Florida Yard television show, which will debut on local PBS stations later in 2023. This reality-style show uses FFL yard design concepts to transform the front or back yard of a home landscape in just one day, with FFL staff providing the expertise and guidance behind the yard redesigns. The show provides a new way to educate millions of Florida residents about the FFL program and its nine principles, showcasing not only the endless possibilities that FFL can bring to creating a sustainable landscape but how much more the FFL program can accomplish in the next 30 years.

For more information on Flip My Florida Yard, go to: www.flipmyfloridayard.com

For more information on the 2021 Statewide Annual Report on Total Maximum Daily Loads, Basin Management Action Plans, Minimum Flows or Minimum Water Levels, and Recovery or Prevention Strategies go to : <https://floridadep.gov/dear/water-quality-restoration/content/statewide-annual-report>.



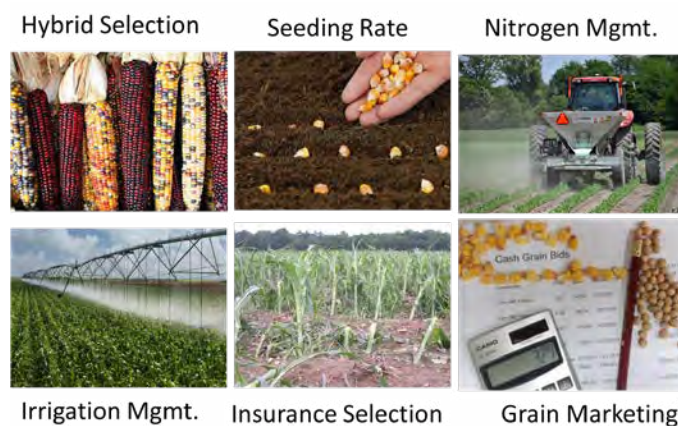
Florida Stakeholder Engagement Program (STEP): An Innovative Way to Optimize Agricultural Water, Nutrient, and Economic Efficiency

A new competitive program is bringing out the best in Florida farmers while educating them about BMPs. The Florida Agricultural Stakeholder Engagement Program (STEP) is a highly interactive farm-management competition that engages producers, the agricultural industry, researchers, and extension personnel in an efficient and profitable way to implement agricultural BMPs and technologies.

Research shows that BMPs are an effective way for growers to reduce the use of inputs that will save time and increase profitability. The challenge for CLUE researchers and the UF/IFAS Extension community is how to bring the information to the farmers who need it. Traditional Extension education formats can create resentment and distrust by placing researchers and farmers in teacher and student roles rather than allowing farmers to share their valuable feedback and making it less likely for them to accept and adopt the information from UF experts. STEP aimed to change that by developing a new way to communicate BMP information where no Extension personnel or industry evaluates different management strategies and tells/educates growers, but it is growers who engage in evaluation and learn by doing.

The program funded by the Florida Department of Agriculture and Consumer Services created the first irrigated corn management competition in 2022 at the UF/IFAS North Florida Research and Education Center Suwannee Valley. The competition brought together 10 teams, comprising 29 participants to compete for three awards categories - Most Profitable, Highest Input Use Efficiency, and Lowest Cost Per Bushel.

The teams included a variety of local farmers and industry professionals and a team of UF/IFAS specialists and Extension agents. Each team was assigned four random plots and provided strategic decisions ranging from selecting the crop insurance package, hybrid and planting population, irrigation management, nitrogen management, and finally the marketing of the grain, just as in any real-world farming operation.



The project management team at the research station conducted the actual physical management of the crop including the irrigation, application of chemicals, and harvesting, but their actions were determined by real-time decisions made by the competitors and submitted via secure online forms

STEP participants had the chance to use a range of farming technologies and BMPs including any commercially available soil moisture sensor, weather station, and drone imagery, and decided between traditional or controlled-release fertilizer. In addition, the project management team also collected soil samples, tissue samples, and took photos at regular intervals, and

provided them to participating teams for their decision-making. For many teams, the STEP provided an opportunity to test out BMPs and new technologies in a risk-free environment. With the ability to experiment, as well as access to comprehensive data on the results, growers can apply what they learn in the competition toward using inputs more efficiently on their own farms.

Furthermore, the STEP also offers the opportunity to with many agricultural professionals, including UF research specialists, Extension personnel, as well as industry leaders, and government state agency personnel.

The inaugural STEP competition was concluded in October 2022 with the awards ceremony. The event was a night of interaction and celebration. Awards were given in the three categories along with a cash prize of \$2,000, a plaque

and oversized check. In addition, an overall runner-up award was also given. Wyatt Jackson, Mallory Jackson, and Bill Jackson from Team Jackson Farm won the Most Profitable category. Ronald Norris from Team Columbia won both the Highest Input Use Efficiency and the Lowest Cost per Bushel categories. While BJ Wilkerson and Kelsey Wilkerson from Team Wilkerson Farms took home the Overall Runner-Up category (Table below).

The STEP corn competition was completed with success and now the project management team is preparing to begin the second year. The 2023 program will kick-off in March. For more information on participating in the competition or becoming a sponsor please contact Dr. Vivek Sharma at vsharma1@ufl.edu

Florida Stakeholder Engagement Program (STEP) – 2022 Corn Competition Results

Category	Winner	City	Hybrid	Planting Density	Irrigation (inches)	Nitrogen (lbs/ac)	Yield (bu/ac)	Net Return per acre (\$)	Cost per Bushel (\$)
Most Profitable	Team Jackson Farms: Wyatt Jackson, Mallory Jackson, and Bill Jackson	Live Oak, FL	Armor Seed 1477	34000	12.05	280	279	\$794	\$4.25
Highest Input-use Efficiency Lowest Cost Per Bushel	Team Columbia: Ronald Norris	Lake City, FL	Pioneer P2042YHR	32000	5.45	190	243	\$650	\$4.19
Overall Runner-up	Team Wilkerson Farms: BJ Wilkerson and Kelsey Wilkerson	Trenton, FL	AgriGold A6659VT2RDB	34000	8.45	210	241	\$672	\$4.46

Collaboration: A Driving Force for Resource Efficient Communities

With Florida's population continuing to grow by more than 900 people a day, it is critical to reduce the adverse impacts of new land development projects. Addressing this need, the Program for Resource Efficient Communities' (PREC) mission is to promote the adoption of best design, construction, and management practices that *measurably* reduce energy and water use and environmental degradation in Florida's master-planned community developments.

PREC has always valued collaboration as a keystone of our work in promoting sustainable development. Unlike traditional programs that target individual homeowners, PREC works with private landowners, real estate developers,

and land development practitioners, as well as non-traditional clientele such as Florida's water and energy service providers, Water Management Districts, and local governments. H₂OSAV and SF-BMP support these partners with measurement and verification of their sustainable development efforts. Developed and delivered in partnership with The Nature Conservancy Florida Chapter, the UF/IFAS Sustainable Floridians Benchmarking and Monitoring Program (SF-BMP) creates "living laboratories" for sustainability where we can simultaneously research urban development best practices and apply what we learn along the way to real-world projects through applied research and service agreements.

H2OSAV added a 15th utility partner, JEA, which provides utility services in Duval, Nassau, St. Johns, and Clay Counties. With the addition of their data, H2OSAV now has historical, metered water data for more than a third of Florida's population.

PREC was founded on the principles of cross-disciplinary collaboration, systems thinking, and applied research and outreach to holistically address Florida's rapid urban growth and associated environmental, economic, and social challenges. Decades later, the program continues to stand on these values, and we look forward to continued collaboration with our CLUE colleagues and external partners in 2023 and beyond.

Our work addresses and integrates across **four core areas:**

Land Development & Ecosystem Health (e.g., SF-BMP)

Water Quality & Quantity (e.g., H₂OSAV)

Energy Efficiency & Renewable Energy (e.g., continuing education on Energy Efficient Building Construction in Florida)

Community Resilience & Climate Adaptation ("Peril of Flood" Interlocal Agreements; National Extension Climate Initiative/NECI)



Master Gardener Volunteers Help Hand Out a \$2.3 Million Donation After Hurricane Ian

Master Gardener Volunteers from across Florida helped to spread some relief from mosquitoes to residents suffering after Hurricane Ian. They partnered with the Inzecto Company, UF/IFAS Extension offices, mosquito control districts and county parks and recreation center to distribute a UF designed mosquito trap. The traps offered some protection to residents in four Florida counties struggling with large mosquito populations due to floodwaters left behind by the hurricane's rain and storm surge.

The Inzecto Mosquito Trap is an easy-to-use, environmentally friendly, and effective mosquito-killing device. The Gainesville-based company donated 100,000 traps, valued at \$2.3 million, in October of 2022 to help residents in Orange, Lee, Charlotte and Collier counties. Designed to protect American soldiers serving overseas from insect-borne disease, the traps can provide protection and relief from mosquitoes after major weather events where there is limited or no power. They

also have no impact on beneficial insects like bees and other pollinators because non-target insects are not attracted to the traps.

More than 30 Master Gardener Volunteers turned out to help pass out the traps and teach residents how to use them. They were able to mobilize so many so quickly because of the established network of 4,000 volunteers that are part of the program. The Master Gardeners who participated say they are proud to have been part of the relief effort and hope to see Southwest Florida back in full bloom.

*This story is based on an article by Karen Dooley



In 2022...

3,221

Master Gardener Volunteers

628

New Volunteers Trained

303,417

Volunteer Hours Contributed
at a Value of almost

\$8.4 million

Funding Best Management Projects to Help Florida Farmers



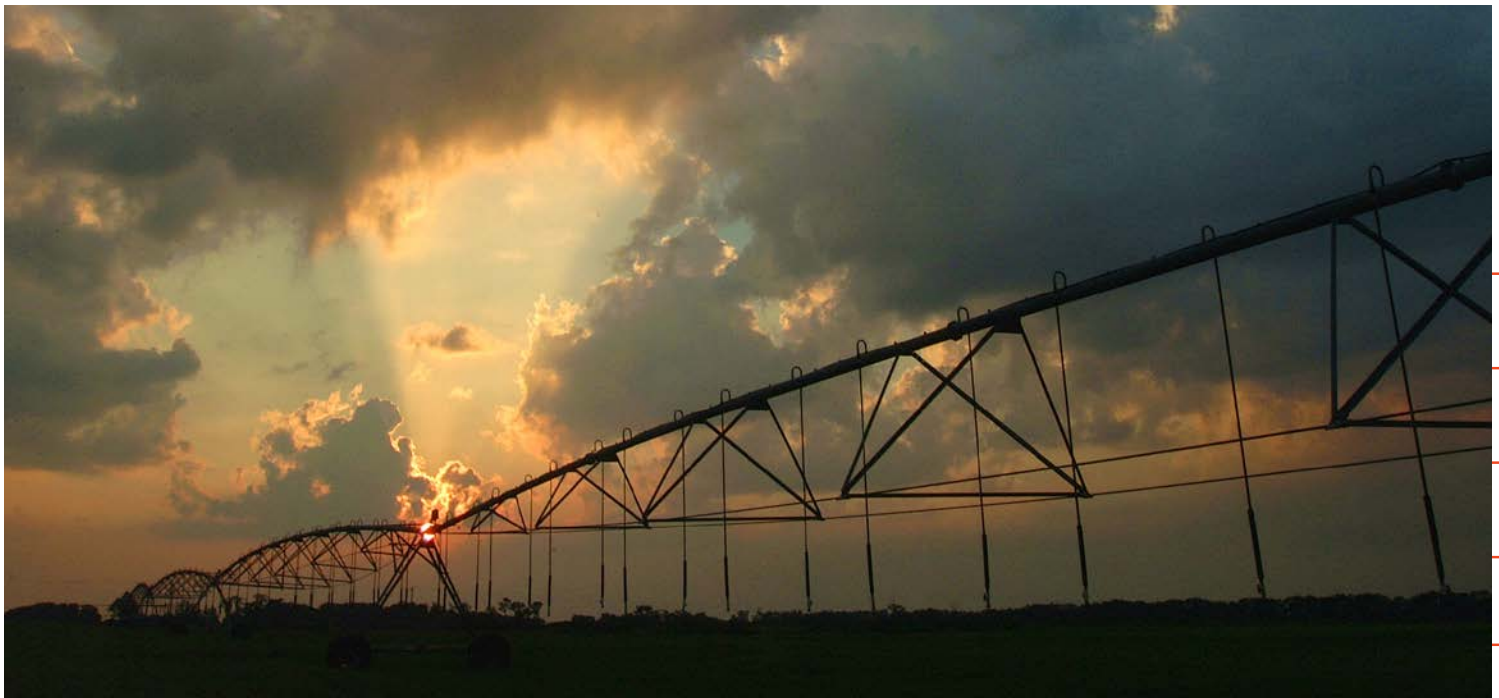
**AGRICULTURAL BEST
MANAGEMENT PRACTICES**

Partnering with the Florida Department of Agriculture and Consumer Services, UF/IFAS provided mini-grants to faculty working on projects related to agricultural Best Management Practices (BMPs). These mini-grants support efforts throughout the state and provide essential information to specific crop industries.

2022 FDACS Best Management Practices Mini-Grants

Title	PI	Co-Investigators
Minority and Indigenous Agriculture Producers Symposium (MIAPS)	Arnold, Donna	Jones, Robbie; Sprague, Danielle; Bolques, Alejandro "Alex"; Freeman, Josh
Petiole Sap Testing and Water Flow Testing Kit	Beach, Emily	Not Applicable
Integrated Pest Management BMP Demonstrations	Bearden, Jennifer	Carter, Ethan; Sprague, Danielle
Improving best management practices on small acreage livestock farms through pasture and nutrient management by implementing electric fences	Bosques, Jonael	Bainum, Caitlin; Yarborough, JK
Side-Dressing Pelletized Chicken Litter as an Efficient and Economical Fertilizer Application Method	Capasso, Jay	Morgan, Kelly; Bhadha, Jehangir
A Nitrogen Rate Comparison of Asian Vegetables – An Expanding Alternative Crop in St. Johns County	Fletcher, Evelyn "Prissy"	Wells, Bonnie; Sharma, Lakesh

Continued on next page



Title	PI	Co-Investigators
Integrating Cover Crops as a BMP for Improving Nutrient Cycling in Row Crop Production in Florida Panhandle	Johnson, Libbie	Singh, Hardeep; Carter, Ethan
Grazing Management Strategies to Increase Nutrient & Water Use Efficiency	Mauldin, Mark	Not Applicable
Year 2: Evaluating the Effects on Irrigation and Nutrient Efficiency in Sod Production Using Both Established and Advanced Next Generation BMP Technologies	Mussoline, Wendy	Unruh, Bryan; Lindsey, A.J.; Dinkins, David; Sharma, Vivek
Multi-County on-farm corn nitrogen rate demonstrations in parallel to ongoing corn rate trial research at NFREC-SV	Sidhu, Sudeep	Sharma, Lakesh; Aue, Kelly; Phillips, Amanda; Fanneman, Daniel
Developing NDVI as a non-destructive tool for in-season nitrogen content and fertilizer rate determination in corn	Sidhu, Sudeep	Capasso, Jay; Phillips, Amanda; Pitman, Tyler; Fenneman, Dan; Beach, Emily; Warren, Mark; Wynn, Keith; Korus, Kevin
Assisting Florida Sod Producers with Protecting Water Quality by Quantifying Nutrient Inputs and Exports	Wells, Bonnie	Tancig, Mark; VanWeelden, Matt

Communicating through Digital Platforms

In 2022, the Gardening Solutions website and associated social media were again very popular.

There were **1.8 million** users of the Gardening Solutions website with **4.1 million** unique views.

The Neighborhood Gardener newsletter has **9,007** subscribers and an open rate of **58%**. That's 21% better than the industry average according to Constant Contact. The newsletter "click" rate is **14%** which is 13% better than the email newsletter industry average.

The Master Gardener Facebook page has **31,545** followers with a reach of **540,746** in 2022.

The Master Gardener Instagram reached **89,679** accounts and had **10,679** followers.

Popular articles for 2022 included **Vegetable Gardens by Season, Native Plants, Groundcovers, Treating Cold-damaged Plants, and Beautyberry.**



In Memoriam

Barbara Haldeman was the quintessential “unsung hero” of PREC, offering her talents and insights as a core part of the team through almost three decades of service. On any given day, she wore multiple hats, ranging from editor to customer service rep to accountant to “Haldecard” creative, to in-house naturalist, sharing her extensive knowledge of and love for Florida’s winged and four-legged creatures. She brought a brilliant mind, steady hand, and committed heart to her work and she lives on in all of the lives she touched personally and professionally. Barbara’s earthly journey ended on July 7, 2022 after a valiant battle with cancer and we miss her dearly.

“ Nature always wears the
colours of the spirit ”
~ Ralph Waldo Emerson

About the Center

The Center for Land Use Efficiency promotes the adoption of science-based policies and practices that measurably create an environmentally and socially vibrant life for Florida's citizens. Research and Extension programs largely relate to water quality and quantity and various best management practices (BMPs) in the following areas:

- Agriculture
- Urban and suburban landscapes
- Large-scale development

Contact information

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CENTER FOR LAND
USE EFFICIENCY