

UNIVERSITY EXTENSION'S ROLE IN ONSITE SEWAGE MANAGEMENT EDUCATION

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Abstract

Onsite sewage management systems (OSSMS) serve approximately 1.7 million properties in Georgia, providing critical wastewater treatment through septic tanks and absorption fields that are located on the site of the water usage. While the mechanical and biological functions of OSSMS are well established, public awareness and maintenance practices remain inconsistent, contributing to system failures and environmental contamination. The University of Georgia (UGA) Cooperative Extension—part of the Land-Grant University system—leverages its statewide network to deliver targeted education on OSSMS care and maintenance to diverse audiences, including homeowners, industry professionals, environmental health inspectors, and K–12 students. Educational strategies include hands-on demonstrations with model septic systems, interactive games such as *Flushable or Non-Flushable*, Paper breakdown experiments, and EnviroScapes® watershed models. These methods are designed to accommodate multiple learning styles, foster environmental stewardship, and prevent costly system failures. Extension's outreach also integrates with broader programming, engaging youth through 4-H, supporting professionals with continuing education credits, and collaborating with local and state agencies to align messaging. The UGA model demonstrates that Extension-based education—rooted in research translation, community partnerships, and interactive learning—can be replicated nationwide to improve OSSMS performance, protect water and soil resources, and enhance public health outcomes.

Introduction

Onsite sewage management systems (OSSMS) help manage the waste from approximately 1.7 million properties in Georgia. The OSSMS typically consists of a septic tank used for primary treatment and an absorption field used to redistribute water back into the environment. This system in its simplest form uses gravity to move the waste products from a house or business downhill to the tank and onto the adsorption field. In the process, solids settle in the septic tank, and the fats, oils, and greases float to the top of the water column in the tank. Within the tank there is some treatment of the liquid and solid fractions through anaerobic digestion with the water fraction, with a small volume of solids, being moved onto to adsorption field where the soil and associated bacteria further treat the water as it moves through the aerobic soil column. If there are certain or specific soil conditions in the location of the septic system, more advanced pre-treatment and treatment options are available.

For this paper we do not want to get into the operation of the septic system itself but rather want to discuss how we at the University of Georgia (UGA) are providing education to various groups associated with the maintenance portion of caring for a septic system. These groups consist of homeowners, pumpers, installers/repairers, and the environmental health permitters/inspectors.

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Not only is the audience clear, but the reasons for increased educational effort have been documented. We are seeing a decline in number of professionals in the field or entering the field, university-level programs, continuing education classes that are engaging and hands-on (Holodak et al., 2023). Yet there is an increased need for improved public awareness of importance of OSSMS and training of maintenance techniques for users of these systems (Holodak et al., 2023).

As we discuss educational avenues we use at UGA, these can be used by other universities and colleges as well as many different groups associated with the onsite wastewater industry. These can include local departments of Environmental Health, onsite wastewater companies, soil and water conservation districts, or anyone that provides natural resource education to protect water and soil resources. UGA is a Land Grant University with sister universities across the USA as can be seen in Figure 1 (Appendix). Within these universities there is typically a college of agriculture and within UGA that is the College of Agricultural and Environmental Sciences (CAES) with associated departments. Within CAES at UGA there are three branches, these are Teaching (Academics), Research, and Extension. Teaching is the portion that prepares the students academically, Research is that portion associated with conducting research to answer questions on advancing the agricultural sciences. Extension is the outreach portion of the CAES. The following section explains Extension in more detail.

What is Extension at a Land Grant University?

In 1862 the Morrill Act set up funding through Land Grant to support universities across the country (US Congress, 2025). It wasn't easy for farmers and families to keep up with knowledge coming from the university. The original vision brought education from the university level out into the communities. Local agents worked to help our citizens by translating scientific research into more digestible language. They were able to offer demonstrations and help troubleshoot local issues. This was intended to provide a better reach for agriculture and homemaking education.

Later, the Smith-Lever Act of 1914 solidified Cooperative Extension Services as a connection between the United States Department of Agriculture (USDA), Land-grant universities, and state and county governments. Extension reaches all 50 states and each county within those states through funding and support from these government agencies. This leaves opportunity for all residents of the United States to learn from college-level research and local experts. Gaining knowledge in agriculture, natural resources, family & consumer sciences, and 4-H; earning continuing education credits; and engaging in the community are just some of the ways that residents can engage with their local Extension Office.

This level of outreach makes the University Extension Service well equipped to disseminate proper information about how OSSMSs work as well as the installation, care, and maintenance of a functioning system.

How does Extension at UGA interact with the public and other state agencies (as well as federal)?

As mentioned above Extension is in all communities across the USA and in Georgia each of the 159 counties has at least one county extension agent and multiple agents in most counties across the three focus areas of Agricultural and Natural Resources (ANR), Family and Consumer Sciences (FACS), and 4-H. In other states, this model is different, but each county in all 50 states is covered by a county extension agent associated with one of the Land Grant Universities or Colleges in that state. In Georgia, the UGA Extension Agents are also associated with the local governments and typically a department within the county government system. With such a

connection with the county government and the main UGA campus, the extension agents can bring unbiased research related to various aspects to the community they work in daily. Working with the public takes many different forms from working with the youth through the 4-H program, working typically with in-home issues, food, health, and money along with food businesses through the FACS program, and typically outdoor issues with homeowners and agricultural producers through the ANR programs. With the three different focus areas at UGA, the extension agents and state specialist involved in water and wastewater issues provides onsite wastewater education as part of their programming.

Why are Extension services across the USA set up to provide onsite education?

As we look at Extension at UGA and across the other Land Grant Universities and Colleges, topics such as onsite wastewater treatment fits with the programming of topics like natural resources, water quality, and resource conservation already offered. The ANR agents work to provide programming that focuses on assisting homeowners and producers in better managing natural resources to produce food and fiber while protecting water and soil resources. With OSSMS outside the houses, it helps homeowners and business owners better understand how the OSSMS and soil resources interact to treat the produced wastewater while protecting both surface and subsurface water resources. The origin of the wastewater starts in the home or business, so providing education on how to protect the system by what goes down the drain, would fall under the programming of the FACS and 4-H agents. This could involve teaching homeowners what items should and should not be put down the drain, what does excess water additions to the system due to the soil outside, and how does the OSSMS separate and treat the materials that go down the drain. With 4-H programming can educate the kids on all aspects of the OSSMS and help them better understand. Not only that, but can also get them interested in topics and subjects such as water resource management, soil science, and engineering. So, as the extension agents work with the various groups that come to the Extension offices, there is a place to provide education to citizens of a community. As mentioned above, Extension Agents are part of the communities where they are located, so collaborating with other departments such as the Public Health and Public Utilities can help citizens better understand how to protect water and soil resources as well as protect their health.

Materials and Methods

Education:

K-12, college, and career professionals all can benefit from OSSMS education. Children may seem like an odd target audience, but the goal of reaching them is to help prevent issues for their parents. We can empower them to help maintain their families' septic systems by watching what they flush. Toilets, how they work, and where the water goes is always a confusing topic for children. Flushing the toilet can be a great source of fun as well. They may put toys and other objects in just to see how these items move when flushed. To target young children, we focus on what is flushable and what is not.

Children also make a great target audience to learn how these systems work in terms of environmental health. As children age and their class material gets more challenging, they are asked to take on a new point of view. OSSMS absorption fields directly impact environmental health, especially when discussing the immediate area surrounding the system. These systems can also be a source of non-point source pollution. The contaminants remaining in the leftover water

can be transported through surface water leading to stormwater drains. Underground, fields can become oversaturated and cause dirty water to rise to soil level, carrying with it the remaining contamination. Additionally, it can be transported by groundwater and move anywhere. To demonstrate the way water moves through the environment, we use EnviroScapes® that are model towns (Figure 2). These allow participants to learn with a model representing their community through visual representation and hands on experience.

Students learn the parts to a system and how each part works. This can be taught on the scale of their personal septic system or on the city sewage scale. Children learn where their poop goes and how we are able to recycle this water source. Finally, this can encourage students towards a career path when they are exposed to the possibilities. They will get to see roles that people take on during different steps of the maintenance and installation process. Part of Extension's youth development goals includes learning about potential career pathways.

College students gain similar experiences in exposure to future career opportunities. They might even be on their way towards a career path in water resources and conservation. Courses for career certification do require college level coursework. The University Extensions can partner with courses to fill in supplementary education as guest speakers or an established part of the syllabus.

Professionals need initial training, continuing education, and the opportunity for refresher training and asking questions in a safe space. Extension partners with the Department of Health to train soil scientists, environmental health technicians, and reach other professionals in the field. Extension already works to provide continuing education credits for many professionals such as pesticide applicators, arborists, teachers, real estate professionals and more. We can use our background and skills for these continuing education credits as well. Extension can partner with groups like State Onsite Wastewater Associations, American Society of Agricultural and Biological Engineers (ASABE), Soil and Water Conservation Society (SWCS), to name a few, to provide the initial training and continuing education with the most up-to-date information.

At the University of Georgia, we have a facility specifically designed for septic system trainings. This facility includes examples of approved materials used to support different systems, materials used in absorption fields to help control dispersal along with many other larger resources (Fig 3.). For example, there are serial trenches that display use of all approved products in Georgia as raised beds and in ground displays (Fig. 4.). Shadow boxes built to demonstrate pipe and gravel distribution systems (Fig. 5.). These were built with North Georgia clay and South Georgia sandy soil to model water flow ability using the same tools, but in different soil types. In addition to the model for visualization, we covered these models with plexiglass that keep all materials in place but also provides a writing/drawing surface so that real life situations can be added to the visual. This is an ideal location to train installers, pumpers, designers, regulators, homeowners, and Extension agents. This model can be replicated for each state based on their approved materials and state usage.

Extension Outreach:

Extension services have what they consider "base programming" that serves as the foundation by which we deliver educational materials. This includes, but is not limited to publications, bulletins, circulars, blogs, newspaper articles, educational programming, on-site consultations, field days. Any of these programs can cover topics of water resources and OSWWTS. This could be the means

we use to educate children, college students, professionals and homeowners. Reaching homeowners is a great target audience. This is usually the person who will be responsible for the management of their OSSMS. They especially need to know how to use their system and how best to protect it. It can be expensive to drain, maintain, and repair these parts as digging is inevitably involved, and special tools are needed. Because of this, Extension services across the country can better reach these homeowners and save them time and money.

Educational Games:

The Water Resources Team at UGA has developed some games that help participants who are more visual or tactile learners (Silverman, 2005). The games are engaging and educational when used alongside verbal explanation or handouts that participants can take home to remind themselves of the information they have learned.

A favorite we found is Flushable or Non-Flushable. This is set up on a homemade display made from plywood sheeting with holes big enough to hold jar containers. Each jar will contain a model version of the potentially flushable item or something else to represent it. Examples that we have used include grease/oil, pills, cigarettes, plastic, dental floss, toys, slime, bolts/nuts, cotton swabs/balls, facial tissue, baby wipes, dryer sheets, hair, bathroom cleaner, chlorine, septic additives, toilet paper, pee, and poop. Participants will work alone or in teams to determine what items should be flushed and those that should not be flushable. We also included a middle zone of items that can be flushed but should not be used in excess. This would include primarily cleaning products.

Participants can also observe the way different materials would move through or be captured in the OSSMS with a model septic tank. We built a model septic tank to help program participants visualize the process. This model includes steps from the toilet, into the septic tank where there are two basins with a wall in between to denote the two chambers in the tank for settling of solids, floating of F.O.G., and microbial processes. Following these two basins, there are pipes that represent the absorption field of this system and how water will flow out of the OSSMS and into the ground.

One of the few things you can flush down the toilet is Paper. There are many types of paper that might be associated with the bathroom, so clarification is needed. Ideally, the only paper that will be flushed is toilet paper. Facial tissue, paper towels, and flushable wipes can easily be mistaken as paper products safe for flushing. It is especially confusing to consumers who use products that are advertised as being “flushable” when they really shouldn’t be used with an OSSMS. To demonstrate how effectively each of these products break down, we set up a four-beaker stirring station with a jar-test apparatus. The stirring action will speed up the breakdown process so that participants can see the process in a few minutes. A “paper” product will be placed in each of the beakers, and we are able to compare the rate at which they break down and how effectively they do so. This model can be recreated using jars with lids and water. Participants will add their paper products, shake the jar to agitate the solution, and evaluate the success or failure of the material to break down. Shaking for just 30seconds will provide valuable results.

Discussion:

There are many ways that University Extensions can be at the forefront of On-Site Sewage Management System education. We can go beyond handouts and brochures to reach those of varying learning styles. As a part of the State's Land Grant University(ies), Extension is a great source as we are able to offer in-class instruction and training for professionals. We focus on reaching the whole community. This provides more opportunities to share information and models of OSSMS. As shown above, we can easily obtain or build these model systems that are engaging to the audience. University Extension reaches youth, adults, elderly, and working professionals. This methodology of disseminating information can pull together all pieces to ensure a healthy septic system for the individual and the local environment. Materials mentioned here can be replicated by Extension Services throughout the country.

Literature Cited:

- Bauske, E., Habteselassie, M.Y. and Risse, M.A. Beginner's Guide to Septic Systems. (2013) *University of Georgia Cooperative Extension*. Bulletin 1421.
- Holodak, J., Stanley, J., Cox, A., Groves, T., Jantrania, A., Moeller, J., Neset, K., Walker, C., Zhang, H., Ryan, B., Heger, S., & Brooks, B. (2005). Identifying Workforce Education, Training, and Outreach Needs in Decentralized Wastewater and Distributed Water Reuse. *Journal of Environmental health*, 86(5), 20-28.
- Silverman, G. S. (2005). The effectiveness of education as a tool to manage onsite septic systems. *PubMed*, 68(1), 17–22, 38.
- US Congress. 2025. The U.S. Land-Grant University System: Overview and Role in Agricultural Research. Last accessed August 13, 2025

Appendix: Figures

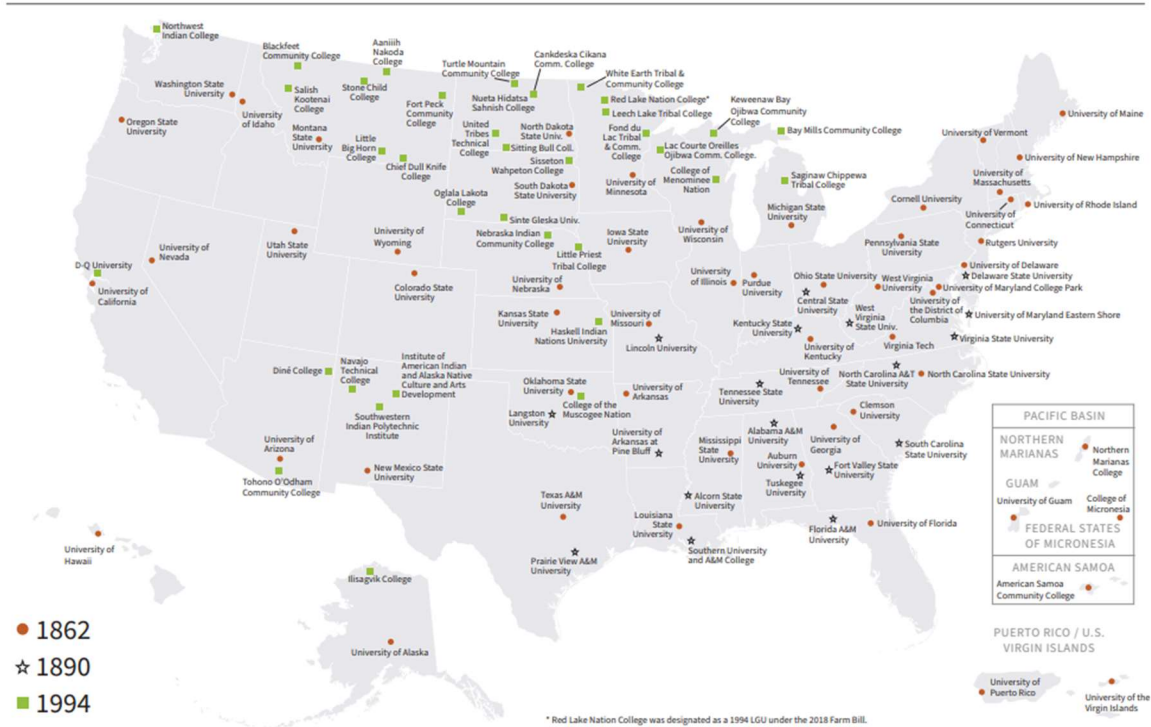


Fig. 1. Map showing the Land Grant Universities across the USA. The map was taken from USDA-NIFA Land-Grant Colleges (2022).



Fig. 2. EnviroScapes® model (photo from EnviroScapes®)



Fig. 3. Image of the different materials absorption fields may use (image from G. Hawkins)



Fig. 4. Serial trenches (images from Hawkins, 2019)





Fig. 5. Shadow boxes of approved distribution systems in Georgia and Hawkins demonstrating the writability on the displays for multiple educational purposes (images from G. Hawkins and J. Rolando Orellana)



Fig. 6. Flushable/Non-Flushable game. Left is tabletop set up, right is a smaller and personal game version (photos by MC Halbrook and G. Hawkins)



Fig. 7. Model septic system. Includes toy toilet on far right then progresses to the left. (photo by MC Halbrook)



Fig. 8. The top image shows the materials needed for this model/demonstration, facial tissue, toilet paper, and jars with water and lids. After 30sec agitation, you can see the results with the facial tissue (left) is still intact and toilet paper (right) is broken down into tiny pieces. (Photos by MC Halbrook)