Thirst For KNOWLEDGE

Through wastewater education and research projects, onsite specialist Sara Heger is making a difference for the environment in her home state of Minnesota and across the country.

PAGE 10
Sara Heger didn’t set out to be an expert in onsite wastewater treatment. It just turned out that way. As an engineer for the University of Minnesota Onsite Sewage Treatment Program, Heger spends her time providing education at professional conferences, consulting on troubled systems and working on projects to improve the industry.

From childhood on, her experiences lined up to mostly bring her back to where she began – working the ground. She understands the industry because she lives it, and after 16 years as a wastewater engineer she has a broad insight into the issues facing the industry.

“I wanted to get away from farming,” Heger recalls about her career path from higher education onward. She was interested in the environment but not in working the front lines of agriculture.

BE AN ENGINEER

While she baled hay as a teen on her family’s farm in Minnesota, Heger regretted the life she was missing, all the options and activities open to girls in the cities. Her father ran the farm, first as a dairy operation and later (continued)
raising hogs and cash crops. She was the youngest of eight children. Her mother died when she was young and her older sisters helped raise her.

In her father she had a singular advantage. “My dad wanted me to be an engineer, so I was on the science track in high school. He was a strong proponent of women and girls being encouraged in that direction,” Heger says. She earned an undergraduate degree in biosystems and agricultural engineering because she could learn about water and soil along with engineering.

What makes the wastewater industry so attractive is the combination of high and low technology, she says. On the high end are all the technologies and pumps to provide treatment, but on the low end everything depends on soil to passively accept large amounts of water, provide final treatment and recycle that water through the environment.

“"When was the last time you spent $5,000 to $15,000 for a piece of equipment in or around your home and you didn’t get an owner’s manual? We need to have it like getting your oil changed. Why does everybody not know they need to get their tank cleaned?”

Sara Heger

Heger’s first step into the industry came in her third year of college when she had an internship at Minnesota’s Pollution Control Agency. “Actually, I didn’t care at all what the job was there as long as it was environmentally related. I just wanted some experience,” she says. She got that, but she also met Jim Anderson, then a professor at the University of Minnesota and director of its Water Resources Center. His writing is familiar to readers of this magazine. With his encouragement she entered a master’s degree program in water resources science, and as she finished that degree the job she now holds became available.

She may have wanted to get away from agriculture and farming when younger, but her attitude has changed. She has great appreciation for the hard work farmers do every day and for her own past. “There’s nothing to me now like the smell of a dairy barn,” she says.

TRAINING AND TECHNICAL ASSISTANCE

At the University of Minnesota, Heger has two primary responsibilities. One is research and the other is education.

Education means providing training at workshops and providing technical assistance to wastewater professionals, governments and property owners in Minnesota and across the country. Heger says she enjoys translating complex scientific information into understandable terms.

Research does not mean working in a laboratory day in and day out. “We’re trying to answer questions that come up in the industry. We’re not inventing new technology. We’re solving problems,” Heger says. This might take the form of helping a manufacturer test a new technology in the field.

At the moment she’s involved with a project in Crane Lake, Minn., a town in the lake-studded wilderness and canoeing paradise that hugs the Canadian border. She has to help the community determine how to bring this environmentally sensitive area into compliance with modern wastewater standards.

In addition to doing much of the research work, Heger is also a grant (continued)
Working in the onsite industry has taken Sara Heger beyond the normal locations of home, school and business. In her job with the University of Minnesota Onsite Sewage Treatment Program she consults on any project that is troublesome, and lately this has led her into an evaluation of state highway rest stops.

These systems operate under different and tougher conditions than most commercial or domestic wastewater systems and they are often neglected. “The people who build roads aren’t thinking about protecting the soils. In fact, many of these rest stops were built in fill areas,” Heger says. These soils are poor. Some locations are environmentally sensitive, and in Minnesota many of the systems are old.

So far she is doing a Minnesota-only study. It started with a call when a new engineer took over the rest stop wastewater program for the Minnesota Department of Transportation. The engineer knew the state needed to make repairs or upgrades and wanted the university’s help to prioritize projects.

Aside from challenges presented by the soils at rest stops, the state had been installing low-flow toilets and automatic faucets, so the wastewater flow was small and concentrated, Heger says. Flows vary because of the seasonal and inconsistent volume of highway traffic, and as traffic patterns change rest stops may be additionally stressed. For example, rest stops along the Interstate 94 corridor between Minneapolis and North Dakota have been under continuing strain recently because of the number people traveling to and from oilfield jobs in North Dakota boom towns.

Assessments for Minnesota’s 55 rest stops, weigh scales and truck storage stations were made by the university team in 2013 and 2014. Some of the systems had not been pumped out in three years, and that’s not good for a rest stop tank, Heger says.

Three people from the university do the inspections, and they are joined by people from the state transportation department. Each inspection requires about two days for the site visit and work back in the lab. As part of the research the teams grab samples from the septic tanks. Samples that are abnormally high in organic material, nitrogen or phosphorus receive a second look. Two onsite systems installed this year include monitoring wells and groundwater sensors to evaluate the treatment down-gradient and to spot pooling of water beneath the drainfield. This is a Minnesota project at the moment, but it will have implications for similar systems all across the country, Heger says.
northern climate, yet it has also inspired people in other regions to develop localized versions. Now Heger is involved in producing a national guide that can be customized for any location. This guide will not appear in a finished form. Instead it will be an online form that will work like online tax-preparation software, Heger says.

A knowledgeable system owner or a septic system professional will enter basic information about the system, or as much information as they know. The software will generate a customized maintenance guide for that type of system. It will be a simple guide, too – no 100-page monster that a customer will toss into a drawer because it’s too much to read, Heger says.

However, Heger knows that manuals can take people only so far. Even if a system is maintained perfectly, there are still environmental issues because of what flows through an onsite system and what it cannot now handle, she says. Phosphorus is a good example of an issue that needs dealing with.

**Tainting the Water Supply**

In the Midwest, a phosphorus surplus from septic systems and lawn and agricultural fertilizers has been blamed for encouraging toxic algae blooms in inland lakes and for generally reducing the amount of dissolved oxygen by encouraging the growth of all kinds of aquatic plants. There are currently no off-the-shelf products for reducing phosphorus in wastewater, but Heger believes there will be an increasing need for such technologies as regulations catch up with the environmental harm.

The Onsite Sewage Treatment Program has three phosphorus projects going. One is in conjunction with a company to test some of its ideas.
Another involves collecting wastewater from a cluster of buildings, removing the phosphorus and generating biogas for energy production. The third evaluates how much phosphorus migrates out of wastewater systems. One study evaluated cesspools, which have not been allowed in Minnesota since the early 1980s, and found a very high level of phosphorus 40 feet down-gradient, Heger says.

From her position at the university, Heger sees the need for much more consumer education. The biggest issue she and her colleagues see are toxic septic tanks – tanks where the bacteria population is unhealthy or absent because of an accumulation of home cleaning chemicals, pharmaceuticals and all the other things people shouldn’t dump down their drains.

Consumers don’t know enough to ask the right questions, Heger says. Because they lack knowledge of their wastewater systems, they don’t think about the environmental impact of a drug that a doctor prescribes and that works its way through the patient and into the water supply. This isn’t just an issue for those on septic systems, of course, but it’s an important area of concern for decentralized systems.

Of all the presentations she gives, the issue of what is being flushed through wastewater systems draws the most feedback. “And this is people in the industry. I hope the information gets from their hands to their customers’ hands. Our industry, not me, is doing all this education,” Heger says.

INDUSTRY PROUD

It is the industry that taught her, and Heger says her most valuable connections have come through professional organizations. Early in her career she became involved with the Minnesota Onsite Wastewater Association. The membership gives constant feedback and they are great supporters, she says.

More than 10 years ago Heger became involved with the National Onsite Water Recycling Association. Through NOWRA she had the opportunity to meet professionals from across the country, plan national conferences, learn about systems and research elsewhere, and develop educational materials through the Consortium of Institutes for Decentralized Wastewater Treatment.

Heger does not stop learning, and in addition to her job in the onsite program, she’s working on a doctorate degree in water resources science. She doesn’t need it for her university job nor is she planning to leave the university for an academic job that takes her out of the field. What she’s doing now is too interesting to leave, she says.

She is pursuing the degree just for herself. At the same time she’s doing what the entire industry must do, because the only thing protecting the health of people and the environment is the knowledge of wastewater professionals.