Research and Extension Collaboration: On a Land-Grant Mission to Improve Water Quality with a Unique and Versatile Structure

To make research findings widespread and produce change at the state and national level, it is often beneficial for research and extension faculty to collaborate. One notable example of this at Oklahoma State University is the connection formed between Chad Penn, Associate Professor of Soil and Environmental Chemistry, and Josh Payne, Area Animal Waste Management Specialist. Together they develop and disseminate information on phosphorus removal structures.

Penn developed these structures to filter out dissolved phosphorus from flowing water before it reaches and pollutes nearby water bodies. “Some soils are built up with phosphorus to the point that a portion enters the environment through runoff,” Penn said, “That dissolved phosphorus is primed to fertilize aquatic vegetation when it hits a water body, which is bad for recreation, drinking water treatment, the ecosystem, everything.”

Phosphorus removal structures adsorb dissolved phosphorus from runoff like a filter, preventing water contamination in streams and rivers. “To build a structure,” Penn said, “you need three things: an effective sorption material, a site with phosphorus-rich water to flow through the material, and the ability to retain and replace the material.” With all three conditions met, a structure can be built in any shape to filter out dissolved phosphorus.


Though Penn has published several articles and installed structures in multiple locations, word of this technology needs to be publicized to investors. “Commercialization is key to getting this out,” Penn said, “We’re patenting all of this so someone can take it and build them nationwide.” Penn’s solution to effective public outreach is partnering with Extension faculty member, Josh Payne.

Penn and Payne have been working together since 2006. Payne extends Penn’s findings beyond academic journals to a broader audience at public demonstrations and conferences. “When OSU researchers conduct experiments and team with the Oklahoma Cooperative Extension Service to disseminate their findings, this illustrates an excellent example of effective teamwork between research and extension,” Payne said.

Payne also helps connect Penn to other organizations for opportunities to inform the public, including the Poultry Waste Management Education Program, a poultry farm research and demonstration site, the Illinois River Watershed Partnership (IRWP), and other university researchers. “For example Dr. Bob Nairn, an expert in treating acid mine drainage, is providing acid mine residuals as a demonstration material at the IRWP’s educational facility,” Penn said.
Both Penn and Payne agree the collaboration between research and extension was necessary to get this information out to the public. “Simply publishing a peer-reviewed scientific journal article is not enough to get the word out to our constituents,” Payne said. “We need another avenue to share results in order for agricultural producers and environmental professionals to benefit from our work, and Cooperative Extension serves as that conduit of information by transferring research-based information to the public.”

Through their collaboration, the future is bright for making the phosphorus structures more widespread. “We have people in Florida set to purchase the first license, and the Natural Resources Conservation Service is very interested in cost sharing this best management practice at the national and state level,” Penn said. “We’re also currently working with them to build a large filter near western Lake Erie.”

For faculty members interested in forming their own collaboration between research and extension, Payne offered some advice from his experience: “It requires open communication and a desire to answer a question through research and share it through Extension. These opportunities don’t always present themselves and often must be sought out.” The Oklahoma Water Resources Center is eager to help you form a research-extension team. Contact us at (water@okstate.edu).