



# It's in My Nature

Dr. Amy Pruden Shares Her Special Journey through the World of Water Research

By Julia Dinmore, The Water Research Foundation

Dr. Pruden recognized the value of water from a young age. In a July 2023 interview with The Water Research Foundation (WRF), she reminisced about growing up near a lake. Exploring the ecosystem, she quickly learned that water is essential for life—not just for humans but for “all the little creatures in the water” as well. This fascination with water and its life-sustaining properties guided Amy in her studies, inspiring her to pursue an undergraduate degree in biology from the University of Cincinnati.

After her undergraduate studies, Amy faced a wide array of options ahead of her, even considering medical school to fulfill her passion for helping people and saving lives. Despite toying with that idea, Amy insisted, “Everything just kept pulling me back to water. It became clear to me that what we really need to do is keep people healthy and out of the hospital in the first place. One of the most effective ways we can do that is make sure people have access to clean, safe water.”

Instead of becoming a medical doctor, Dr. Pruden pursued a PhD in environmental science. In doing so, she placed herself on a path that would allow her to do exactly as she intended: create a safer and healthier world for all through the study of water. “There’s nothing more important than life itself. And there’s no known life form that can survive in the absence of water.”

A frequent collaborator with WRF, Dr. Pruden was a Principal Investigator for five completed WRF projects, all focused on microbial communities within water—her area of expertise. Antimicrobial resistance is a major human health challenge of the 21st century, and the water environment is a key recipient, pathway, and source of antibiotic-resistant bacteria (ARBs) and antibiotic resistance genes (ARGs). Efforts to quantify and mitigate the spread of antimicrobial resistance are hampered by a lack of standardized monitoring methods. Dr. Pruden’s work aims to fill that gap.

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Most recently, she took the lead on WRF Project 5052, *Standardizing Methods with QA/QC Standards for Investigating the Occurrence and Removal of Antibiotic Resistant Bacteria/Antibiotic Resistance Genes in Surface Water, Wastewater, and Recycled Water*, published in 2023. The project lays out what’s known about anti-microbial resistance, what isn’t, a framework for

moving forward, and guidance on how the water sector can engage with monitoring antimicrobial resistance in water.

Antimicrobial resistance hasn't always been the hot topic it is today. "I finished my PhD in a time when we were just starting to really appreciate the complexity of microbial communities in both water and wastewater systems. And the DNA based tools were just starting to take off. To me, it seemed like there was just so much discovery to be made...it seemed it should naturally follow that there would be practical applications, too." And Amy was right.

Dr. Pruden described being honored with the Paul L. Busch Award by WRF in 2014 as "a real breakthrough moment." The Paul L. Busch Award recognizes an individual for innovative research in the field of water quality and the water environment, with a special focus on those who show promise and make significant contributions in bridging research and its practical application. The Award carries with it a \$100,000 grant, allowing recipients to continue their work, take risks, and explore new directions. Amy knew that if she could just make progress on her research, "people would see the importance of antimicrobial resistance as an emerging contaminant. And that's exactly what happened."

In 2014, the work that Dr. Pruden and her team accomplished with the support of the Paul L. Busch Award was recognized with a Best Paper Award from the journal *Environmental Science and Technology*. Her paper, "Balancing Water Sustainability and Public Health Goals in the Face of Growing Concerns about Antibiotic Resistance," garnered the California State Water Resources Control Board's attention such that they invested in solicited research calls on antimicrobial resistance, bolstering the scientific community's interest in the topic. More recently, the UN Environment Programme invited Dr. Pruden to be a co-author on a major report about antimicrobial resistance, with a featured section on water and wastewater systems.

This past June, nearly nine years after receiving the Paul L. Busch Award, Dr. Pruden was recognized with WRF's Research Innovation Award during the WRF Subscriber Luncheon at American Water Works Association's ACE conference. This award honors

researchers who have made significant contributions to advancing the science of water. Receiving the award invigorated Amy's already strong motivation: "The work we're doing does have practical impacts on everyday people and the research insights have direct translation to application."



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Despite multitudes of personal achievements, when asked about her proudest accomplishment, Dr. Pruden spoke about her passion for teaching. Training students over the last twenty years has allowed her to "play a role in shaping the future generation of water scientists." Not only does she get to make a valuable impact, but Dr. Pruden has the chance to see her students rise to new heights: "They're taking it to a whole other level with AI, bioinformatics, and other skills and tools that didn't even exist when I was in graduate school."

Amy's passion for education lies more specifically within interdisciplinary education. She was Associate Dean for interdisciplinary education for four years at Virginia Tech and currently acts as a Principal Investigator for an interdisciplinary graduate training grant funded by the National Science Foundation. Amy described pursuing interdisciplinary studies as "Taking the path less followed or never followed. You're trying to integrate



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understanding from multiple fields. That’s going to require patience with developing skills not only in how to explain your research to people working in other fields, but even more so in taking the time to listen, understand, and learn from their perspectives as well.” Embracing diversity is essential to achieving this aim. “We can’t solve problems in a box. We can’t even identify the problems if we’re in a box.” Dr. Pruden recognizes that gathering information from people of all walks of life, backgrounds, and identities is key for success in water research. And she makes sure her students know that as she strives to help them understand problems through a holistic lens, such that approaching them doesn’t create more problems in other areas, which—according to Amy—can be “very hard to do.”

After over 20 years of deep involvement with water science, one might imagine that Amy has had her fill.

The wonder she cultivated for water as a child endures today. “I think it’s the old adage: ‘the more you know, the more you realize how much you don’t know.’ I’m not going to run out of things that fascinate me, and I think that’s essential for a researcher.” As Amy continues to engage with the infinite mysteries of water science, she has some goals she’d like to see accomplished—if not by her, then by her students. “I’d really like to see us get to a place where we can intentionally control microbial communities...20 years from now, why can’t we be in a situation where we’re using AI bioinformatics to identify the conditions needed to select for exactly the microbes we need to do the job? Maybe we’ll all be carrying DNA sequencers on our cell phones. Who knows, right?”

Who knows? Perhaps in another 20 years, WRF will have published a research report on just that. For now, though, Amy feels that “it’s been an honor and a privilege to call myself a water professional, and I just really appreciate the support and encouragement that I’ve received from The Water Research Foundation and the water community.” In turn, the water community has much for which to thank Dr. Pruden, and, surely, much more to come.

### FOR MORE INFORMATION

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