



MASTER WELL OWNER NETWORK

A program of the Penn State College of Agricultural Sciences and Cooperative Extension

Social Science of Drinking Water

It is estimated that 25% of Pennsylvania residents use private water systems such as wells, springs, or cisterns.¹ Additionally, many private water system users, as well as residents connected to municipal water supplies, also use roadside springs on occasion. It can be difficult to pinpoint exactly how many Pennsylvanians rely on these sources of drinking water, which are not legally required to be tested for quality. This is a challenge for planners, health officials, scientists, and educators who want to understand the needs of these water users.

Social science data can be a key piece of the puzzle in addressing these gaps. In the physical sciences, water quality data is often reported measuring things such as pounds of phosphorus per year, nanograms of PFAS per liter, or millions of gallons per day. The social sciences tend to focus more on understanding things such as the perceptions, attitudes, values, and beliefs of individuals, or trends across different locations or demographic groups. Applying social science methods to water quality questions can help inform programs and policies of organizations and governments that want to improve health outcomes or access to different water sources.

US Census data is widely used in research to help answer critical questions. The last US Census to include a question about drinking water sources was 1990. That means water quality planners and researchers have been relying on the same Census dataset for over thirty years, which is one of the main reasons it is difficult to pinpoint exact numbers of affected users. That data may still be used in broad analyses in current research; however, we know that much has changed in that time span. For example, many social science studies have been done in the past several decades on people's perceptions of water quality from various sources. The source of a person's drinking water may be based on a combination of several factors. Access to municipal drinking water systems is not necessarily a given. In many regions of the state, that infrastructure has not been built out.

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When a household does have multiple options for the source of its water, considerations such as affordability and perceptions of quality may be important.^{2,3,4} In addition, studies have shown how perceptions of the taste, smell, and color of drinking water are only one piece of how an individual may perceive the overall quality of drinking water. Social factors such as previous experiences, trust in suppliers, familiarity with water properties, risk perception, and attitudes towards water chemicals may influence an individual's perceptions of water quality.⁵

People tend to make choices based on their perceptions, which have implications for where they source their water and whether they test it or treat it. Many Pennsylvanians are choosing to treat their water, even without getting accurate testing.⁶ In these cases, there is a risk of choosing the wrong treatment system to address a particular water quality concern or incurring costs without health benefits. While our senses can be a first indicator of water safety, it is important to rely on laboratory testing to establish if water is safe for drinking. Some harmful pollutants in drinking water cannot be discerned by our senses of smell, taste, or sight. If you ever source your water from private wells or roadside springs, here are some resources for you to learn more.

Resources for You

Private Drinking Water Wells

Current estimates of Pennsylvanians that rely on private wells as their primary source of drinking water vary widely from 1-3.4 million people.^{1,7,8} Penn State Extension has done extensive work with and for private well owners and users, and has collected survey data from across the state. Some of these surveys show that about half of private drinking water supplies have never been properly tested. Water quality data from studies have shown upwards of 40-50% of private wells within the region fail at least one health-based drinking water standard.



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Original article: <https://extension.psu.edu/social-science-of-drinking-water>



2025 PA Groundwater Symposium



Thank you to all who attended. We'll see you next year!



Microplastics in Our Waters, an Unquestionable Concern

Microplastic pollution is not a new problem. However, in recent years, the public has become more aware, and scientists are studying the seriousness of the situation. Have you ever stood on a riverbank after a heavy rain and noticed how much plastic waste floats by? Gallon milk jugs, plastic bottles, food wrappers, plastic bags, rubber balls, etc., all race downstream. Plastic, plastic, and more plastic.

Where Does this Plastic Waste in Waterways Originate?

People. We have become a throw-away society. Statistics are staggering. Americans use 2.5 million plastic bottles every hour. Every week, 10 billion plastic bags are used worldwide. (University of Tennessee). Eight million metric tons of discarded plastic makes its way to the oceans each year, according to the National Oceanic and Atmospheric Administration (NOAA). Plastic waste enters both land and water sources through littering, poor waste management, stormwater runoff, fishing vessels, cargo and cruise ships, and more. Many plastics float, so countless plastic items of all shapes and sizes make their journey downstream, eventually making their way to the oceans.



An example of just some of the plastics that can enter our waterways. Photo: Jodi Sulpizio, Penn State

What Happens to this Plastic Debris Over Time?

Unfortunately, wildlife may consume some of the plastic or become entangled in it, likely leading to their death. We have all seen the unsettling photos of sea turtles strangled by plastic six-pack rings or dead marine animals washed ashore with pounds of plastic in their stomachs. Also, you may have heard of great garbage patches in the oceans where vast amounts of marine debris, mostly plastics, collect. These patches are not islands of floating trash and are not easily detected from above. Rather, the garbage patches consist of broken-up pieces of plastic suspended throughout the water column. Imagine it like flecks of pepper floating in a bowl of soup. Clean-up efforts are extremely difficult.



Plastics degrade over time, but never go away. They break up into smaller and smaller pieces, eventually becoming microplastics and microscopic nanoplastics. Microplastics are bits of plastic less than 5mm in size, smaller than a popcorn kernel. They are found in every ecosystem on Earth and consist of microbeads, microfibers, and broken-down pieces of plastic.

Microbeads are tiny abrasives, usually polyethylene, found in wash-off cosmetics, cleansers, and toothpaste. In 2015, the U.S. Congress passed the Microbead-Free Waters Act, banning the use of microbeads in cosmetics and toothpaste. Over the past four years, manufacturers started phasing them out of products, but they continue to be used and are still found in waterways.

Microfibers are tiny pieces of threads and fibers that break off clothing. Clothing made from plastic (nylon, polyester, rayon, acrylic, and spandex) sheds microfibers with every wash. These microfibers and microbeads go down the drain into sewer systems. Wastewater treatment plants are not designed to remove all particles. Therefore, microplastics can be discharged into waterways through wastewater effluent. If the microplastics are removed during the treatment process, they can remain in the sewage sludge that may be applied as fertilizer on agricultural fields. They can still end up in the environment, entering waterways through runoff. Microfibers are also in the air, entering waterways through dust fallout and surface runoff.

Should We be Concerned?

Microplastics can leach chemicals into the environment. However, an even greater danger, they attract and concentrate heavy metals and organic pollutants dissolved in the water. One example is polychlorinated biphenyls (PCBs). Even though PCBs have been banned, they are still present all over the world in both land and aquatic environments. Plastic debris accumulates pollutants up to 100,000–1,000,000 times the levels found in seawater, according to NOAA. This chemical adsorption and bioaccumulation add a whole new level of concern.

Are We Consuming Microplastics?

Yes. Microplastics are present in both tap water and bottled water. A study showed that an average of 325 plastic particles were found in a liter of bottled water as compared to 5.5 plastic particles per liter of tap water, according to Sherri Mason, a Penn State researcher. Microplastics are consumed by aquatic life and bioaccumulate in the food chain, traveling all the way from filter feeders to apex predators. We consume toxin-saturated microplastics in seafood such as mussels, but likely consume more microplastics in food via dust fallout from the air.



Do Microplastics Impact Our Health?

The answers are not yet clear, but microplastics are found in food, air, water, and soil. They are literally everywhere. Scientists are studying the impacts on both animal and human health. Much more research needs to be done to know what adverse effects they may have.

What Can You Do?

Amounts of microplastics in the environment are likely to increase with the increase in plastic production. Although depressing, there are simple things you can do to cut down on this growing problem.

- Reduce use of single-use plastics.
- Purchase items with less packaging.
- Use reusable water bottles/coffee mugs.
- Refuse plastic straws/lids when dining out. Consider purchasing a reusable straw.
- Pack trash-free lunches. Use reusable containers/utensils.
- Use reusable shopping bags rather than plastic ones.
- When eating out, take a reusable container for leftovers.
- Recycle when possible.
- Use microplastic catch bags when washing fleece and other synthetic fabrics.
- Secure waste bins on collection days.
- Buy used.
- Repair/maintain products like clothing and appliances.
- Borrow, rent, or share items you don't use frequently.
- Get involved. Participate in local clean-ups.
- Educate about plastic waste and impacts on the environment.

Microplastic pollution is not a new problem. However, in recent years, the public has become more aware, and scientists are studying the seriousness of the problem. The problem is vast, but everyone can make conscious decisions to reduce the use of single-use plastics.

Sources



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MWS Coordinator York Co



Agricultural Analytical Services Lab

The goal of Penn State's Drinking Water program is to promote well water testing and to educate home-owners on its importance. Penn State's Agricultural Analytical Services Laboratory is accredited by the Pennsylvania Department of Environmental Protection for drinking water analysis.

How do you submit a water sample?

To submit a drinking water sample to Penn State's laboratory, you must first obtain a Drinking Water Test Kit. Kits are available at many county extension offices. The kit consists of a cooler, shipping box, sample bottles, instructions on how to take a sample, and a submission form.

After taking your water sample, you must send the kit to the laboratory by overnight mail along with your payment for the test(s) requested. For the bacteria test, included in all test packages, the laboratory must receive the sample within 30 hours after sampling. If you need the bacteria test only, contact the laboratory to receive a smaller cooler test kit. The lab cannot accept any water samples for bacteria on a Friday.

How soon will you get your results?

In general, tests are complete within two weeks after sample receipt by the laboratory. With mailing time, you should receive your report within two to three weeks after sending your sample.

<https://agsci.psu.edu/aasl/water-testing/drinking-water-testing>
EMAIL aaslab@psu.edu OFFICE [814-863-0841](tel:814-863-0841) FAX [814-863-4540](tel:814-863-4540)

Resource Highlights:

Private Wells and Water Systems Management Course

Wondering how you, too, can get information about the management of private drinking water systems? Take Extension's online, self-paced course. This online course will help you identify the proper location, construction, maintenance, testing and treatment of a water well, spring or cistern.

<https://extension.psu.edu/private-wells-and-water-systems-management>



Save The Date: Wednesday Water Webinar Series

<https://extension.psu.edu/education-format/webinars?topic=Water>

Hard Water Issues - July 9th

Keys to Wellhead Protection - July 16th

Arsenic and Nitrogen Risks - July 23rd

Understanding test results - July 30th

Home Water Treatment Basics - Aug 6th

Oil and Gas Impacts on Water - Aug 20th

What is the Master Well Owner Network?

The Penn State Master Well Owner Network (MWON) is a program dedicated to educating PA residents about the proper construction and management of private water systems. This program aims to educate private water system owners and promote better management of private wells, springs, and cisterns throughout the state.

MWON Sponsors

This project is made possible in part by Penn State Extension, the Pennsylvania Department of Environmental Protection and the Pennsylvania Ground Water Association.

Important Websites

Master Well Owner Network

<http://extension.psu.edu/water/mwon>

Penn State Extension Drinking Water

<http://extension.psu.edu/water/drinking-and-residential-water>

PA Ground Water Association

<http://www.pgwa.org/>

National Ground Water Association

<http://www.wellowner.org/>

Penn State Drinking Water Interpretation Tool

<http://dwit.psiee.psu.edu/>

Penn State Resources for Well and Spring Owners

<https://extension.psu.edu/resources-for-water-well-spring-and-cistern-owners>

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