hpio health policy institute of ohio

Health **Policy** Brief

Connections between water quality and health

Overview

Clean air and water, safe places to walk outside and access to healthy foods—conditions of our physical environment—all affect our health and well-being. However, not all Ohioans have equal access to healthy living conditions, including clean, uncontaminated water.

For example, rural and Appalachian communities have faced environmental degradation from agricultural and industrial practices, along with a lack of public resources to reduce health harms.

Additionally, because of historical and ongoing racist policies and practices, such as disinvestment, redlining and exclusionary zoning, Black, Indigenous and Latino communities have experienced negative environmental consequences from industrial, commercial and governmental policies and practices.

Based on measures of water quality and water infrastructure, Ohio received a C-minus rating in the American Society of Civil Engineers' 2021 Infrastructure Report.[1] This rating means that Ohio's water infrastructure is in fair or good condition, but shows signs of deterioration with increasing vulnerability to risk.

3 key findings for policymakers

- **Improving water quality**, including a reduction in lead exposure, will lead to improved health for Ohioans.
- **There is a strong policy foundation** for Ohio policymakers to build on to improve water quality, such as investments in H2Ohio, and guard against new challenges.
- **State and local policymakers have opportunities to improve water quality,** such as increasing investment in water infrastructure, ecosystem restoration and evaluating the impact of industrial and commercial development.

Still, Ohio has invested in water quality in recent years through efforts such as **H2Ohio** (a comprehensive water quality initiative working to strategically address Ohio's water quality challenges) and can build off these investments to continue improving Ohio's water, health and well-being.

This policy brief focuses on the importance of clean water and the many effects that water pollution and deteriorating infrastructure can have on health throughout life, highlighting data and information for policymakers to improve Ohio's water quality, including:

- How poor water quality affects health
- Which Ohioans are most affected by poor water quality
- What Ohio has done to address water quality and additional steps the state can take

What is water pollution and how does it impact health?

Water is a foundational need for all life. Water quality describes the condition of the water and if it is usable for a variety of purposes, such as drinking or swimming, based on selected physical, chemical and biological properties.[2] Water pollution, on the other hand, is the contamination of bodies of water by harmful substances, such as chemicals or microorganisms.[3] These harmful substances, called pollutants, can contaminate water at its source or when it is distributed or stored for consumption and use.[4] There are three general sources of water pollution:

- Agricultural runoff
- Poor infrastructure, including lead pipes
- Industrial contaminants and pollutants

Key terms

- **Cyanotoxins**. Highly potent toxins that negatively affect human health.[5]
- **Disparities**. Avoidable, patterned differences in outcomes across populations or communities.
- **Groundwater**. Water that exists underground in saturated zones beneath the land surface. It fills the pores and spaces in underground material like sand, gravel and other rock. The water may flow naturally and may be able to be pumped for drinking water and agricultural use.[6]
- **Inequities.** Unequal and unfair conditions that are the underlying drivers of disparities. For example, inequitable access to a quality education can lead to disparities in employment or wages.
- **Lead leaching.** The process of lead being extracted from its carrier substance by a solvent.[7]
- **Per- and Poly-fluoroalkyl substances (PFAS)**. A class of human-made chemicals widely used in products, like Teflon and firefighting foam, for their water-resistant and non-stick properties.[8]
- **Source water.** Rivers, streams, lakes, reservoirs, springs and groundwater (i.e., sources of water) that provide water to public drinking water supplies and private wells.[9]
- **Water distribution system.** Physical infrastructure designed to carry drinking water from a centralized treatment plant to consumers' taps. The main elements of this system include pipes, pumping stations, fire hydrants, house service connections and storage facilities.[10]
- **Water service lines.** Underground pipeline to carry water from a municipality's public water supply directly to private, indoor plumbing fixtures.[11]

Agricultural runoff and harmful algal blooms

Some conventional agricultural practices contribute to water contamination, including overgrazing of pastures, excessive land use and improper application of pesticides, herbicides and fertilizers.[12] Livestock manure and an excess of chemicals in products applied in fields pollutes water as agricultural runoff. This runoff can produce high levels of nutrients such as nitrogen and phosphorous in the water, a condition called nutrient pollution. It is estimated that about 85% of phosphorus in lake water comes from agricultural sources.[13]

In addition to agricultural runoff, stormwater is another source of excess nitrogen and phosphorous in water (nutrient pollution).[14] Stormwater can carry pollutants like oil, dirt, chemicals, heavy metals, lawn fertilizer, road salts and contaminants from construction into streams and rivers.[15]

Pollutants from runoff can contaminate groundwater, which is used for drinking water, especially in rural areas through wells and pumps.[16] Over 13 million households in the U.S. rely on private wells for drinking water. Private wells are less regulated (private wells only need tested for contamination when they are installed in Ohio), making them more susceptible to contamination.[17] Along with those who use private wells for drinking water, farm workers and rural communities are at increased risk of harm from nutrient pollution due to their proximity to agriculture[18] and the use of water for other purposes, such as bathing and recreation (e.g., filling personal swimming pools).

Nutrient pollution also contributes to harmful algal blooms (HABs) in which algae carpets the water's surface, blocking sunlight, inhibiting underwater plant growth and depleting the water of oxygen. HABs make it impossible for aquatic life to exist in these areas and harm those who depend on fishing.

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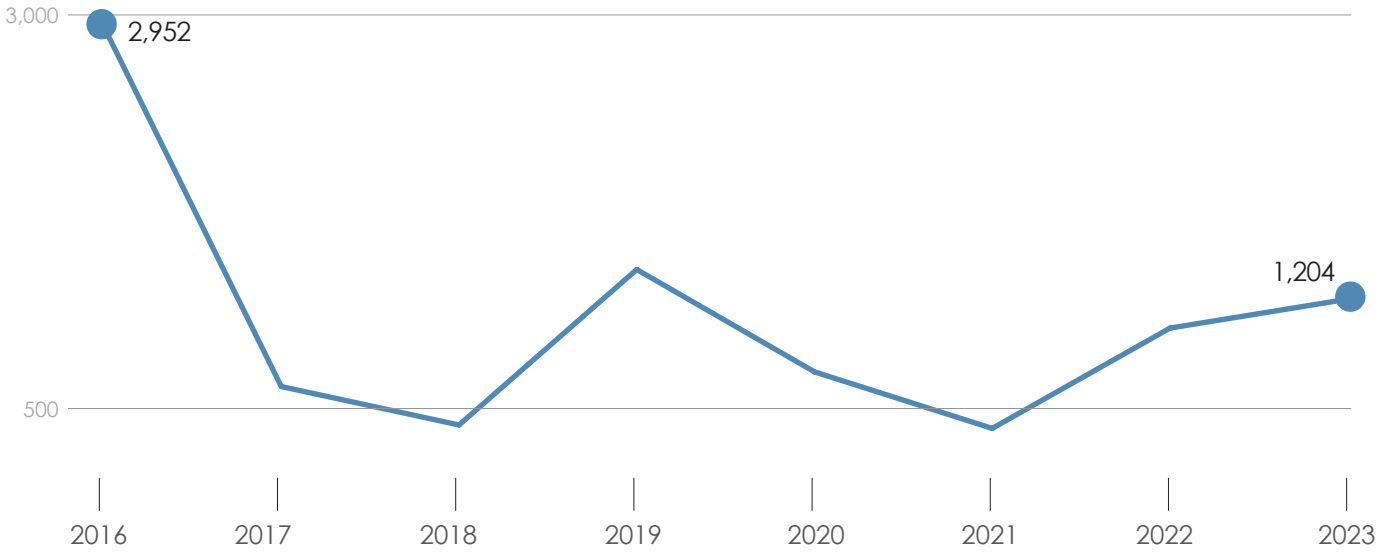
HABs secrete dangerous toxins. Human exposure can occur through ingestion (e.g., swallowing contaminated water, eating contaminated seafood), skin contact and inhalation. Illness can vary depending on how someone was exposed (skin, ingestion, inhalation), how long they were exposed, and the type and amount of toxin. While there is no established "safe level" of HABs, the CDC recommends that people take **precautionary steps** before entering any lake, river or ocean.[19] The Ohio Department of Health (ODH), Ohio Department of Natural Resources (ODNR) and the Ohio Environmental Protection Agency (EPA) also collaborate to annually update HAB thresholds to protect human health.[20]

Exposure to HABs has been associated with adverse short- and long-term health effects, including:[21]
- Disruption of the endocrine and nervous systems
- Blood disorders
- Reproductive impacts, such as irregular menstrual cycles and infertility
- Liver injury and liver cancer
- Disorders of the kidneys, gastrointestinal tract and skin

In addition to health effects, HABs cost Ohioans millions of dollars each year by negatively impacting recreation, businesses and property values.[22]

ODNR and the Ohio EPA are tasked with monitoring and sampling for HABs in Ohio's lakes. When algal blooms exceed thresholds set by the state, an advisory for the affected beach is posted by ODH, ODNR and the Ohio EPA at the beach itself and online. While the number of advisory days (i.e., number of days and Ohio beaches at which the number of toxins exceed a state-established threshold) has fluctuated over the past eight years, 2023 saw the third highest number of advisory days at 1,204 days (displayed in figure 1).

Figure 1. **Number of harmful algal bloom advisory days*, Ohio, 2016-2023**



*The number of advisory days is the total number of days a beach was under advisory (above the sampling threshold) during the season.
Notes: Advisory days are based on thresholds set by the Ohio Departments of Health and Natural Resources and Ohio Environmental Protection Agency for the amount of toxins in water samples. For more information, see **HAB Response Strategy for Recreational Waters**. Data as of 1/22/2024.
Source: Ohio Department of Health

Who is most at risk of exposure to agricultural runoff and harmful algal blooms?

Due to living or working near agriculture and/or large bodies of water, the following communities are at increased risk of exposure to the negative impacts of runoff and harmful algal blooms (HABs):

- **Rural communities.** Increased agricultural land use is associated with increased nutrient pollution in drinking water.[23]
- **Coastal communities.** Northwestern Ohio communities along Lake Erie are more likely to experience the detrimental impacts of HABs.[24] The Maumee River watershed connects agricultural runoff from Northwest Ohio to Lake Erie and is a main driver of HABs.[25]

Poor infrastructure

Water infrastructure refers to the structures and facilities Ohioans rely on to supply and distribute water, including dams, reservoirs, wells, treatment plants and pipelines.[26] Ohio has 4,800 public water systems delivering 1.3 billion gallons of clean drinking water every day, with planned improvements at the local level and plentiful water sources to meet current and future demand.[27] However, the challenge lies in improving Ohio's worsening infrastructure.

According to the **American Society of Civil Engineers**, a significant amount of the state's water infrastructure needs to be replaced or will need to be replaced in the next two decades.[28] For example, the Ohio EPA and H2Ohio estimate that 31% of all household sewage systems in Ohio are experiencing some degree of failure, discharging untreated sewage into waterways.[29] Outdated water distribution networks are vulnerable to damage like leaks, improper connections and corrosion.

Water can also become contaminated after being processed in a water treatment plant, harming the health of the communities served by those treatment systems.[30] Chemicals and microbes can also contaminate private water systems (sources of water for homes, such as wells, that are not connected to a public water system). Since water quality testing on private water systems is only required at installation, this increases the risk of exposure for homes using private systems.[31]

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When contaminants in a public water system exceed levels established by the U.S. EPA, a drinking water violation is issued. In 2022, seven Ohio counties received a violation for at least one of the public systems in the county (displayed in figure 2).

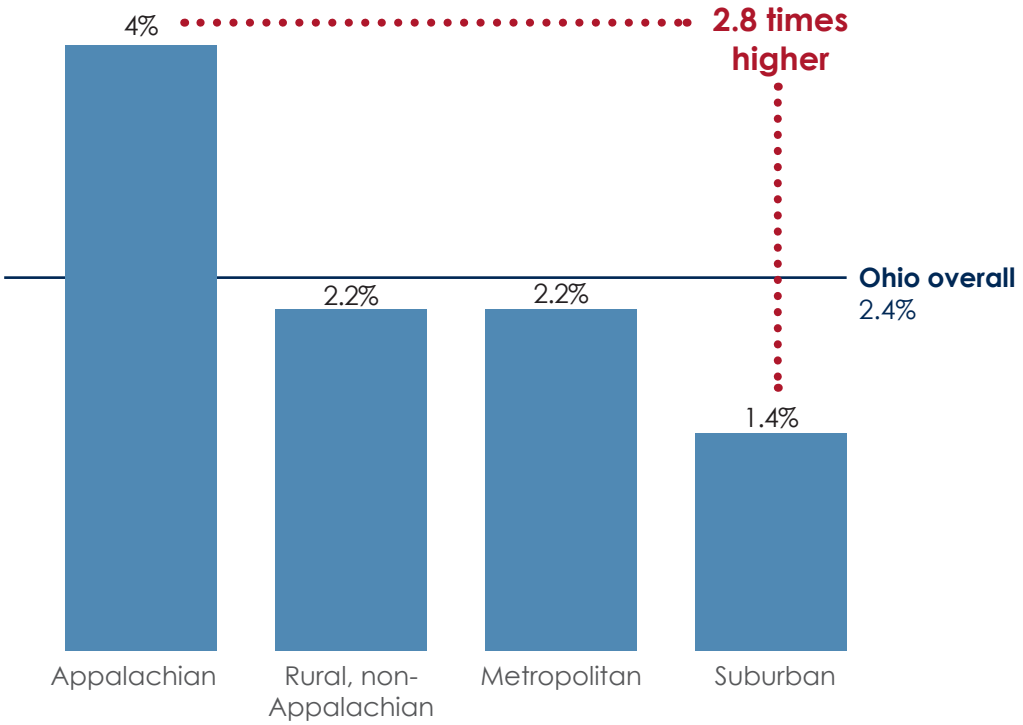
Figure 2. **Number of counties with a drinking water violation, Ohio, 2022**

Note: Drinking water violations are issued for public water systems. Contamination in private systems (e.g., wells) are not included in this figure.
Source: Ohio Environmental Protection Agency Consumer Confidence Reports

In 2021 2.4% of homes across Ohio (**124,761 homes**) lacked hot and cold running water and/or a bathtub or shower.

Despite Ohio having thousands of public water systems serving Ohioans across the state, not every Ohioan has complete access to running water. Figure 3 highlights that, in 2021, 2.4% of homes across Ohio (124,761 homes) lacked hot and cold running water and/or a bathtub or shower (i.e., complete plumbing facilities). Lack of complete plumbing was the worst in Appalachian communities, with 4% of homes (35,495 homes) lacking complete access.

Figure 3. **Percent of households without complete plumbing facilities*, by county type, Ohio, 2021**



*Complete plumbing facilities include: (a) hot and cold running water and (b) a bathtub or shower. Both facilities must be located inside the house, apartment, or mobile home, but not necessarily in the same room. Housing units are classified as lacking complete plumbing facilities when either of the two facilities is not present.
Source: U.S. Census Bureau, American Community Survey 5-year estimates

Lead infrastructure and health

Lead is a potent chemical that can cause irreversible adverse health outcomes throughout life.[32] Water service lines and household plumbing often contain lead, specifically those installed before the 1986 Safe Water Drinking Act prohibited lead in water service lines.[33] As the pipes deteriorate, the lead used in them can leach into the water.[34]

There is no safe level of lead exposure, with consequences of lead poisoning documented even at low blood lead levels (under 5 micrograms per deciliter).[35] Timely identification and prevention of lead exposure is crucial because the burden of lead-related illness can be lifelong,[36] with babies and young children particularly impacted:[37]

- **Fetuses** can be exposed to lead during pregnancy by the chemical passing through the placenta. Fetal lead exposure can increase the risk of negative birth outcomes such as premature birth and delayed fetal development.[38]
- **Infants** who mostly consume mixed formula are at an increased risk of lead exposure through contaminated water. It is estimated that infants can receive 40-60% of their total exposure to lead from drinking water in formula.[39]
- **Children less than six years old** exposed to lead or born to lead-exposed mothers can experience behavior and learning problems, mental and physical developmental delays, hyperactivity, anemia and hearing problems.[40]
- **Ohioans over the age of six** can have lead stored in the bones from childhood exposure, where it builds up over time.[41] Although lead toxicity can decrease over time, childhood exposure can cause health problems for older children and adults, such as increased risk of high blood pressure, cardiovascular problems and kidney damage.[42]

The most effective way to prevent lead exposure from drinking water is by replacing lead-containing materials from household plumbing, service lines and other water infrastructure that may have been made with lead.

The U.S. EPA estimated in September 2023 that Ohio had at least 369,077 lead service lines, but could have as many as 745,061 lead lines, based on EPA projections of lines with unknown materials (657,490 pipes of unknown material).[43] This estimate puts Ohio among the states with the highest number of lead service lines, along with Illinois, Pennsylvania, New York, Florida and Texas.[44] However, no comprehensive map or inventory of lead service lines in Ohio has been made, making it hard to know where they are and how to invest strategically in communities with the most lead lines.

Still, Ohio has made progress in investing in mapping, inventorying and replacing lead services lines across the state. Figure 4 shows current H2Ohio funding, per capita, for lead service lines by county type. Appalachian counties have the largest investment at $1.16 per person, and suburban regions have the smallest investment at $0.37 per person. Metropolitan counties received the most total funding from H2Ohio for lead line mapping and replacement, but this investment may not meet the per capita needs of the communities. These counties have received $3,386,593 overall, at $0.55 per person, compared to $2,435,121 ($1.23 per person) in Appalachian counties.

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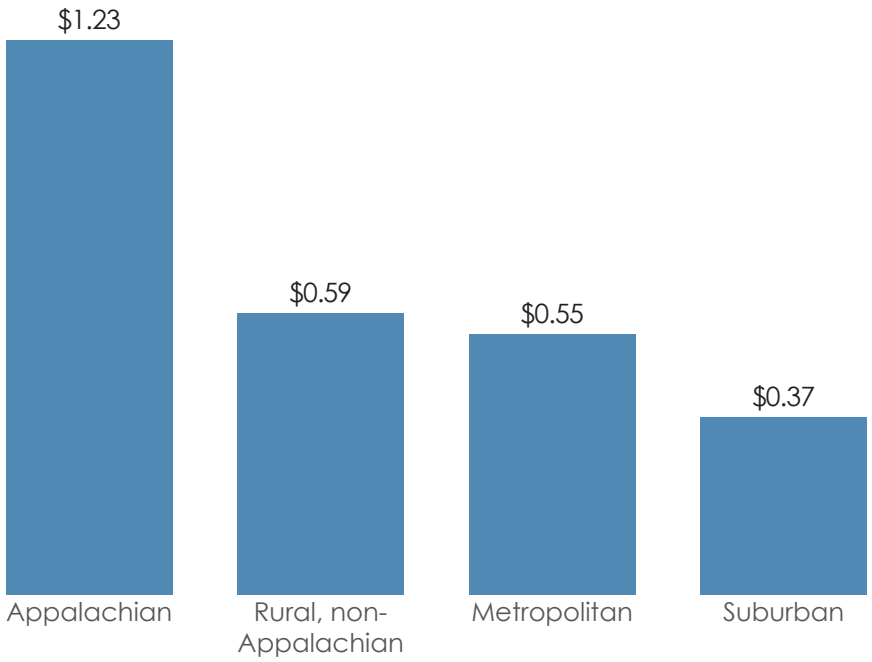
Figure 4. **Per capita H2Ohio funding for lead service line replacements, inventory and mapping projects, by county type, Ohio, 2024***



*Includes projects that have been completed, announced or are active as of Jan. 18, 2024
Note: This figure does not include funding from the federal Infrastructure Investment and Jobs Act (Bipartisan Infrastructure Bill). Funding from the Act is distributed through the State Revolving Loan Fund, not H2Ohio.
Source: H2Ohio Program

Who is most at risk of poor water infrastructure and lead exposure?

Certain groups of Ohioans are more likely to live in an area with inadequate water infrastructure, including older or lead service lines. Historical and ongoing policies have shaped the conditions in which people live, including access to adequate water infrastructure. The following groups are most impacted by these conditions:

- **Urban, low-income and communities of color**. These groups are more likely to live in communities and homes with worsening infrastructure and are less likely to be able to afford infrastructure improvements at the individual level.[45]
- **People who live in older homes and communities.** Homes built before 1986 are more likely to have lead pipes, fixtures and welding. Older communities are also more likely to have water supply systems connecting homes to water mains made with lead pipes.[46]
- **Households that use well water.** There is growing evidence that exposure to lead in private well water may be more prevalent than previously recognized and may be greater than water supplied by a municipality.[47] Homes relying on private wells are at an increased risk of lead exposure from corroded private infrastructure. Private water systems (e.g., wells) are not regulated by the Safe Water Drinking Act like public water systems, and in Ohio, wells are only required to be tested upon installation.
- **Pregnant mothers, infants and children**. Lead exposure is especially detrimental to health during pregnancy and for infants and children.

Industrial contaminants and pollutants

Industrial, manufacturing and other processes can affect water quality, producing pollutants such as per- and polyfluoroalkyl substances (PFAS) and heavy metals.

PFAS, also known as "forever chemicals," do not biodegrade quickly in the body or in nature. There is growing evidence of the negative health impacts of PFAS, which can be found in drinking water, fish and other sources.[48] Exposure to PFAS can negatively impact child and infant growth and development, fertility and reproduction and functioning of the thyroid, liver and immune system.[49]

The international science community documented the harms of PFAS in the **2014 Madrid Statement**. This consensus statement laid out steps for governments and others to take to prevent and mitigate exposure to PFAS and was signed by over 250 science professionals from across the globe, including some from Ohio.

Heavy metals, like arsenic, copper and lead, contaminate drinking water and have acute and chronic health risks, including liver, kidney and intestinal damage and cancer.[50] Exposure to heavy metals can occur through a variety of sources:[51]

Industrial, manufacturing and other processes can produce water pollutants, including PFAS (or "forever chemicals") that do not biodegrade quickly in the body or in nature.

- Household plumbing and service lines
- Municipal waste disposal
- Industrial activities including mining, fracking, petroleum refineries and electronics manufacturers
- Natural mineral deposits

Recreational exposure, such as swimming and fishing, to lead in water is also of particular concern because of its long-term use in commerce and industry. It can appear in high concentrations near gun ranges and historical and ongoing mines, among other sources.[52]

Emerging research is also focused on the impact pharmaceuticals, including over-the-counter medication, illicit substances (e.g., fentanyl) and common stimulants (e.g., caffeine) have on Ohio's water quality and the ecosystem. Pharmaceuticals in water negatively affect wildlife and recreation, specifically fishing.[53]

Who is most at risk of exposure to industrial contaminants?

Increased risk for exposure to industrial contaminants such as PFAS largely depends on where someone lives or their occupation. Communities at higher exposure risk include:

- **Appalachian communities.** People who live in Appalachian communities are more likely to be exposed to water pollution resulting from fracking.[54] Fracking is more concentrated in these communities because of large deposits of natural gas in the Appalachian Mountains.
- **Low-income and communities of color.** Sources of industrial contamination including military sites, airports, industrial sites and wastewater treatment plants are often located in, or close to, low-income communities and communities of color.[55]
- **Industrial workers.** People who work in jobs that involve the making or processing of PFAS and PFAS-containing materials are more likely to be exposed to PFAS compared to the general population.[56]
- **Pregnant and lactating mothers, infants and children.** Pregnant and lactating mothers, infants and children drink more water per pound of body weight, which increases their exposure to pollutants. Breastmilk from mothers who have PFAS in their blood and infant formula made with contaminated water can increase exposure for infants. PFAS may also impact fetuses in utero.[57] Water pollution caused by fracking has also been linked to poor birth outcomes.[58]

Climate change and water quality

The health of humans, animals and ecosystems depends on the health of our planet. Research has shown that the average temperature of the earth has increased in recent decades because of greenhouse gas emissions.[59] Climate change threatens water quality in the following ways:

- **Increased exposure to pollution.** Climate change is expected to increase the frequency of severe precipitation events. Increases in heavy precipitation harm crops and increases agricultural runoff.[60] As discussed on page 2, runoff affects source water quality. Excessive rain can cause flooding, which can overflow water management systems and natural sources (e.g., lakes and rivers). This increases risk of exposure to microbes that cause infectious disease.[61]
- **Lower water levels.** Higher ambient temperatures and drought result in lower water levels for lakes, streams and other sources, concentrating the level of any contaminants.[62]

Water policy in Ohio

The Ohio General Assembly (GA), state agencies and local governments have implemented several water and environment-related policies in recent years. Additionally, there are recent federal policy changes that can be leveraged by Ohio policymakers to improve water quality in the state. Examples of these state, local and federal policy changes are detailed below.

State agencies and executive branch example

H2Ohio, created by Governor Mike DeWine in 2019, is a partnership between the Ohio Department of Natural Resources (ODNR), Ohio Department of Agriculture (ODA), the Ohio EPA, the Ohio Lake Erie Commission and other partners across the state. The partnership has received funding from the state legislature since its establishment.

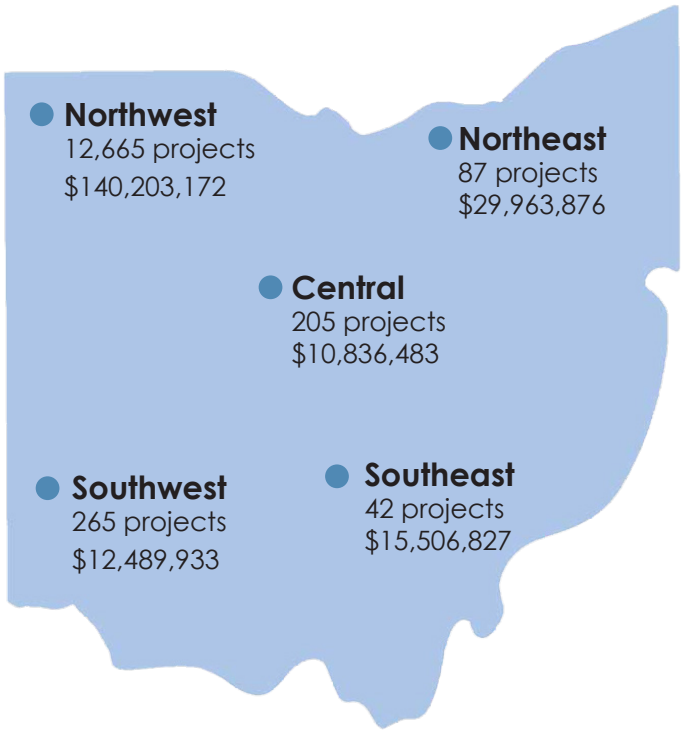
H2Ohio is focused on addressing Ohio's water quality challenges, particularly agricultural runoff, worsening infrastructure and lead contamination, dam removal, land conservation and PFAS.[63] The partnership allows each partner to coordinate efforts and strategically invest in improving Ohio's water quality.

Figure 5 highlights the number of H2Ohio funded projects and total funding received in each region of the state. Northwest Ohio has the most H2Ohio-funded projects, with 12,665 projects and a combined funding over $140 million, indicating the state's focus on improving water quality in the Western Basin of Lake Erie.

In 2023, H2Ohio awarded:

- $16.7 million in **water infrastructure grants** through the Ohio EPA for 14 projects across the state. The grants focus on supporting drinking water and wastewater systems, including extending water and sewer services to underserved areas and eliminating inadequate treatment systems. The funding will also support opportunities for communities to share the costs associated with building, operating and maintaining the infrastructure needed to provide safe and clean water.
- $8.2 million in grants for 12 new **wetlands projects** through ODNR. These are the latest round of grants from H2Ohio's Statewide Wetland Grant Program, which provides up-to-100% project funding for natural infrastructure projects focused on nutrient reduction and water quality improvement. Twelve projects in 11 counties received funding in the latest grant allotment. A total of 171 wetland projects have received funding since the start of the program and once completed, are cumulatively expected to reduce nitrogen by 798,000 pounds and capture 159,000 pounds of phosphorus every year.

Figure 5. **H2Ohio project funding and total projects by region, 2021-2023**

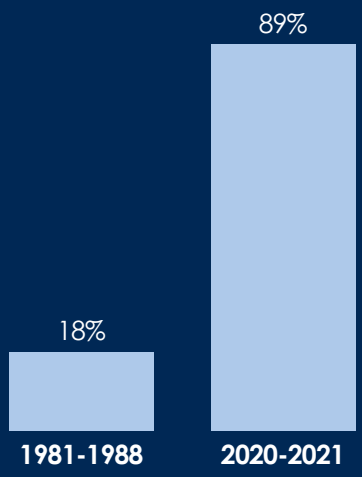


Notes: The figure includes H2Ohio projects and funding for lead service line inventorying, mapping and replacements; home sewage treatment system replacements; water and sewer infrastructure improvements; voluntary nutrient management plans; and wetland and floodplain reconnection and restoration. Funding amounts are rounded to the nearest dollar.
Source: H2Ohio Program

Policy impact

Policy efforts have led to substantial improvement in the quality of Ohio's water. For example, a study by the Ohio EPA in 2020-2021 found that 89% of Ohio's rivers met standards at the time of the study, compared to 18% in the 1980s (displayed in figure 6).[64] Most river pollution in the 1980s was related to toxic chemicals or sewage, whereas today, the pollution in the river is related to over-enrichment (i.e., nutrient pollution). Policy efforts to upgrade and modernize sewage collection and treatment and soil conservation are the biggest contributors to improvement.[65]

Figure 6. **Percent of Ohio rivers that met water quality standards, 1981-1988 and 2020-2021**



Note: The study of Ohio's rivers grouped water quality surveys of the rivers from 1981-1987, prior to wastewater improvements, and from 2020-2021.
Source: Ohio EPA (2024)

Ohio General Assembly examples

House Bill (HB) 33, the 2024-2025 state operating budget, included several provisions related to water quality. Specifically, the budget:

- Allocated funding for the soil and water phosphorous program through the ODA to H2Ohio.
- Provided incentives for farmers along the Maumee River to develop a voluntary nutrient management plan (VNMP) to reduce phosphorous runoff. VNMPs are developed in consultation with local Soil and Water Conservation Districts and help farmers improve the health of their soil while also reducing nutrient pollution.
- Provided funding for soil and water conservation districts in the Western Lake Erie Basin and other priority regions identified by the Director of ODA.
- Funded wetland restoration through the ODNR budget to H2Ohio.
- Allocated dollars for the Lake Erie Commission to fund a research group to refine Ohio's current method for evaluating the expected nutrient reduction in the state's water because of H2Ohio projects.

In 2022, the GA passed **HB 175**, which reduced regulations on most ephemeral streams (also called ephemeral features) to match federal regulations under the federal Clean Water Act of 1972 (CWA). Ephemeral streams are streams that are produced by rainfall, rather than groundwater, and that are present only during wet weather or for only part of the year.[66] Specifically, the bill:[67]

- Removed regulations that went beyond those identified in the CWA and prevented the Ohio EPA director from creating new regulations that go beyond the CWA.
- Required the Ohio EPA, ODNR and the Ohio Department of Transportation to appoint an agency designee and an alternate to the federal interagency review team (review teams are required under the CWA) to advise the U.S. Army Corps of Engineers on mitigation projects related to restoration, creation, enhancement or preservation of wetlands, streams and other aquatic resources.

Opponents of the legislation stated that ephemeral streams are an important part of the water ecosystem because they feed into larger waterways, such as lakes and rivers, and can carry runoff pollution that contributes to harmful algal bloom development.[68] Supporters of the legislation stated that the bill would decrease regulatory burden on businesses, while still protecting waterways.[69]

Federal regulation of ephemeral features has been in flux in recent years. The CWA made it illegal to drain, fill in or pollute "waters of the United States" without a permit, but did not define what waterways were included. An Obama-era rule included ephemeral streams in the definition of "waters of the U.S." The Trump administration rescinded that rule in September 2019, and in January 2020 further loosened regulations on ephemeral streams, allowing landowners to dump or discharge pollution into these streams.[70] The Biden administration sought to reinstate the Obama-era regulations, however the U.S. Supreme Court ruled in May 2023 that ephemeral streams (and other waterways that are not permanently flowing) are not defined as "waters of the U.S." under the CWA and therefore not subject to federal regulation.[71] This ruling, combined with HB 175, removed regulations of ephemeral streams in Ohio.

Local government examples

There are several initiatives across the state led by local governments, including projects funded by H2Ohio (displayed in figure 5) and the Ohio Department of Development (ODOD).

The City of Cleveland has dedicated significant policy attention to removing lead from drinking water in the city and surrounding suburbs. The city banned lead service lines in 1954, 32 years before a federal ban in the Safe Water Drinking Act. In 1997, the city started using orthophosphate in water treatment, a food-safe chemical that reduces the risk of lead leaching. Use of the chemical has reduced the presence of lead below federal regulation levels. Cleveland used $2.5 million in funding from H2Ohio and the Ohio EPA to remove lead service lines from all licensed childcare facilities.[72] The city also **published a map** of city-owned lead service lines by census tract and is developing an interactive map for the public.

Rural Action, a community action agency located in Appalachia, is partnering with ODNR, Ohio University, the U.S. Department of the Interior and the Office of Surface Mining Reclamation and Enforcement to clean acid mine drainage that has been emptied into Sunday Creek in Millfield, Ohio (Athens County). The partnership, called **True Pigments**, plans to remove iron oxide pollution from the local watershed and turn it into pigment for paints, dyes and construction. The partnership's goal is to restore the creek, reclaim the land of the former mine and create new economic opportunities in the area through the production of the pigment.[73]

Other examples of local initiatives include:

- **The Village of Paulding (Paulding County)** will receive $750,000 to repair and replace outdated wastewater collection pipes, benefiting 3,635 Ohioans, according to ODOD.[74]
- **The City of Oregon (Lucas County)** is using grants from the U.S. EPA's Great Lakes National Program Office and H2Ohio for a restoration project of the Wolf Creek stream and floodplain. The project will reduce stream bank erosion, improve the habitat and reduce pollution, including agricultural runoff.
- **The City of Beavercreek (Greene County)** will use American Rescue Plan funding to develop stormwater retention facilities to reduce flooding.

Federal government example

In 2021, Congress passed the Infrastructure Investment and Jobs Act, also called the Bipartisan Infrastructure Bill. The Act allocates $1.2 trillion nationally to infrastructure projects, including those related to water infrastructure. Ohio is slated to receive $1.39 billion over the next five years for drinking water and wastewater infrastructure projects, including $735 million for lead abatement. As of November 2023, Ohio received $766.8 million of the water-related funding allotted by the bill, including $238.2 million dedicated to lead pipe and service line replacement.

What can Ohio policymakers do to improve water quality?

The challenges described in this brief impact all areas of Ohio and states across the country. Addressing them requires action at the state, federal and local levels. Policymakers have many opportunities to build on the momentum of the current policy environment to strengthen Ohio's environmental protections, reduce the harms of poor water quality, prevent future risks and increase health equity at the state and local levels. Below are state and local policy recommendations to improve water quality in Ohio.

State recommendations

- The Ohio Department of Health (ODH) and the General Assembly (GA) can explore ways to fund private well replacements to maintain private water systems.
- State agencies can allow the use of **housing rehabilitation loan and grant programs** to make sure that all Ohioans have access to hot and cold running water and showers or baths in their homes.
- The Ohio EPA and ODH can align with recommendations from the **Madrid Statement**, the scientific consensus regarding the persistence and potential harms of PFAS, and other best practices to limit exposure to PFAS when updating the **Ohio PFAS Action Plan for Drinking Water**.
- State policymakers can create an **environmental legislative review process** to assess the environmental impact of actions by the GA and state agencies, in addition to 1969 National Environmental Policy Act requirements. Indiana, for example, requires its state agencies to complete an environmental assessment and impact statement for specific types of projects. These assessments and statements are completed in consultation with each agency that has jurisdiction or special expertise.[75]

State and local recommendations

- State and local policymakers can leverage federal and state grants, such as those from the **Bipartisan Infrastructure Bill**, to map, inventory and replace lead service lines across the state. These maps can be used at the state and local level to strategically invest in service line replacements. Policymakers and other partners should focus on communities with the highest number of lead lines per population. Ohio can also set a goal for completion of the mapping process. The U.S. EPA provided **guidance** to states on developing and maintaining this inventory.
- ODA and H2Ohio can partner with local environmental health professionals and farmers participating in ODA's nutrient management incentive program to evaluate the effectiveness of current best management practices recommended by ODA and explore additional or alternative practices.
- State and local policymakers can review the recommendations from the American Public Health Association's brief **Creating the Healthiest Nation: Water and Health Equity** to address inequities related to water quality and health, including acknowledging the role of systemic racism in creating inequities in accessing clean water and ensuring adequate investment in water infrastructure.
- State agencies, such as the Ohio Department of Transportation, can work with municipal and county policymakers to explore the use of **permeable pavement** as a means of reducing stormwater runoff. The **Pennsylvania Department of Transportation** has used permeable pavement in walking and bike paths and parking lots.

Policymakers have many opportunities to build on the momentum of the current policy environment to strengthen Ohio's environmental protections, reduce the harms of poor water quality and increase health equity at the state and local levels.

- State and local policymakers can fund evidence-based green infrastructure projects, such as **bioretention systems** like rain gardens, green roofs and planter boxes, to reduce flooding and stormwater runoff. Bioretention is a process that manages stormwater runoff by controlling water quality and removing pollutants and nutrients from the water.[76]

Local recommendations

- Local policymakers can implement **multi-component groundwater management programs** to reduce groundwater pollution and improve water quality at the local level, especially in rural communities.
- City and county policymakers can set a goal for mapping and replacing all lead service lines in their area. For example, Grand Rapids, Michigan set a goal in its Water/Sewer Comprehensive Master Plan to replace all lead service lines within 20 years.[77] The city provides a **water service line map** that details which lines need serviced because they contain lead, which lines are up to code and lines that are unknown (i.e., untested).

Looking forward

Through dedicated policy focus at the state, federal and local levels, Ohio has seen substantial improvement in the quality of its water. Still, there are challenges facing the state presently and in the future that could hinder progress without targeted focus. State and local policymakers have laid a strong foundation for Ohio to continue to address its challenges and set Ohio up as an example of environmental policy.

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