

Protect Groundwater Sources of Drinking Water



CALL TO ACTION:

1. Act now to safeguard, maintain, and protect unseen and often vulnerable groundwater sources of drinking water.
2. Collaborate with partners, gather data and information on sources of groundwater contamination and threats, and educate and inform decisions to protect it.

Why it Matters

At least one-third of the US and half the global population relies on groundwater for their drinking water source. Groundwater sources also furnish irrigation water for a significant amount of food production. Aquifers providing drinking water from groundwater sources are typically unseen, often vulnerable, and require proactive, front-line land use controls and defense actions to safeguard, maintain, and improve drinking water quality and quantity. Protecting drinking water sources provides economic, environmental, social, and public health value. Once groundwater is contaminated, it is more costly to pay for advanced treatment and other difficult and expensive measures to clean up and remove contaminants.

Protecting Groundwater Sources Is Challenging

Characterization: The subsurface conditions affecting groundwater movement are hidden and difficult to characterize. This presents challenges for local decision-makers and the public in understanding local groundwater flow and managing the movement and fate of groundwater-based drinking water supplies and preventing or controlling contamination threats and incidents for water utilities.

Subsurface Contamination: Groundwater offers added protection compared to surface water because soil, sediment, rock layers, and other geologic formations filter and diffuse contaminants as water travels from the surface to drinking water wells. Shallow groundwater is more vulnerable to contamination from the land surface due to shorter travel pathways, while deeper groundwater is generally better protected by longer distances and greater travel times, such as from chemicals used in the last century. However, both shallow and deep groundwater sources can be impacted by land use activities such as agriculture, industry, stormwater infiltration, poorly constructed nearby wells, and waste disposal.

Incomplete Monitoring: Chemical contaminants in groundwater can only be detected through sampling and analysis from drinking water or monitoring wells. Many water utilities lack monitoring wells due to expense and lack of identified needs. Groundwater and surface water sources may also contain unregulated contaminants with no federal or state monitoring or treatment guidance, leaving some water utilities unaware of these substances.

Federal and State Programs for Groundwater Protection

The 1986 Safe Drinking Water Act (SDWA) amendments required states to establish wellhead protection (WHP) programs and delineate WHP areas—from simple fixed-radius circles around wells to more sophisticated mathematical models of groundwater contributing areas. Ten years later, the 1996 SDWA amendments required states to delineate source water protection (SWP) areas for water utilities using both surface and ground water sources of drinking water. They were also required to identify potential/actual contaminants and sources and share results publicly. The SDWA does not mandate SWP programs. Though some states have their own water utility requirements to develop and implement SWP plans and protect SWP areas, SWP actions in other states remain voluntary. The goals, scope, and actions of state SWP programs vary based on local conditions, source water quality and quantity, groundwater availability, contaminant threats and concerns, financial and technical resources, degree of community involvement, and many other factors. State SWP planning and program implementation can focus on statewide, regional, or local policies and activities.

Additional Federal, State and Local Frameworks/Programs to Protect Groundwater

Underground Injection Control (UIC) Program: Established under the SDWA in 1974, under which EPA develops minimum federal requirements for state or other UIC programs and other safeguards to protect public health by preventing injection wells from contaminating current and future underground sources of drinking water. UIC programs are overseen by EPA or by states, territories, or tribes with appropriate enforcement authority.

Sole Source Aquifer (SSA) Program: Established under SDWA, which authorizes EPA to designate an aquifer as a sole source of drinking water and establish a review area. EPA reviews proposed projects that will both (a) be located within the review area and (b) receive federal funding. The review area includes the area overlying the SSA and may also include the source areas of streams that flow into the SSA's recharge zone. EPA's review is intended to ensure that the projects do not contaminate the SSA.

Clean Water Act (CWA) - Water Pollution Control (Section 106) Grant Program funds can be used for SWP and well head protection actions that protect groundwater used for drinking water.

CWA - Water Quality Management Planning Grants (CWA Section 604(b)) Program provides noncompetitive funding to states and territories to conduct essential water quality management planning activities in partnership with area planning organizations to assist them in achieving their clean water goals. Water quality planning allows states and territories to undertake a wide variety of activities such as characterizing the quality of waterbodies and the impacts of pollution on human health and the environment and developing strategies to protect high-quality water and restore degraded waters.

CWA - Section 319 Nonpoint Source Management Program provides grant funding to states, territories and tribes to implement their nonpoint source program that can include education, training, technology transfer, demonstration projects and monitoring to assess the success of implementation projects. These funds support a balance of protection and restoration projects.

CWA - EPA's Healthy Watersheds Program focuses on protection efforts is a key outgrowth of the 319 program. For example, these funds have been used for WHP projects in Nebraska.

State Revolving Fund Programs: The Clean Water State Revolving Fund (CWSRF) and Drinking Water State Revolving Fund (DWSRF), can provide financial assistance to public, private, and nonprofit entities for a wide variety of groundwater-based SWP projects. Each of the 50 states and Puerto Rico receives annual capitalization grants from EPA, which in turn are used to provide low-interest loans and other types of assistance to eligible recipients. The CWSRF may [provide financing to eligible recipients](#) for projects that protect and restore groundwater, such as pump and treat or aquifer recharge projects, as well as leachate control and septic system replacement. Under the DWSRF, states can keep a portion of their capitalization grant as "set-asides" to fund DWSRF and related programs (e.g., capacity development, SWP, operator certification) and provide non-infrastructure support to communities. States can use set-asides to administer the state SWP program, to provide technical assistance, and to fund implementation activities. The DWSRF may provide [financing to eligible recipients](#) for projects that protect groundwater, such as capping wells, fixing septic systems, or land acquisition and conservation easements on groundwater recharge areas. Links to each state program are available on the [CWSRF](#) and [DWSRF](#) websites. See the [DWSRF Fact Sheet](#) and [CWSRF Fact Sheet](#).

State Groundwater Quality Standards, such as those established by the State of Washington, protect existing and future beneficial uses through the reduction or elimination of contaminants discharged to the subsurface, groundwater management areas and cleanup programs.

Federal Regulatory Programs: Regulatory programs under federal statutes: Underground Storage Tank (UST), Superfund (CERCLA), Resource Conservation and Recovery Act (RCRA), Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), Toxic Substance Control Act (TSCA).

Agriculture Improvement Act of 2018 (Farm Bill): Includes provisions that make SWP a goal and specific focus of the conservation programs. The Natural Resources Conservation Service (NRCS) of the U.S. Department of Agriculture is directed to work with water utilities, [identify priority areas](#) and spend at least 10% of conservation funds (except for the Conservation Reserve Program) on SWP.

Local Land Use Measures: Local land use ordinances, zoning bylaws, or other measures instituted by local governments, which can be coupled with federal and state programs to strengthen SWP and assessment efforts.

Groundwater Protection Action Framework

While many SWP activities are voluntary, this table includes opportunities for states and water systems to support groundwater supply protection.

Framework Steps	Action Items	Goals
<i>Capacity Building and Engagement</i>	Collaborate with the U.S. Geological Survey and state geological surveys	Better characterize groundwater quality and movement. Develop and implement strategies and best management practices to minimize or eliminate contaminant releases.
	Establish partnerships with governmental, private, non-profit, environmental, industry, agriculture, and other organizations.	Develop and implement strategies using best management practices and state regulatory/permitting programs (if available) to minimize or eliminate contaminant releases in SWP areas.
<i>Research and Data Collection</i>	Gather data on historic land use and agricultural, industrial, or commercial activities within SWP areas.	Identify legacy contamination for future action.
	Review previous work and research on SWP areas and assessments.	Update SWP areas, identify contaminants of concern, and develop effective SWP strategies.
<i>Funding</i>	Work with organizations such as NRCS and state environmental and public health departments.	Leverage funding for SWP, including Farm Bill Conservation and Forestry Titles, Clean Water and Drinking Water SRFs, and Section 319 grants.
<i>Implementation</i>	Characterize threats from contaminants based on the nature of releases.	Alleviate potential SWP impacts such as injection wells, infiltration of chemicals or contaminated stormwater.
	Develop and implement monitoring programs	Track contaminant movement and apply risk mitigation measures where indications show contaminants entering aquifers.
	Develop outreach and education initiatives for landowners.	Educate and increase awareness of landowners within wellhead and SWP areas.
	Integrate land use planning with water resource management.	Build into model ordinances, zoning requirements, permitting and other institutional controls to safeguard groundwater.

Examples of Proactive and Model State Strategies

Minnesota: Minnesota has embraced a watershed-based approach to address its 81 major watersheds. Restoration and protection strategies are being developed to help prioritize and target local efforts for restoring watershed and groundwater resources as part of the local water planning process. Groundwater Restoration and Protection Strategies (GRAPS) reports utilize existing state data and information about groundwater and land-use practices affecting groundwater quality and quantity in watersheds. These reports provide targeted actions and strategies for restoring and protecting groundwater, which are coordinated with Watershed Restoration and Protection Strategies (WRAPS) reports to inform local watershed management plans. <https://www.health.state.mn.us/communities/environment/water/cwf/localimplem.html>



Nebraska: The Natural Resources Districts (NRDs) in Nebraska play a key role in conserving and protecting natural resources, including groundwater used for water supply. NRDs collaborate with producers and use funds from various sources, including NRCS, to promote best management practices (BMPs) in groundwater management areas (GWMAs). These practices help protect groundwater quality, and NRDs offer financing and technical assistance for proper closure of abandoned and unused wells. NRDs also develop programs to support communities in protecting their drinking water supply sources as needed. <https://www.nrdnet.org/programs/water>

New Hampshire: The New Hampshire Department of Environmental Services (NHDES) provides grants and technical support to communities and water suppliers for developing and implementing drinking water source protection plans. Support includes training and model groundwater protection ordinances and regulations. Grants for permanent protection of water supply lands are available through the state's Drinking Water and Groundwater Trust Fund. NHDES encourages collaboration across communities for long-term SWP planning and supports the reclassification of groundwater resources. Reclassification involves state designation and state-local implementation of land use restrictions and other protections. <https://www.des.nh.gov/water/groundwater>

Indiana: The Indiana Department of Environmental Management (IDEM)'s Ground Water Section offers guidance to public water systems for establishing Wellhead Protection and Source Water Assessment Plans, as well as support for private well owners. The Section operates a Ground Water Monitoring Network (GWMN), collecting untreated water samples statewide to characterize groundwater and raise awareness of local and statewide groundwater quality. The GWMN aims to provide a comprehensive understanding of groundwater across Indiana and identify areas with impaired groundwater quality due to natural or human influences. <https://www.in.gov/idem/cleanwater/2450.htm>

Nevada: Nevada's Integrated Source Water Protection approach is especially beneficial for small public water systems (PWSs), which are primarily groundwater systems serving rural communities. These PWSs often have limited capacity and authority to develop and implement SWP programs. Nevada addresses this by developing countywide plans that cover all PWSs within a county, ensuring that small systems are included and protected under regional plans. Each county has the authority and capacity to implement SWP practices at the regional level. <https://ndep.nv.gov/water/source-water-protection>

Helpful Resource: [Guide for Land Use Planners](#)