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A PUBLICATION OF THE GROUNDWATER FOUNDATION

A Call to Action

Recommitment to Assessing and Protecting Drinking Water Sources

The Source Water Collaborative (SWC) is made up of national organizations united to protect America's drinking water at the source – in the lakes, rivers, streams and aquifers we tap for drinking purposes. The SWC formed in 2006 with the goal to combine the strengths and tools of a diverse set of member organizations to act now, and protect drinking water sources for generations to come.

The vision of the SWC is simple: All drinking water sources are adequately protected. As a result, the nation gains profound public health advantages and economic benefits.

Why a Call Now?

The nation faces water quality and quantity challenges that are both pressing and ongoing. Persistent threats and disastrous chemical spills highlight the importance of safe drinking water to public health and local economies. The public and private costs of inaction can be extensive. Together, we must consider lessons learned and apply newly available resources to prioritize threats and protect all drinking water sources. Recent events demonstrate that additional action by federal, state, and local partners can and must be taken to effectively protect drinking water sources.



Our Vision for the Future: The Nation's Source Waters are Protected

The SWC's vision includes the following elements:

Federal, State, and Local Actions Reflect the High Value of Safe Drinking Water: The high value of drinking water is widely recognized at all levels of government and among the general public, by regular and systematic actions to help ensure sufficient, high quality water into the future.

Source Water Protection is Embedded into Our Processes: Source water protection is "hard-wired" into everyday practice at federal, state, and local levels.

All Stakeholders Work to Help Protect Drinking Water Sources: Stakeholders across multiple fields and sectors are invested in source water protection.

To accomplish this vision, the SWC recommends the following key actions:

1. Update/improve source water assessments and protection plans to prioritize risks and actions, by leveraging new data and tools.
2. Take priority actions to protect sources of drinking water, working with key partners.
3. Coordinate, plan, and communicate in advance with key "upstream" partners as well as within water utilities to help ensure that, in an event, rapid emergency notification is provided to facilitate activation of mitigation measures.

Key Actions for Leaders and Stakeholders

Source water protection ultimately takes place at the local level, and those on the front lines of drinking

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Mission of The Groundwater Foundation:

To educate people and inspire action to ensure sustainable, clean groundwater for future generations.

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National Water-Use at Lowest Levels Since Before 1970

Water use across the country reached its lowest recorded level in nearly 45 years. According to a new USGS report (found online at <http://pubs.usgs.gov/circ/1405/>), about 355 billion gallons of water per day (Bgal/d) were withdrawn for use in the entire U.S. in 2010.

This represents a 13 percent reduction of water use from 2005 when about 410 Bgal/d were withdrawn and the lowest level since before 1970.

In 2010, over 50 percent of the total withdrawals in the U.S. were accounted for by 12 states in order of withdrawal amounts: California, Texas, Idaho, Florida, Illinois, North Carolina, Arkansas, Colorado, Michigan, New York, Alabama and Ohio.

California accounted for 11 percent of the total withdrawals for all categories and 10 percent of total freshwater withdrawals for all categories nationwide. Texas

self-supplied industrial water. Withdrawals declined in each of these categories. Collectively, all of these uses represented 94 percent of total withdrawals from 2005-2010.

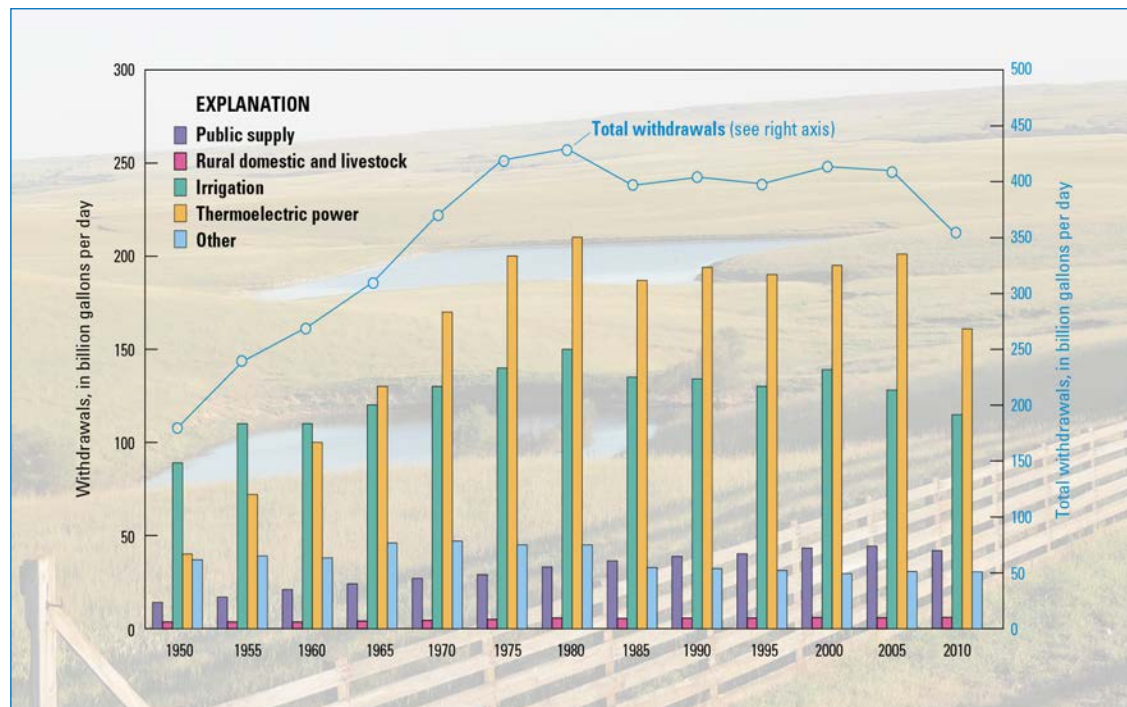
- Thermoelectric power declined 20 percent.
- Irrigation withdrawals declined 9 percent.
- Public-supply withdrawals declined 5 percent.
- Self-supplied industrial withdrawals declined 12 percent.

“Irrigation withdrawals in the United States continued to decline since 2005, and more croplands were reported as using higher-efficiency irrigation systems in 2010,” said Molly Maupin, USGS hydrologist. “Shifts toward more sprinkler and micro-irrigation systems nationally and declining withdrawals in the West have contributed to a drop in the national average application rate from 2.32 acre-feet per acre in 2005 to 2.07 acre-feet per acre in 2010.”

For the first time, withdrawals for public supply declined, despite a 4 percent increase in the nation’s total population. The number of people served by public-supply systems continued to increase and the public-supply per capita use declined to 89 gallons per day in 2010 from 100 gallons per day in 2005.

Declines in industrial withdrawals can be attributed to greater efficiencies in industrial processes, more emphasis on water reuse and recycling, and the 2008 U.S. recession, resulting in lower industrial production in major water-using industries.

The USGS is the world’s largest provider of water data and the premier water research agency in the federal government. Find out more at <http://water.usgs.gov>. ♦



“Reaching this 45-year low shows the positive trends in conservation that stem from improvements in water-use technologies and management,” said deputy secretary of the Interior Mike Connor. “Even as the U.S. population continues to grow, people are learning to be more water conscious and do their part to help sustain the limited freshwater resources in the country.”

accounted for about 7 percent of total withdrawals for all categories, predominantly for thermoelectric power, irrigation and public supply.

“Since 1950, the USGS has tracked the national water-use statistics,” said Suzette Kimball, acting USGS director.

Water withdrawn for thermoelectric power was the largest use nationally, followed by irrigation, public supply and

A number of factors can be attributed to the 20 percent decline in thermoelectric-power withdrawals, including more power plants built or converted since the 1970s that use more efficient cooling-system technologies, declines in withdrawals to protect aquatic habitat and environments, power plant closures and a decline in the use of coal to fuel power plants.

A Reason for Celebration

The Safe Drinking Water Act (SDWA) was originally signed into law in 1974 to protect public health by regulating the nation's public drinking water supply. On December 9, 2014, US EPA celebrated SDWA's 40th anniversary with an Experts Forum in Washington, DC. Many attended the event in person and via video stream.

US EPA Administrator Gina McCarthy thanked participants for their hard work but stressed that there is still more to be done: "More than ever, water is gold. It is not only our personal lifeblood, it's the lifeblood of our nation's economy. We need to face the challenges and continue to provide safe, reliable drinking water to the American people. We have to focus on each step from source to tap."

Administrator McCarthy also shared, "When we all work together, we can adapt to new circumstances and protect our most precious resource for our children and our communities. You guys know better than anyone, protecting drinking water has never been easy, and it's not getting any easier. But when we focus on infrastructure investments, building partnerships, and protecting source water—we can continue to make a difference."

For more information about the Safe Drinking Water Act and the 40th anniversary, visit <http://www2.epa.gov/safedrinkingwater40>. ♦

Call, continued from page 1

water protection have unique opportunities to defend drinking water. Federal agencies can provide tools and data, and leverage programs and authorities to protect drinking water sources. Other source water partners, including SWC members and their constituents, also play vital roles. All SWC members and other stakeholders can seize opportunities to establish, participate in or support state and local collaboratives to protect drinking water sources. Defending drinking water is truly a shared responsibility among all concerned stakeholders.

Drinking Water Utilities use source water protection as part of an effective multiple-barrier approach to ensure the safety and quality of drinking water. Utilities can leverage new contaminant information resources to update source water assessments, protection plans, and emergency response plans. Utilities can also work with partners on priority actions to prevent contamination, build relationships with emergency responders and staff at sites storing priority contaminants, obtain information from local and state agencies and potential contaminant sources, identify funding strategies for priority protection measures, and develop and exercise response and recovery plans for potential contamination events.

Local Government is well situated to address specific source water concerns through land use planning and collaboration with key stakeholders. As such, local leaders can address potential impacts through comprehensive land use planning, zoning, development regulations, and code enforcement; educate the community on water quality issues; and coordinate with others to develop source water assessments and implement

protective measures.

State Drinking Water and Other Programs – Collaboration between state water programs and other influential agencies provides multiple opportunities to protect drinking water sources. For example, where source water assessments are no longer current or sufficient for supporting protection efforts, these programs can encourage and engage in targeted updating of assessments in collaboration with drinking water systems and other state, federal, and local officials. These programs can also leverage the Clean Water Act and other programs to protect water supplies, communicate key information from source water assessments to stakeholders to advance protection, consider source water protection needs in land acquisition and management, partner with communities and other stakeholders to implement priority actions, and facilitate community and state-level all-hazards planning.

Federal Government – Land management, environmental, agriculture, scientific, and public health agencies have a role in protecting source water and a duty to support to source water protection between programs at all levels. They also function to assist state agencies and local communities in improving assessments and protection plans by providing information on the nature and quantity of potential contaminant sources, as well as modeling and analytical tools to characterize contaminant transport. Federal agencies can expand electronic data sharing for assessments and protection plans, identify opportunities to incentivize collaboration between the chemical emergency response community and state and local assessment and protection activities, encourage upstream entities to take shared responsibility for

protecting source water, and promote use of Clean Water and Safe Drinking Water State Revolving Fund programs to support preparedness and protection priorities.

Other Partners can engage in public participation processes under state and federal programs and local land use planning processes to protect source water. These partners can also promote grassroots initiatives to advance source water protection; share data and information to help target source water protection and citizen scientist monitoring; continue soil health best management practices to improve water quality and drinking water protection; inform and influence land use decisions that adequately consider potential impacts to drinking water sources; encourage land conservation practitioners to work with landowners, drinking water suppliers, and other interested parties to protect undeveloped land that is critically important for protecting source water areas; and communicate the importance of source water protection to decision-makers.

For a complete copy of the Call to Action with supporting resources, visit www.sourcewatercollaborative.org.



What is the SWC?

Comprised of federal, state, and local partners, the SWC has come together to further the goals of protecting sources of drinking water. Each member organization understands and appreciates the importance of source water protection, promotes implementation of source water protection in their overall mission, and recognizes the need to leverage resources in order to increase the chances for success. ♦

Special Feature: Peeking at the Past

As The Groundwater Foundation celebrate its 30th anniversary in 2015, we'll take a look back at headlines and articles in issues from the past.



20 YEARS AGO

Volume 9, Number 3, December 1994

Source Water Protection Key Any New Reauthorization of the Safe Drinking Water Act Needs to Consider Protection

Increasingly, communities across the country are realizing that to ensure safe drinking water is to prevent pollution of drinking water sources. This common-sense approach, known as source water protection, was one of the issues at the heart of the debate over reauthorization of the Safe Drinking Water Act (SDWA).

Congress debated the SDWA against a backdrop of concern about both the cost and safety of the nation's drinking water supplies. States, water suppliers, environmental groups, and others weighed in on a broad range of issues, such as the creation of a new state revolving loan fund for drinking water, modifications to the process for setting drinking water standards, the establishment of state source water protection programs, and the viability of small water supply systems.

SDWA Legislation

By the end of the session, the Senate and House of Representatives had each

passed separate reauthorization bills, S. 2Q19 and H.R. 3392. Each of the two bills represented a significant overhaul of the SDWA.

Attempts to reconcile the bills rapidly bogged down as Congress approached adjournment in the first days of October. As with many other legislative initiatives this year, a final bill was not enacted, leaving SDWA reauthorization to the next Congress.

A number of factors contributed to Congressional interest in source water protection. Heightened awareness resulted in the spring of 1993 after an estimated 400,000 people in Milwaukee became ill when drinking water supplies that were contaminated by the parasite cryptosporidium. Boil-water orders were issued later in 1993 because of related microbial concerns in Washington, DC, and New York City.

These highly-publicized events drove home the point that monitoring and treatment of drinking water supplies are not failsafe. Currently, the SDWA relies primarily on monitoring and treatment to ensure that drinking water meets federal standards. But in reality, community water supplies remain vulnerable because of the potential for human error or mechanical failure during treatment, as well as limitations in the reliability of sampling and monitoring.

The high costs of relocating drinking water wells or cleaning up contaminated groundwater also suggest that an ounce of prevention really is worth a pound of cure. A recent study by the National Research Council suggests that it could cost as much as \$1 trillion over the next 30 years to clean up the estimated 300,000 to 400,000 contaminated groundwater sites in the U.S. For many sites, the report concludes that full clean-up isn't even possible. We simply don't have the technology.

Progress in Protection

Source water protection offers an important line of defense against these problems. A prevention approach may also allow some communities to decrease

or forgo costly monitoring or treatment, without compromising public health.

Many states and communities are engaged in source water protection right now in the form of wellhead protection programs for groundwater. Thirty-seven states and territories have wellhead protection programs approved by EPA. EPA estimates that wellhead protection areas have been delineated for almost 18,000 public water systems. Several thousand of these also have made headway in one or more other areas, such as identifying potential sources of contamination, enacting local pollution prevention ordinances, or developing contingency plans to respond to problems such as floods or chemical spills.

More limited progress has been made for systems which depend on surface water. Among the notable exceptions are several large cities, such as Portland, and Seattle and Tacoma, which are carrying out protection programs for surface water sources of drinking water.

Although we have made a good start, much remains to be done for both groundwater and surface water-dependent communities. There are roughly 60,000 community water systems, which provide drinking water to approximately 93 percent of the people in the U.S. EPA, states, communities, water purveyors and citizens need to work together to prevent contamination of drinking water supplies.

Steps Outlined

First, and perhaps foremost, a reliable source of funding is needed to enable states and communities to carry out source water protection programs. The U.S. General Accounting Office has cited lack of funding as a major barrier to the implementation of prevention efforts under the existing wellhead protection program. One way to tackle this problem is to make source water protection eligible for sufficient funding under a new state revolving loan fund for drinking water.

Second, states should ensure that source water assessments are carried out for all community water systems,

including both groundwater and surface water-dependent systems. Assessments consist of delineating the area to be protected based on local hydrogeologic features and developing an understanding of the types and locations of potential sources of contamination within the delineated area. Such assessments provide information which is necessary to enable communities to make sound decisions about their prevention needs.

Third, any community with an interest in preventing contamination of its drinking water sources should be able to receive assistance from the state. Many communities lack readily available resources or expertise to protect drinking water on their own. States can play an invaluable role in making local prevention programs a reality for such communities.

Fourth, source water assessments should be linked to the use of monitoring alternatives for public water systems. The costs of monitoring can be very little for households on systems serving many people. But for small systems, the costs of monitoring are spread over far fewer households and can, therefore, be very expensive for each. Implemented source water protection would allow states to offer monitoring relief, while providing an important safety net for public health.

Cannot Afford to Wait

A SDWA reauthorization bill which addresses these four points would go a long way towards helping communities prevent pollution of their drinking water supplies. We cannot afford, however, to sit back and wait for legislation. Aside from SDWA reauthorization, EPA is currently working to focus attention on source water protection through organizations like The Groundwater Foundation, League of Women Voters, American Water Works Association and others.

These kinds of pollution prevention efforts are fundamental to providing safe drinking water. EPA's hope is that these initiatives, and others like them, will stimulate increased interest in and implementation of source water protection programs throughout the country. ♦

WHATEVER HAPPENED?

The SDWA was reauthorized in 1996, and made source water protection a key priority. See "A Call to Action" on page 1 for more information on the current state of source water protection. ♦

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"The Road Less Traveled"

Proves to be a Success

By Richard Heigel

The Groundwater Foundation presented its 14th Annual Groundwater Symposium, "The Road Less Traveled: Understanding & Addressing Groundwater Risks," on November 14-15 at the Omni Hotel at CNN Center in Atlanta, Georgia. The purpose of the symposium was to promote understanding of groundwater related risks to human and environmental health. In addition to this theme, conference speakers focused on the chemical, mineral and microbiological risks to groundwater and the science involved.

Preconference workshops were held the afternoon of November 14 and offered specific tools for source water assessment and protection, youth education, and community action. Richard Christof Project Learning Tree provided materials and information on how to include lessons on environmental and human health risks in high school curriculum. Paul John of The Groundwater Protection Council taught computer techniques to manage water program data and write conference reports. Bob Kunka and Jenna Johnson of The Groundwater Foundation conference, continued on page 2

Groundwater Foundation Firsts

For the first time in its history, The Groundwater Foundation presented all of its national awards during one major event, the 1999 Fall Symposium. Monday, November 15th, the 1999 Groundwater Hero Award was presented to Dennis Gernert of Kentucky, the Edith Stewart Groundwater Education Award was presented to Sharon Leno of California, and the E. Benjamin Nelson Groundwater Service Award was presented to Senator James C. Scott of Arkansas. (See page 5 for award winners and their biographies.)

The 1999 Symposium also marked the first time that the Groundwater Guardian National Designation Ceremony was held in conjunction with The Groundwater Foundation's Fall Symposium. Over 45 Groundwater Guardians participated in the National Designation Ceremony, and were honored for their commitment to groundwater protection and conservation.

15 YEARS AGO

Volume 14, Number 3, December 1999

Seacrest Speaks at the U.N.

On November 4, 1999 Groundwater Foundation President Susan Seacrest was a guest speaker at a briefing on Water Issues at the United Nations (UN). The briefing was sponsored by the National Council of Women of the United States, the International Council of Women, and the United Nation's Non-Government Organizations (NGOs) Committee on Sustainable Development. The theme of the briefing was "Water: A New View of the World" and featured, in addition to Seacrest, Greg Keast of UNICEF, Ramona Trovato of the EPA Office of Children's Health Protection, and Chris Hallowell, an environmental journalist and author of several books about environmental issues.

The briefing was attended by representatives from many NGOs associated with and working closely with the UN. Seacrest spoke about her changing world perspective as a result of working on groundwater protection issues with communities. Trovato profiled EPA activities designed to protect children's health. Keast discussed the importance of increasing levels of sanitation worldwide as an important part of public health protection, and Hallowell described contamination concerns in the Mississippi Delta. The presentations were followed by a question-answer discussion and consensus by panelists that water and public health are important, but neglected, issues. ♦

5 YEARS AGO

Volume 24, Number 3, Winter 2009/10

Water Issues are Top Concerns

A comprehensive public opinion survey conducted by Circle of Blue, a Michigan-based international network focused on global water issues, and GlobeScan, a global research firm, recently found that people around the world see water issues as the earth's greatest environmental concern, more than air pollution, depletion of natural resources, habitat loss, and climate change.

The poll surveyed 1,000 people in 15 countries, as well as an additional 500 in each of the following countries: Canada, China, India, Mexico, Russia, the United Kingdom and the United States.

The survey's results suggest that people all over the world see water pollution and shortages as the most crucial aspects of the freshwater crisis. Other global results include:

- The vast majority of respondents (93%) said water pollution was a very serious (72%) or somewhat serious (21%) problem.
- 91% believed a shortage of freshwater was a very serious (71%) or somewhat serious (20%) problem.

Within the seven countries of focus:

- Over half of respondents said that government is considered the most responsible for ensuring clean water.
- 76% said they needed more information to be able to do more to protect water. ♦

Water Issues are Top Concern

According to Recent Survey

A comprehensive public opinion survey conducted by Circle of Blue, a Michigan-based international network of journalists, scientists, and communicators focused on global water issues, and GlobeScan, a global survey research firm, recently found that people around the world see water issues as the earth's greatest environmental concern, even more than air pollution, depletion of natural resources, loss of habitat and even climate change.

The poll surveyed people's attitudes about the sustainability, management and conservation of fresh water resources. The independent survey was underwritten by a grant from the Midcon Coors Brewing Company.

The poll surveyed 1,000 people in 15 countries, as well as an additional 500 in each of the following countries: Canada, China, India, Mexico, Russia, the United Kingdom and the United States.

In response to the survey data and to gauge the reality of the opinion, Circle of Blue commissioned some of the world's best photographers from Contact Press Images and Getty Images to report in pictures and words various facets of the conclusions in seven countries.

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Other global results include:

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- 91% believed a shortage of freshwater was a very serious (71%) or somewhat serious (20%) problem.

Within the seven countries of focus:

- Over half of respondents said that government is considered the most responsible for ensuring clean water. When asked if individual citizens are also responsible, the responses varied widely by country (76% in Mexico agreed, 60% in the U.S., and only 32% in China).
- 76% agreed that solving drinking water problems will require significant help from companies, suggesting that partnerships are an important component to resolving freshwater sustainability challenges.
- 76% said they needed more information to be able to do more to protect water.

Interestingly, respondents in each country responded differently to various items, suggesting that solutions should be tailored to each region's specific local conditions. For example, in the seven countries of focus named above, those in Mexico are the most concerned about lack of water for agriculture and expressed the most urgency about the severity of pollution and water scarcity, but were most optimistic about their ability to solve the problems. People in India were most concerned about the comparative highest cost of water. The full survey results are available online at www.circleofblue.org/waternews/waternews.

1. water pollution

2. fresh water shortages

3. DEPLETION OF NATURAL RESOURCES

4. AIR POLLUTION

5. loss of species

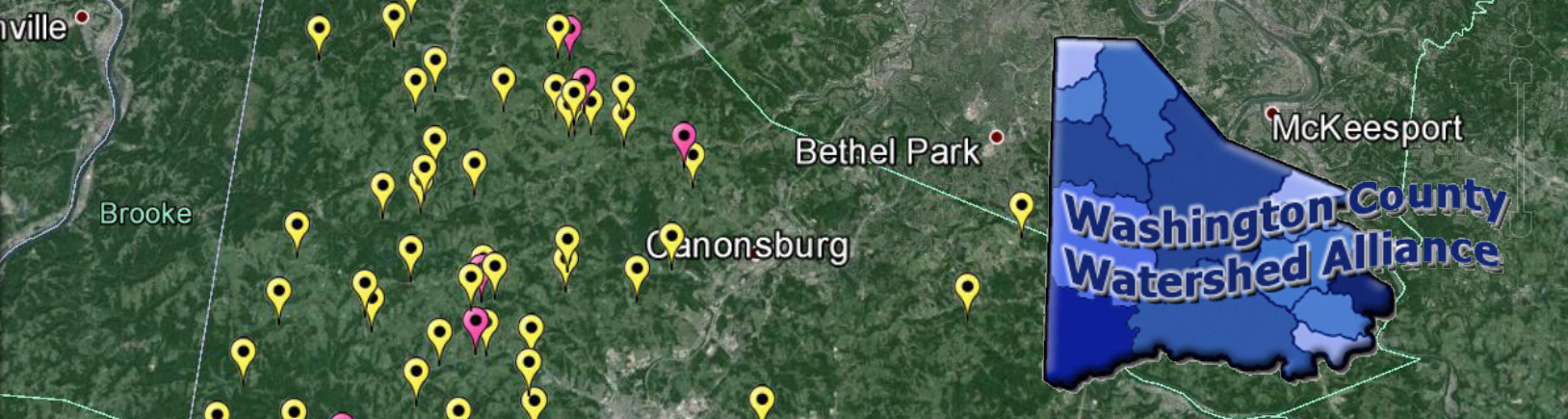
7. emissions

6. climate change

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County-Wide Water Quality Monitoring in Pennsylvania

by Beth Kahkonen, Washington County Watershed Alliance Groundwater Guardian Team

In the southwest corner of Pennsylvania, about 10 miles south of the city of Pittsburgh, lies Washington County, a largely rural county with a strong agricultural character and abundant natural resources. Washington County's economic history began with agriculture, predominately sheep farming for wool production. It progressed to coal, oil, and natural gas extraction and distribution, and local glass, iron, steel, and metal production and distribution, with the discovery of plentiful raw materials and the county's strategic location along major transportation routes both natural and manmade. Beside coal, oil, and gas, Washington County is rich in other natural resources. Within the boundaries of its 857 square miles of land, 56% is forested and there are four square miles of rivers, streams, reservoirs, lakes, and ponds. There are numerous important ecological habitats and environmentally-sensitive areas including three Important Bird Areas, five State Game Lands, 23 Biological Diversity Areas, four high-quality warm water fisheries, and three trout stocked fisheries. Today, the largest single land use in the county

remains open space at 64.7%; the second largest is agriculture at 25.7%, and the third largest is residential at 4.9%.

Washington County consists of smooth, rolling hills in the north, and higher, sharper ridges and steep valleys in the south. The geologic strata and soils are well stratified with no glaciation. Precipitation averages about 38 inches per year and is essentially evenly distributed. The county can be divided into twenty or so subwatersheds according to its larger significant streams, but the entire county lies within the larger Ohio River Watershed; rivers, streams, and tributaries in the north and west drain directly into the Ohio River, and those in the east and south drain into the Monongahela River, which flows into the Ohio River in Pittsburgh.

The quality of the Ohio River and many of its tributaries in Washington County was compromised during the industrial development of the area. In addition to pollution from agricultural practices, water quality was significantly degraded through the mid-1900s by abandoned mine drainage, raw sewage, gas well brine, oil pollution, and industrial effluents. While

the legacy of natural resource extraction and industrial development persists in the region to this day, the overall water quality of the Ohio River and its tributaries has improved over the past 50 years due to increased wastewater treatment facilities, stricter regulations on discharges, and a dramatic decline in industrial activity in the region in the second half of the 20th century.

The latest trend in energy demands, coupled with technological advances and abundant reserves, has led to a new boom in natural resource extraction in Washington County, and the surrounding region. Natural gas contained in rock formations far below the surface is being identified in multiple states across the country and is being extracted via a technique known as unconventional hydraulic fracturing. In Pennsylvania, the strata containing natural gas is the Marcellus Shale formation, situated generally 0.5 - 1.5 miles beneath the surface. The portion of this formation beneath Washington County is exceptionally productive and has therefore become an area of concentrated effort to extract this natural resource.

Beginning in 2004, 1,003 unconventional gas wells were developed for production in

the county. An additional 628 conventional wells were also developed during that time period for oil and gas located in more shallow strata. Besides the wells themselves, the transportation of the gas involves laying miles of underground pipelines, the processing requires compression and distribution stations, and the entire operation involves miles of new access roads, clearing of forested areas, billions of gallons of water taken from local resources, installment of fluid waste pits, and an onslaught of industrial traffic throughout the rural areas of the county. Due to this newly and rapidly developing industry, many residents and organizations became concerned about the potential environmental impact on the area. Individuals, organizations, academic institutions, and government agencies have been monitoring and researching the effects of this industrial process and continue to do so as it has now become an issue of national concern.

The Washington County Watershed Alliance (WCWA), a non-profit conservation organization in Washington, Pennsylvania, is one of the many groups who have initiated projects and

research to contribute to the collaborative effort to address the concern of impact from Unconventional Natural Gas Development (UNGD) in southwestern Pennsylvania. Compelled by its member watershed associations to combine their efforts, and offers to work collaboratively with other organizations, the WCWA obtained funding and initiated a county-wide stream monitoring project in 2011 and groundwater monitoring project in 2013.

Stream Monitoring

Beginning in the spring of 2011, 22 streams around the county were selected to be monitored continually for impacts from the increased industrial activity in the area. Instream data loggers were installed at each location to record conductivity, water temperature, and water level every 15 minutes automatically. Collection of data from each site occurs on a monthly basis by students from local cooperating universities/colleges and community volunteers. Additional stream monitoring information, such as macroinvertebrate populations and dissolved chemicals, is collected by the local watershed associations and communicated to the WCWA. Eventually, data from our streams will be visible on a website being developed by the West Virginia Water Research Institute, one of the institutions researching impacts from UNGD and other industrial activities in the PA-WV-OH region and compiling data from many organizations for public access.

This project has collected data from the 20+ stream locations in the county for three consecutive years and continues. Monitoring stream conductivity enables us to identify locations with potential impact from land use

activities, to visualize degrading or improving water quality, and track trends due to season or activity.

Groundwater Monitoring

In the summer of 2013, the WCWA partnered with the Southwest Pennsylvania Environmental Health Project (SWPA-EHP) to initiate a project to monitor the county's groundwater by distributing conductivity measuring devices to households with private well or spring water sources. The device, called the CATTFish, was designed and built by the CREATE Lab of Carnegie Mellon University and was developed specifically to be a simple and inexpensive way for residents to monitor their own water quality on a frequent basis. The CATTFish is installed in the tank of a toilet within the home where each flush delivers effectively a new sample of groundwater to be measured. This design allows residents to test their water quality any time and enables changes to be detected immediately.

The concern of residents drinking compromised groundwater due to increased industrial activity in the county was the main motivation behind monitoring this resource; therefore, we were interested initially in groundwater sources that were within 1500 feet of UNGD only. As the call for project volunteers with private water sources was answered

by residents both near and far from UNGD, we realized the importance of collecting data from all over the county to establish and document the current conditions to be used for future reference. Volunteer households were selected to make up four distance categories from

monthly. Fifty-seven of the households have been monitoring their water for over a year; 13 new households have been added to the project since it began in 2013.

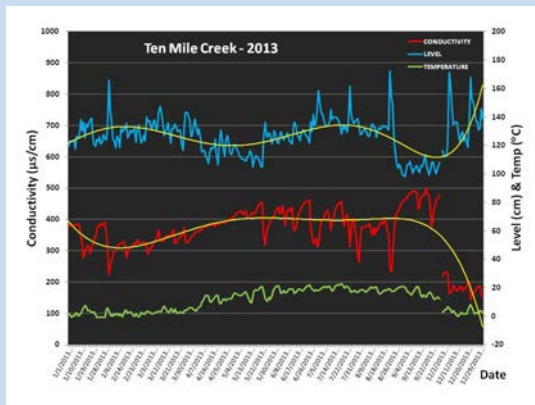
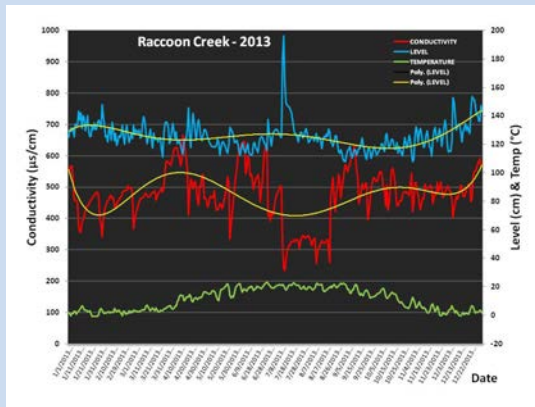
Initial data generated by this project revealed high variability of the quality of the sources being monitored. This

prompted us to have comprehensive tests done on the majority of the project wells and springs. Water samples were taken by a commercial laboratory and tested for at least 32 analytes including organic and inorganic chemicals, metals, microorganisms, and radionuclides. Results indicated variation in the amount and number of salts and metals present in each of the water sources.

Information produced from the first year of this project is still under analysis, though some general conclusions can be stated: groundwater quality in Washington County is highly variable, 96% of the project water sources experienced no significant changes in their water quality over the course of the year, no identifiable effects from UNGD were observed in any of the project water sources, and comprehensive testing revealed minor pre-existing water quality issues in many of the sources.

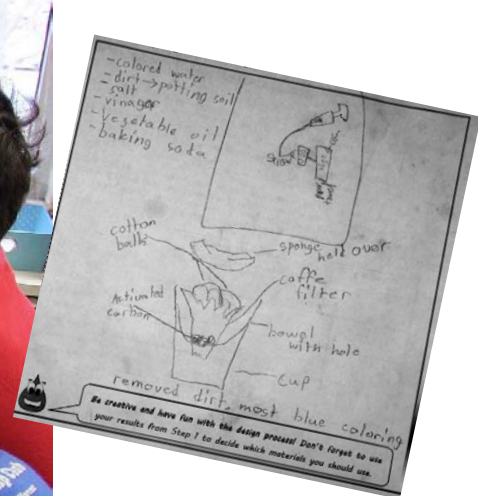
Generous support for these projects provided by: Colcom Foundation, CREATE Lab, Foundation for Pennsylvania Watersheds, Three Rivers Quest, and the Washington County Conservation District.

For more information, visit www.wcwalliance.org.



UNGD, including a "control" group whose water sources are approximately a mile or further from any activity.

Each household takes readings of their water source daily with the CATTFish and submits the data collected to the WCWA to be reviewed



▲ An example of a team water filter design.

◀ A team of students work together to test out their water filter.

Groundwater Restoration and Education

by Amy Kessner, Groundwater Foundation Program Manager

A new set of science standards known as the Next Generation of Science Standards (NGSS) is currently being adopted all across the U.S. These new standards differ from the previous standards in several ways, but one of the main ways they differ is through their heavy focus on engineering. In order to meet these standards and give students a new and exciting way to learn about groundwater, The Groundwater Foundation developed a new program, Groundwater Restoration through Education.

Groundwater Restoration brings groundwater to life for students while allowing them to test their skills at groundwater environmental engineering. Students get to participate in a three-part activity where they work in engineering teams of four to five students. Students are assigned different roles to play such as “Lead Engineer,” “Data Manager” or “Team Leader.”

In part one of the activity, students use the Foundation’s Awesome Aquifer kits to learn

the basics of groundwater and what different groundwater terminology means. They begin with an “empty” aquifer, and recharge their aquifer with rain. Students watch the water table rise as more rain falls on their aquifer. In order to learn about the surface-groundwater connection, students create a lake in their kits and watch as water that is pumped from the ground lowers the elevation of their lake.

Once students have a good grasp on basic groundwater concepts, they learn about sources of contamination by ‘polluting’ their Awesome Aquifers with various non-toxic materials that represent real pollutants. Students watch as household chemicals (food coloring) seep into the ground and eventually into the groundwater and surface water. They learn how improper use of pesticides and fertilizers (baking soda) can contaminate water resources. It’s exciting to watch them grasp the concepts that whatever we use and put on the ground can end up in our water resources and hurt our environment if we are not careful.

In part three of the activity the students work as a team to design, develop, and test a water filter to clean up their aquifers. Students begin by experimenting with various materials to figure out which will remove pollutants from their water. Materials include activated carbon, coffee filters, nylons, cotton balls, etc. Once students have decided which materials they think are the most effective, they work together to create a sketch of their water filter design. Upon approval of their design, the students build and test their filters. It often takes students several iterations to come up with their optimal design. Sharing ideas amongst groups is encouraged during the final stage of testing their filters, and all teams are given the opportunity to share what worked and what didn’t work at the end of the activity.

Piloting of the Groundwater Restoration program took place in fifth grade science classrooms at five Title I schools in Lincoln, Nebraska. Each classroom was able to participate in the full

activity and was then given the necessary resources to continue the activity in the future.

Students and teachers filled out evaluations following the completion of the activity, and the results were very positive. In fact, 97% of students thought groundwater conservation and protection is important and 100% of teachers plan to incorporate the activity into their future curriculum. Said one teacher, “I love how easy this activity is. The kids love it!”

In order to allow educators access to the Groundwater Restoration, The Groundwater Foundation has created a webpage that contains all of the resources needed to run the activity. These resources include a webinar “how-to”, lesson plans, and student worksheets. All of these resources are freely accessible and available to anyone. Find this online at www.groundwater.org/kids/getinvolved/restoration.html.

Support provided by the Nebraska Environmental Trust and Captain Planet Foundation. ♦

New Faces, New Roles Abound



▲ Ze'ev Barylka

Board of Directors

Ze'ev Barylka is the Director of Marketing for Netafim USA, a subsidiary of Netafim Ltd., the global leader in drip and micro-irrigation solutions. In this role, Barylka has developed numerous partnerships with landscape, turf, agriculture and irrigation associations in water conservation and sustainability awareness through public relations and marketing programs, thought leadership, events and community activation, reinforcing Netafim's global "Grow More With Less" brand positioning. He also serves as Director of Sales for its Agricultural Division. A veteran of the US water industry for nearly a decade, he is a current member of two committees with the American Water Works Association and has experience in irrigation, fire protection and water works.

His diverse international upbringing, coupled with an aptitude for technology, fueled his interest in working in the

water industry. Growing up in Latin America, he saw firsthand how irrigation technology enabled farmers to grow food successfully in different climates, and in turn how it helped sustain local communities and drive commerce. He moved to Israel to continue his education, where he delved into studying best practices for food engineering and production with scarce water resources.

"Sustainability and conservation are key to Netafim's core values, and I'm excited to work with The Groundwater Foundation in driving real-world solutions to the nation's most critical water issues," said Barylka. "As parts of the country continue to weather unprecedented drought conditions, we are committed to working side-by-side with the leaders in the water industry and lending our 50 years of expertise to overcoming these challenges."

Barylka received his MBA from Haifa University in Israel and a Bachelor of Science in Food Engineering and Biotechnology from the prestigious Technological Institute of Israel. He currently resides in San Jose with his family.

"We are thrilled to have Ze'ev join the board and bring his unique perspective on water use and experience in marketing," said Jane Griffin, Groundwater Foundation President.

Cathy Lotzer of Marshfield, Wisconsin was elected chair of the Foundation's Board of Directors. Lotzer has been

a member of the Board since 2012 and a longtime participant in the Groundwater Guardian program.

"Cathy's leadership and passion for groundwater protection will serve the Foundation with her at the helm of the Board," said Griffin.

Groundwater Foundation Staff

Two new Program Managers have also joined The Groundwater Foundation staff.

Anthony Lowndes joined the Foundation staff on January 14. Anthony is a native of Papillion, Nebraska. He attended the University of Nebraska-Lincoln where he earned two bachelors degrees, one in Environmental Studies, Natural Resources and another in Fisheries and Wildlife, Aquatic Ecology.

"Having grown up in the outdoors I learned at a young age the importance and interconnectedness of our environment," said Lowndes. "I used to love playing in the rain and marveled at the amount of water running into the gutters and streams in my neighborhood. As I grew older



and became more familiar with the pressures and threats our natural resources face, I realized that water is our most precious resource. Our access to safe, clean drinking water is something that many people take for granted."

Anthony will be heading up The Groundwater Foundation's Growing Groundwater Awareness project, assisting Nebraska communities in local groundwater protection. He'll also facilitate the statewide Nebraska Wellhead Protection Network and continue to promote the Hydrogeology: Water for the World event for Science Olympiad.

"As a program manager I am proud to be a part of an organization that helps people understand where their water comes from and how they can be a part of protecting it. I look forward to being involved in several programs working to educate students, educators and communities on how to protect their groundwater resources."

Anthony can be reached at 402-434-2740 ext. 111 or alowndes@groundwater.org.

Jessica Wheeler, a graduate of the University of Nebraska-Lincoln will join the Foundation staff February 2 as Program Manager.

In addition, long-time staff member Jennifer Wemhoff is taking on a new role as Program Communications Manager for the Foundation, overseeing communication for the organization as a whole, and for individual programs. ♦

◀ Anthony Lowndes



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