the AQUIFER
volume 26
number 1
summer 2011
©
A PUBLICATION OF THE GROUNDWATER FOUNDATION

Change Doesn't Come Easy

Understanding Behavior to Encourage Conservation Goals

By Kathy Jesperson, NESC Editor

Today, people are bombarded with messages about what's healthy, socially acceptable, or good for the environment—don't smoke; eat five to nine servings of fruit and vegetables a day; conserve water. All of these messages require an individual, or a community, to change a behavior from one that's unhealthy or otherwise unacceptable to one that will improve their quality of lives.

Sounds easy enough, doesn't it? Who wouldn't want his or her life improved? But let's face it. If it were easy, we'd all be thin people who drive fuel efficient cars to markets where we buy locally grown organic food all while only watering our lawns twice a week after the sun goes down.

So, if it isn't easy, what makes it so hard? The answer lies in recognizing that people aren't willing to abandon deep-seated beliefs and attitudes easily—even if that means holding onto a behavior that may be harmful, negative, or even dangerous. Think about it. When was the last time you changed your behavior just because someone told you to?

Change Isn't Quick or Easy

Change doesn't come easy for most people. And when it does occur, it happens over long periods of time, often years, according to Philip G. Zimbardo and Michael R. Leippe, authors of the Psychology of Attitude Change and Social Influence.

With this in mind, let's take a look at why some water conservation programs don't succeed the way we imagine they should. First, telling people that saving water is the "right thing to do" likely won't get you very far. Doing so assumes that people's attitudes and beliefs about water conservation are aligned with your own.

Jeff Hoffman, president of the Hoffman Agency, a Florida-based social marketing and public relations firm, agrees. "One water conservation specialist with a mid-level municipal water system wrote an article in a trade publication in which she said that it angered her that her neighbors over-irrigate their lawns when 'they know better' because '[She'd] worked hard to educate the public that what they are doing is wrong and they should stop.'"

I've Got the Answers

"A lot of people assigned the task of public outreach make the prime mistake of being a focus group of one, believing that if I feel a certain way, or have an

Change, *continued on page 4* ▶

INSIDE

Mission of The Groundwater Foundation:
To educate people and inspire action to ensure sustainable, clean groundwater for future generations.

Groundwater Shorts

Save Water, Energy This Summer

Summer is officially here! According to U.S. EPA, most outdoor water use—80 to 90 percent—is for lawn irrigation. However, having a beautiful landscape doesn't have to mean using a lot of water. Follow these tips for a landscape that requires less maintenance and water to stay healthy, green, and attractive:

- Use low water-using, drought tolerant and native plants that need little water beyond normal rainfall, rarely require fertilizer and are more resistant to pests and diseases.
- Use turfgrass strategically and where it has a practical function, such as a play area, and choose types that are low-water-use or native grasses and those that can withstand drought.
- Minimize steep slopes to reduce erosion and runoff. If slopes cannot be avoided, install plantings with deeper root zones such as native ground covers and shrubs to provide stabilization and prevent erosion.
- Aerate your soil to increase the infiltration of water into the ground, improving water flow to the plant's root zone and reducing runoff.
- Use mulch around shrubs and garden plants to reduce evaporation, inhibit weed growth, moderate soil temperature, and prevent erosion.
- Raise your lawn mower cutting height to promote deeper root growth and a more drought resistant lawn.
- Minimize or eliminate fertilizer, which encourages thirsty new growth, causing your landscape to require additional water.
- Learn plants' water needs and water appropriately. If you step on your lawn and the grass springs back, it does not need to be watered. Water your trees and shrubs, which have deep root systems, longer and less frequently than shallow-rooted plants.
- Water when the time is right. The best time to water is in the early morning, when the sun is low or down, winds are calm, and temperatures are cool.
- Collect rainwater in a rain barrel for irrigation and other outdoor uses.
- Sweep driveways, sidewalks and steps rather than hosing them off.
- Check your garden hose for leaks at its connection to the spigot.
- Set sprinklers to water the lawn or garden only—not the street or sidewalk!
- Inspect your irrigation system monthly for leaks, broken or clogged heads, and other problems.
- Install a rain shutoff switch to turn off your system in rainy weather and help compensate for natural rainfall.

The average home spends almost 20 percent of its utility bill on cooling, and increased energy production to run cooling systems not only raises costs, it also can contribute to pollution that adversely affects the quality of the air we breathe. Here are simple things you can do to help protect your wallet and the environment:

- Switch to more efficient light bulbs. Change out incandescent light bulbs with more energy-efficient lighting choices.
- Get a programmable thermostat and set it to work around your family's summer schedule, so when no one is home, you're not cooling an empty house.
- Run your ceiling fan to create a cool breeze, though remember that ceiling fans cool you, not the room, so when you leave the room make sure to turn off the fan.
- Close curtains and shades before you leave your home to keep the sun's rays from overheating the interior of your home.
- Reduce oven time. Use a microwave instead of an oven to cook, when you can. Ovens take longer to cook food and can make your house warmer, requiring your AC system to work harder to keep the house at a comfortable temperature.
- Check your cooling system's air filter every month and change it if the filter looks dirty, or at least every three months. Also remember to have your system serviced annually to ensure it's running at optimum efficiency for money and energy savings.

EPA Identifies Case Studies for Fracking Study

The U.S. Environmental Protection Agency recently announced the next steps in its congressionally mandated hydraulic fracturing study by identifying seven case studies to help inform the assessment of potential impacts of hydraulic fracturing on drinking water resources. The sites identified were selected following extensive input from stakeholders, including the public, local and state officials, industry, and environmental organizations. To ensure the agency maintains the current timeline for the study, the EPA will begin field work in some of the selected regions this summer.

Natural gas plays a key role in the nation's energy future. EPA is working closely with other federal partners to ensure that this important resource can be developed safely. The studies, which will take place in regions across the country, will be broken into two study groups. Two of the seven sites were selected as prospective case studies where EPA will monitor key aspects of the hydraulic fracturing process throughout the lifecycle of a well, including Haynesville Shale (DeSoto Parish, Louisiana) and Marcellus Shale (Washington County, Pennsylvania).

Five retrospective case studies were selected and will examine areas where hydraulic fracturing has occurred for any impact on drinking water resources, including Bakken Shale (Kildeer, and Dunn Counties, North Dakota), Barnett Shale (Wise and Denton Counties, Texas), Marcellus Shale (Bradford and Susquehanna Counties, Pennsylvania), Marcellus Shale (Washington County, Pennsylvania) and Raton Basin (Las Animas County, Colorado).

Information gathered from these case studies will be part of an approach which includes literature review, collection of data and information from states, industry and communities, laboratory work and computer modeling. The combination of these materials will allow us to do a more comprehensive assessment of the potential impacts of hydraulic fracturing on drinking water resources. The study will continue to use the best available science, independent sources of information, and will be conducted using a transparent, peer-reviewed process, to better understand any impacts associated with hydraulic fracturing.

Learn more at http://www.epa.gov/hydraulicfracturing.

Groundwater Inspirations

What Drives Us To Protect Groundwater?

By Jennifer Wemhoff, The Groundwater Foundation

Since starting my tenure with The Groundwater Foundation, I've (obviously) been aware of and concerned about the quality of our water supplies. I grew up on a farm in rural northeast Nebraska. I drank well water and never gave it a second thought.

I started at the Foundation in 2000 when I was a junior in college, and my eyes were opened wide to the fragility and importance of groundwater resources in my home state and across the country and world. Water and the many threats to its quality and quantity began to take a much more prominent place in my thoughts and helped shape my actions.

My husband and I had our first child, a daughter, in March (actually, she was born during National Groundwater Week!). Since her birth, I can't help but think about Groundwater Foundation founder and President Emeritus Susan Seacrest and the concern over her infant son's health that eventually lead to the creation of the Foundation.

"It is often said that the greatest gift is good health," Seacrest wrote in a 2000 issue of The Aquifer. "I did not fully appreciate the extent of this truth until my infant son, Logan, became ill. Happily, he recovered fully after four long years of serious digestive difficulties. During his frequent hospitalizations, I came to understand that the health of our families is the basis on which we build our lives."

Even though I've worked to be an advocate of clean groundwater for the past 11 years through the Foundation's programs and projects, I now feel a more intense responsibility to help protect the resource; not only because it's the right thing to do, but because the stakes are higher now because it will impact my daughter's future. Susan's words about the importance of a family's health now resonate powerfully within me, and I know that safe groundwater and a healthy environment are key components of this. My job and our mission has always been an inspiration to me, but my new inspiration is to help protect water for my daughter's future.

Different Inspirations

What motivates each of us? What inspires us to be stewards of groundwater and the environment? I posed this question to a few of my colleagues here at The Groundwater Foundation and others we work with.

Groundwater Foundation President Jane Griffin is inspired by the resource itself. "Water itself has inspired me to be a steward. Water is a remarkable element. It has defined history and will define the future, it provides life and it takes life, it's essential and it's illusive. Water is a gift to us, to all of us, and therefore each of us has the responsibility to properly use it," she says.

"Why do I have an interest in environmental issues and groundwater? Because someone has to," says Foundation Program Manager Jamie Oltman. "I know not everyone feels a need to make changes in their lives, in their communities, for a better life in the future. Not everyone can, so it is up to those that have an interest and a passion to help build an interest in others, to be the leaders."

"When I was in high school and learning about environmental issues I wanted to change the world," she continues. "Now I see a slightly different picture and want to teach others to understand groundwater or other environmental issues and help them understand that small changes in their lives can be the start of a huge wave of change. One child, one person, one community at a time we can make a difference."

Foundation Program Coordinator Brian Reetz is driven by the people he's met through his Foundation work. "The more that I learn and the more people that I come in contact with from communities across Nebraska, the more that I'm inspired to share the Foundation's mission. Each community faces many of the same issues, but yet they are all different too. That drives me to help each community and its water resources to the best of my ability."

Lori Davison, Database Manager and Groundwater Foundation staff member since the Foundation began in 1985, found inspiration in Seacrest. "I'd have to say that Susan inspired me—just watching her being so passionate everyday made me realize the need to protect and conserve the water we have today so it will be around in the future. Also, working at the Foundation and being educated about water conservation and protection helped too!"

"I think the fact that I work for a water utility, I know how difficult it is to find water and keep it safe to provide to our community," says Groundwater Guardian team member Cathy Lotzer of Marshfield, Wisconsin. "This is something I would have never known had I not worked here. Even though I'm passionate about conservation, having access to the knowledge I have in my job makes me even more determined to be so. Sharing that knowledge is where Groundwater Guardian comes into play!"

Jay Beaumont, Groundwater Foundation board member and Groundwater Guardian from New York state, says, "My motivation is economic. I studied energy efficiency and learned it is cheaper to buy energy conservation and efficiency than to buy new power plants. The same is true for water. It is cheaper to buy water conservation than to drill wells or build reservoirs; and it is far cheaper to prevent water pollution than to go back and clean up the pollution later."

"When I was about 10 years old I remember throwing a popsicle stick on the ground after eating it," recalls Foundation Executive Vice President Cindy Kreifels. "A good friend a couple of years older than me really read me the riot act about polluting and I guess it stuck. A recent grandmother of two new grandsons, she continues, "The environment has always been of importance to me. And, of course, through children and now

Inspirations, *continued on page 9* ▶

Change, *continued from page 1*

understanding about how water should be used, then everyone else does, too," says Hoffman. "Deriving a public outreach program from the insights of a focus group of one is a conceit in which one can be easily trapped.

"Almost all of us have fallen prey to similar conceits at some point," he continues. "However, reliance on a narrowly focused view disregards that other people don't have similar knowledge, experiences, or similar priorities. Outreach programs like this fail to achieve their goals because they don't start from the perspective of the general public and shift attitudes by helping people recognize what personal benefits are gained by forming good conservation habits."

I Have Other Things to Do

As water professionals, we have adopted ideas and behaviors that support our cause. But what we don't always understand is that the way we think often no longer reflects how our customers think, says Marketing Social Change, an online guide developed by the Priority Ventures Group. What we need to understand is that most people believe they have far more pressing matters to attend to.

In 2000, the Arizona Department of Water Resources partnered with the cities of Phoenix, Mesa, and Scottsdale to develop the Water—Use it Wisely campaign. To find out more about how the citizens rated water conservation in their daily lives, they surveyed citizens in the area.

They found that water conservation was ranked in importance below other local concerns such as air quality and traffic congestion. The research further revealed that people lacked knowledge about how to save water, and most people thought that their individual actions would not make a difference.

A recent study conducted by the Water Research Foundation had similar findings. While respondents said that saving money and doing right thing for the environment were motivators for participating in a water conservation program, most people thought they were already doing everything they could conserve water. These inconsistent ideas are found throughout the water industry. "On the one hand I want to help, but what can I do if I'm already doing everything I can?"

The temptation is to think that more education will help. Education increases knowledge; and when people learn that particular behaviors are bad, it just stands to reason that they will change their behavior. Right? Not so fast. Some people will probably change, but most will not. Why?

"You have to have a process by which good ideas become effective ideas," notes John Hadidian, director of the Urban Wildlife Program for the Humane Society. That process is going to have to explore the values, attitudes, and beliefs of your audience.

Breaking Tradition

The key to making water conservation programs work is to break out of traditional educational programs. And that means exploring what the audience or, in the case of the water industry, customers really want. Here's a revelation: If you want people to change, you had better give them a good reason to change, says Getting Your Feet Wet with Social Marketing, a U.S. Department of Agriculture guide to social marketing.

Change is difficult, even when there is great motivation to change. We get used to doing certain things in a certain way. People need to understand that their current behavior is a problem. But merely understanding that a current behavior is a problem will not necessarily lead to behavior change. You're going to have to find out what people want; in other words, what's in it for them?

One of the cold, hard facts that we in the water industry must realize is that if we want other people to change, we have to make changes ourselves. This is where social marketing comes in, says the Basics of Social Marketing, a guide from the Social Marketing National Excellence Collaborative. Social marketing campaigns seek to bring about behavior change in ways that address the audience's need relative to the needs of the community. They create awareness before they create the motivation to change and rely on the principles of commercial marketing to make their point.

Do You Know What I Need?

If you don't address your customers' wants and needs, you may end up wasting a lot of time and money. In Marketing Social Change, there is a story about a national organization that didn't pay attention to its customers, and even its own research, and ended up paying a heavy price.

"The association developed a software product for members to collect and analyze data, with goals to improve service quality and to help members reduce government regulation," the guide reports. "However, the association did not conduct sufficient research on how the product should be designed, who would use it or how it should be promoted. Management did conduct a survey, but largely ignored data on how much members were willing to pay for the software. Hard work, the best of intentions and a useful product were not enough. The software was not widely adopted; the effort lost over a million dollars; and the venture was ultimately discontinued."

In social marketing, you must know your audience well enough to understand what will motivate them to make changes in their lives. What benefits can you offer to help them over the hump? How can you make it easier for them? It also requires that you not look at your audience as a whole, but as subsets or segments who have different priorities and motivations.

Focus on people as customers and understand their needs. What does it mean to treat people like customers? Think about a business where you feel like a valued customer. The quality of the product or service pleases you. Maybe the personnel are attentive and efficient. Perhaps the business offers convenient locations or hours. The prices charged are appropriate. Each of these elements reflects a business that understands what's important to customers and delivers against these needs.

Be clear about what you're asking them to do. And offer them something in return. Many campaigns fail to provide "an exchange." Customers want a payoff for the proposed action you're seeking.

What else could go wrong?

"Another failing that I've observed [in public education programs] is mistaking activity for productivity," says Hoffman. Public outreach programs are often conducted by people pressured by management (or public policy makers) to 'get the word out' so we can start conserving water. Flyers, bill stuffers, cute Facebook pages, blogs filled with droning information, and advertisements may all get done, but the only cohesion they may have is that they tell the public to stop using so much water and promote water audits or appliance rebates."

Hoffman says that when he asked whether appliance rebates and toilet retrofit programs altered water use behavior, one conservation manager with a major municipal system told him that while the answer was probably yes, he believed the program did little to change daily behaviors. The manager told him that the system got more participation by telling people they could get big cost breaks on new appliances—not that they would save water.

"One could argue that his goal (saving water through retrofits) was met," says Hoffman. "But the long-term goal of creating new behaviors and contributing to a new social norm related to water wasn't."

Did you get my message?

Social marketing is more than messages. Not only are these messages coming from almost every media source imaginable, they compete with each other.

"I once saw a public service ad that read 'wasting water is a crime,'" says Hoffman. "I didn't know that. But I wasn't concerned. The message itself represented an empty threat to which no one would pay serious attention. While for those in the know—or those who gave it a second thought—the gist of the message was understandable: Don't use more water than you should. For most, I'd venture a guess that they did not heed the message."

"Words can have different meanings for different people," Hoffman continues. "Words like 'efficient' or 'efficiently' really chafe me. 'Be efficient in your water use.' 'Only use what you need.' Really, now. How many people do you know who say 'Gosh darn, they're right—I use too much water.' Messages like these automatically close the communication. 'I only use the water I need—that message is for someone else.' is the most common reaction."

So what do I do?

Creating a good water conservation program using social marketing strategies requires not only knowing what to do, but what not to do. Developing messages based on what you think people want is a big mistake. To really know, you have to ask them. While this article only touches on many of the items you must consider, it does provide a good starting point. Remember, your audience—your customers—want to be involved in the process.

"We must not constrain human power, but rather we unleash it," say Ted Nordhaus and Michael Shellenberger, political strategists and opinion researchers, and authors of Break Through, Why We Can't Leave Saving the Planet to the Environmentalists. And that means listening to what people really want rather than imposing your will upon them.

MORE INFORMATION

To learn more information about using social marketing, the following resources are available in pdf format:

- Priority Ventures Group, May 2004. "Marketing Social Change," Executive Update. www.priorityventures.com/Marketing%20social%20change.pdf
- Jack Wilbur, 2006. Getting Your Feet Wet with Social Marketing: A Social Marketing Guide for Watershed Programs, Utah Department of Food and Agriculture. ag.utah.gov/divisions/conservation/documents/GettingYourFeetWet.pdf
- The Social Marketing National Excellence Collaborative and Turning Point. The Basics of Social Marketing: How to Use Marketing to Change Behavior, www.turningpointprogram.org/Pages/pdfs/social_market/smc_basics.pdf

Reprinted from OnTap, Volume 11, Number 1, Spring/Summer 2011.

Watchful Eye

How to Keep Consumers Apprised of Unregulated Contaminants Without Creating Panic

By Robert Renner, Executive Director, Water Research Foundation

No one – not even the U.S. EPA – argues that endocrine disruptors (EDCs) and pharmaceuticals and personal care products (PPCPs) shouldn't concern water utility managers or their customers. But science hasn't proven these compounds pose a health risk to humans.

Every day, the active chemicals in herbicides and fungicides, cosmetics, and medicine are released into the environment through agricultural runoff, industrial operations, and human and animal waste.

A 2008 series of Associated Press articles described how these compounds are found in 41 million Americans' tap water, prompting a Congressional inquiry. But while EDCs in particular are blamed for feminizing male fish, it's not clear that the levels at which they occur – in some cases, parts per trillion – harm humans.

That same year the Water Research Foundation released *Toxicological Relevance of Endocrine Disruptors and Pharmaceuticals in Drinking Water*, an analysis of 62 representative chemicals. Risk evaluations for exposure through drinking water were conducted for 16 pharmaceuticals, 10 potential EDCs, and three steroid hormones. Researchers developed acceptable daily intakes for determining exposure levels not likely to be associated with adverse health effects. None of the concentrations exceeded those levels, a finding echoed by EPA upon its second six-year review of the compounds.

Both classes of compounds are moving up EPA's regulatory hierarchy, but the agency provides little guidance for monitoring, treating, and communicating their potential or actual effects. The agency added some to Contaminant Candidate List 3 in 2009. But less than a year later, in March 2010, its second six-year review of drinking water standards recommended no revisions for compounds such as alachlor (used in herbicides) and toluene (used in plastics manufacturing). Nor has EPA revised the existing maximum concentration limit of 3 micrograms/liter for the regulated chemical atrazine.

So as managers prepare for the Stage 2 Disinfectants and Disinfection ByProducts Rule, which requires finished water to be tested using a primary or residual disinfectant other than ultraviolet (UV) light, they face a conundrum: Do they surpass the rule's current requirements by investing in technology that removes unregulated compounds? Or do they satisfy the rule's requirements now and address these compounds/contaminants when (or if) the agency decides they should be regulated?

Unfortunately, no single treatment process removes all EDCs and PPCPs.

Watchful, *continued on page 9* ▶

Outdoor Adventures in H_2O

The Groundwater Foundation Goes to Summer Camp

By Jamie Oltman, The Groundwater Foundation

"What is the difference between a rain garden and a garden?" was one of the first questions a student asked me on Monday morning, our first day of the 2011 Outdoor Adventures in H_2O day camp. By the end of the week, I had students asking if they could use a straw and a filter to build a well to include in their watershed model and if there was food coloring they could use to show what harm pollution could cause to their water supply.

Every year it amazes me how much students learn during our Outdoor Adventures in H_2O camp. By Friday the students had seen at least three different rain gardens and could explain how a rain garden works and its environmental benefits. Students' thinking about water might have been related to the ocean and dolphins Monday morning, but by Friday afternoon, their thoughts of water also included the water we drink and the water that is stored in an aquifer beneath us.

These are some highlights from our fun-filled week of adventures! Monday morning started out with grey skies, but cool weather and clouds didn't hinder the excitement of the first day of Outdoor Adventures in H_2O. We didn't waste much time indoors. After going over rules for the week (which include be safe, have fun, be respectful, and stay with the group) and exchanging brief get-to-know-yous, we headed outside! An urban hike to Antelope Park was first on the agenda. The students split into two groups and along the way worked to complete a scavenger hunt. Could they find a rain garden or a rain barrel? What about a bird bath or a "pick up your pet waste" sign? Campers found many water-related items as well as other fun yard art like a rooster and a zebra! At Antelope Park students learned about runoff and recharge and wells and groundwater, and built models to demonstrate their knowledge of these concepts. They also began working in small groups to design small-scale watershed models replicating concepts learned earlier in the day. Campers packed up and hiked back to Randolph (our home-base) to conclude the day.

Tuesday brought more grey skies, but rain or shine the adventure went on! We spent the morning learning about potential risks to groundwater quality through model-building and macroinvertebrates as a water quality indicator. A game of memory, a game of tag, and a mock dip netting activity were presented to prepare the crew for their afternoon adventure to Spring Creek Prairie Audubon Center. Our visit to the prairie started with a break and a challenge for our group of 19 middle school students to sit quietly on the prairie's edge just listening and observing their surroundings. After a hike through the prairie, we arrived at the pond for dip-netting. What could they find? Many caddisflies and mayflies were identified, and plenty of frogs were caught and dragon flies spotted as well.

Spring Creek Prairie Audubon Center offered our group a great place to explore and take in nature.

The sun came out for our trip to Branched Oak Organic Dairy farm on Wednesday, where owners Doug and Krista Dittman gave campers an up close look at their dairy farm, from how the milkers work to where and how cheese is made. We even had the opportunity to sample a few of their cheeses. After a satisfying snack it was off through the pastures to meet the cows and make our way to their pond. The students were eager to explore the pond but first were challenged to build a filter to reduce the turbidity in a sample of pond water. Students discovered the difficulty of eliminating the particles suspended in the water that we can see, and wondered about those that dissolve and cannot be seen, tasted, or smelled? The afternoon brought great weather and students spent the remainder of the day at the farm catching frogs and exploring pond life. Students found tadpoles and frogs in different stages of their life cycles – including tadpoles, tadpoles with legs, young frogs with tails and mature frogs.

Thursday brought rain but our campers didn't let a storm stand in their way, and arrived at Holmes Lake Park ready for the day's adventures. During the morning students explored the pH of various liquids, from cola to milk, ammonia and salt water, and experimented to alter two mystery samples (one acidic and one basic) to a neutral substance. Following the pH activity the group was divided in two to learn how to demonstrate groundwater concepts in a groundwater flow model and how to play the Incredible Journey, a game about the water cycle, in order to share what they learned during camp at the Lincoln Children's Zoo the next day. The sun finally came out that afternoon, and after lunch Ellen Wright and Amanda Conway from the City of Lincoln Watershed Management program led the afternoon's lake clean-up project. In four groups students surveyed the lake shore for debris for proper disposal or recycling. Some of the most interesting finds were a bowl with a lid and a high heel shoe. A water transportation relay, center pivots made from straws, and work on the watershed models from earlier in the week concluded the afternoon.

Friday morning the Outdoor Adventures in H_2O crew met at the Lincoln Children's Zoo, where students set up two booths, one with the groundwater flow model and the other with the Incredible Journey activity. Taking everything they learned throughout the week, campers welcomed Zoo guests to stop by and learn about water! It was impressive to see them share their knowledge and confidently explain groundwater concepts to visitors young and old. Students also had the opportunity to go on a Zoo-fari, a safari through the zoo, learning about rain gardens, composting, and a multitude of animals. After a hot hike back to Randolph, popsicles were a welcomed treat. Students then began to prep their watershed models to share with their parents, who were invited to come at the end of the day to see a photo slide show of our experiences throughout the week and learn more about what took place during camp. See the slide show and camp photo album at http://www.groundwater.org/kc/adventuresinh2o.html.

Five full days of field trips, activities, and games with built-in lessons on various water and groundwater concepts provides our camp participants with an opportunity to learn about water while exploring nature, making new friends, and having fun! Thank you to our camp partners and funders: Wal-Mart, Nebraska Public Power District, Bright Lights, the City of Lincoln Parks and Rec and Watershed Management, Spring Creek Prairie Audubon Center, Branched Oak Organic Farm, and the Lincoln Children's Zoo.

Intelligent Use of Water

Water Conservation Project Earns Grand Island Groundwater Guardian Team $10,000

The Grand Island Groundwater Guardian team and partners were the winners of $10,000 from Rain Bird's 2011 Intelligent Use of Water Awards to go towards the development of an outdoor learning area at the Nebraska State Fair at Fonner Park in Grand Island.

The team won the contest by garnering the most votes in the awards' $10,000 category. The Intelligent Use of Water Awards is an interactive grant program that awards funds to water conservation and environmental sustainability projects that promote green spaces. Now in its fourth year, the annual program recognizes individuals and organizations whose innovation, leadership, and dedication to the management and protection of Earth's most precious natural resource through improved landscape water-efficiency raises the standard for outdoor water conservation. The 2010-11 Intelligent Use of Water Awards program aimed at encouraging and funding future water conservation projects worldwide.

From Dust Bowl to Water Learning

The outdoor learning area will provide visitors to the State Fair with a "stimulating place for play, learning, and environmental education, particularly water education," said Groundwater Guardian team member Marcia Lee in the March 22 issue of the *Grand Island Independent*. The team felt that such an area would be the perfect venue to educate children and adults about our dependence on the natural world. Although the site would be located at the State Fair grounds, the learning area will be available year-round.

During the State Fair's first year in Grand Island in 2010, the location of the proposed learning area was a barren piece of ground. There were several attempts to seed the area with grass prior to the fair, with no success. Now, however, the site will be home to a variety of features that explain the process and importance of groundwater protection, including a xeric garden, utilizing native and adapted plants that use little water; a tree fort constructed in one or more mature trees; a splash ground consisting of concrete pads, drains and nozzles; a bioswale, designed to remove silt and pollution from surface runoff; a gazebo with seating to provide a classroom setting/ resting area for education; a willow tunnel natural play; three rain gardens to allow rainwater runoff from impervious areas to soak into the ground and educate the public about how they can reduce stormwater runoff; and a prairie maze made of prairie grass to add structure to the soil and improve water infiltration over time.

The goal of the learning area is to educate the public about water quantity, water quality and stewardship of water resources in Nebraska; various types of vegetation and water uses across the state of Nebraska; natural filtration techniques; efficient water use and the Ogallala Aquifer.

Intelligent Use of Water

Rain Bird announced the winners of its 2010-2011 awards on World Water Day, March 22. Winners were determined by online voting over a four month period by visitors to the competition website.

Over 275,000 total votes were cast for 85 different water conservation projects that will support sustainability and green spaces. When voting officially closed on March 15th, 10 winners claimed over $50,000 in funds: four $1,500 winners, three $5,000 winners, and three $10,000 winners.

The social media driven program supported environmentally sustainable projects that promote green spaces with the efficient use of water. More information about the winners can be found at www.iuowawards.com.

"The Intelligent Use of Water Awards program really broadened the reach of how Rain Bird can effectively impact those who are improving their local communities with water conservation and the preservation of green spaces," said Dave Johnson, Rain Bird's director of corporate marketing.

In developing the program, Rain Bird assembled a team of partners that share a common goal of helping individuals and organizations make an impact in their community through the Intelligent Use of Water, including The Groundwater Foundation.

Based in Azusa, California, Rain Bird Corporation is the manufacturer and provider of irrigation products and services. Since its beginnings in 1933, Rain Bird has offered a broad range of irrigation products for farms, golf courses, sports arenas, commercial developments and homes around the world. Visit www.rainbird.com to learn more.

Watchful, *continued from page 5*

The foundation found that ozone removes most. So do advanced oxidation processes such as ozone/peroxide and UV/peroxide, but they don't eliminate atrazine, X-ray contrast media, and flame retardants. While more effective than chloramination, chlorine only removes about half

of the compounds investigated and it's one of the many treatments (aside from UV light) that has come under scrutiny in the byproducts rule. Biological filtration, nanofiltration, reverse osmosis, and granular activated carbon are highly effective, but also very expensive.

Depending as they do on such site-specific factors as source water quality, existing treatment train, design flow, and average flow, exact cost comparisons are difficult to calculate. Water Research Foundation Senior Project Manager Alice Fulmer estimates ozonation for a plant with a design flow of 100,000 gallons per day (gpd) and daily flow of 30,000 gpd would require a $400,000 capital investment and $71,175 annually in operations and maintenance. Granular activated carbon is $150,000 and $57,488, respectively.

Depending on treatment system size and required retrofit, utilities begin their first year of compliance monitoring for the DBP rule between 2012 and 2016. Compliance is expected to cost the nation's water providers $79 million annually.

Although none treat specifically for EDCs and PPCPs, we asked managers in Philadelphia, Las Vegas, and Cincinnati how their operations test, or plan to test, for unregulated compounds and how they communicate these efforts.

Conservative Approach

Given that only a few have been detected, Administrative Scientist Gary Burlingame says the Philadelphia Water Department can't justify diverting resources to eliminate trace levels of compounds that may or may not be harmful.

The department reports the presence of unregulated compounds in its annual water quality report and Web site.

The department uses chlorination, sedimentation, and filtration to treat surface water from the Delaware River and Schuylkill River watersheds, producing 270 mgd for 1.6 million people. It's investing about $500,000 in liquid chromatography and a double mass spectrometer to screen source water. "We want to establish a scientific understanding of the issue, to know what's out there in our watershed," says Burlingame.

Until EPA requires monitoring of particular chemicals, the department's participating in voluntary cooperative efforts such as take-back programs and watershed controls through the Philadelphia Partnership for Pharmaceutical Pollution Prevention.

Aggressive Approach

Fifteen years ago, a small outbreak of cryptosporidiosis prompted the Southern Nevada Water Authority to introduce ozonation, even though cryptosporidium had never been detected in finished water.

Ozonation costs five to 10 times more than traditional treatment processes such as chlorine, but it also removes 80% to 90% of EDCs and PPCPs. As a result, the authority subsidized some of the early research in 1998 on the compounds' occurrence, was an early participant in studies about EDCs, and has been testing for EDCs since 2003.

"These communications are very important," says Water Quality Research and Development Manager Dave Rexing. "As a consumer, I'd feel more confident in the safety of my water if I knew the agency was progressive and doing research into those areas."

By selling 600 mgd to five municipal retail authorities, the authority ultimately supplies two million people. Its two plants draw Colorado River water through Lake Mead.

Like Las Vegas, Greater Cincinnati Water Works (GCWW) has a robust treatment train in place. It tests for PPCPs as well as EDCs and provides an average 135 mgd to 1.1 million people.

Ohio River water first goes through chemical coagulation, which makes particulates sticky and heavy so they fall out of the water in the settling process. The water is filtered through sand and sent through granular activated carbon filters, a final step that removes organic molecules such as pesticides, oils, industrial chemicals, and pharmaceuticals.

Because numerous manufacturing plants are located along the river, managers chose granular activated carbon in case of an industrial spill. But Assistant Superintendent of Water Quality Jeff Swertfeger says research shows the process is also an effective treatment for removing EDCs and PPCPs. In 2007, the Water Research Foundation reported that routinely regenerating the material removed all target compounds at participating water utilities.

"If we didn't have it in place, I'd be looking at a process – such as ozonation or membranes – that doesn't just remove EDCs and PPCPs but has other benefits that improve water quality," he adds.

Reprinted from the February 2011 issue of Public Works Magazine with permission by Hanley Wood, LLC.

Inspirations, *continued from page 3*

grandchildren my commitment to a good, clean environment, including water, is vital. I mostly do it for them."

Education is Key

Seacrest, who has been an inspiration to many, said in the same 2000 *Aquifer* article, "The Groundwater Foundation was started so that citizens like myself could learn in ways that were scientifically accurate, but also user-friendly. From the beginning, The Groundwater Foundation worked hard so that groundwater science would be accessible and understandable to citizens everywhere. These educated and involved citizens would in turn, protect the environmental and economic vitality of their communities."

Griffin sums up her drive to protect water: "The belief that being better stewards of the resource is largely dependent upon our awareness of it. If we are conscientious of the resource and how our actions impact it then our decisions and actions will be made accordingly. Our individual decisions and actions will collectively make a difference."

My new perspective as a parent has increased my respect for the communities, individuals, and organizations out there working to educate people and protect our precious water resources. My hope is that these efforts will not only help my daughter's generation learn about the environment, but one day, become stewards themselves.

Groundwater Foundation Partners Recognized

The Groundwater Foundation has always believed that by including everyone we can make a difference, and three of the seven honorees at the 2011 Lincoln Lancaster County Health Department Environmental Leadership Awards proved just that. The awards recognize businesses, organizations, and individuals who have demonstrated environmental stewardship and dedication to sustainable practices that improve air, land, and water quality while protecting public health.

Robert Kuzelka was recognized for his work in environmental education. Bob deserved this award for many reasons, including his work as a professor at the University of Nebraska Lincoln and with the Foundation's Groundwater Guardian program. In 1994, Bob took a year sabbatical from teaching to get the Groundwater Guardian program up and running by directly working with the first eight pilot communities.

Dr. Marcia Mueting of the Nebraska Pharmacists Association was the recipient of the community organization award for her work in organizing the Nebraska Medication Education and Disposal Strategies Committee, also known as the Nebraska MEDS project. Mueting first became interested in keeping pharmaceuticals out of the environment when she attended a Foundation workshop on the subject in 2007. Mueting took what she learned and organized a group, including The Groundwater Foundation, to deal with the issue locally.

The final recipient with ties to the Foundation was the Nebraska Environmental Trust, which was awarded the government environmental leadership award. The Trust has provided coordinated efforts to identify and fund strong environmental conservation and educational projects in Nebraska. The tie to The Groundwater Foundation is two-fold. Susan Seacrest, founder of The Groundwater Foundation sat on the Trust Board of Directors for over 15 years. The Foundation has received several grants from the Trust to assist it in meeting its mission of educating people and inspiring action to ensure sustainable, clean groundwater for future generations.

The Groundwater Foundation certainly does not take any credit for the accomplishments of these very deserving awardees; however, it is certainly nice to see them recognized for their hard work on behalf of the environment and each making a difference in their own way!

Conference Registration Now Open

Registration for The Groundwater Foundation's 2011 conference, which will be held October 4-6, 2011 in Omaha, Nebraska, is now open. Take advantage of special early bird rates and register before August 31.

Links to online registration, a draft agenda, and other conference information is available on The Groundwater Foundation's website at http://www.groundwater.org/pe/conference.html.

Mark your calendars and plan to attend the conference, which will focus on the theme "Let's Keep It Clean: Exploring a Collaborative Approach to Groundwater Protection."

The conference will offer participants the knowledge and tools to help build a far-reaching, collaborative groundwater protection strategy. It will feature field-based tours; traditional classroom presentations on topics such as rural and urban partnerships, land-use planning, community engagement, and contamination challenges and solutions; the Groundwater Guardian and Green Site National Designation Celebration, which includes the Designation Ceremony, reception, and dinner; and opportunities to network with other water professionals and Groundwater Guardian team members.

Check the Foundation's website for updated information about the conference, or contact Cindy Kreifels at ckreifels@groundwater.org or 402-434-2740 ext. 103 for more information.

The 2011 Groundwater Foundation thanks Conference Co-Sponsor Nebraska Department of Environmental Quality; Conference Partner Valmont Industries; Supporting Partners Lower Platte South Natural Resources District, Olsson Associates, Senninger Irrigation, and Water Research Foundation; and additional supporters Central Nebraska Public Power and Irrigation District, Gothenburg Water Utilization Learning Center, Prairie Fire, Rain Bird, Rembolt-Ludtke LLP, and T-L Irrigation for their contributions to the 2011 conference.

Foundation Continues to Grow Groundwater Awareness

After spending nearly a year and a half doing exciting, educational work in the communities of Crete, Wayne and Minden as part of the Growing Groundwater Awareness/Let's Keep It Clean in Nebraska program, The Groundwater Foundation has begun working with three new communities – Fairbury, St. Paul and Auburn, Nebraska.

Each of the communities brings their own uniqueness to the program. Fairbury must pipe in its water from a few miles outside the city limits, St. Paul has a fairly new treatment plant after having issues with high nitrates, and Auburn's groundwater supply was deemed under the influence of surface water so a new treatment plant was opened.

Recently Foundation staff member Brian Reetz took part in the grand opening of the Auburn Water Treatment Plant. Water department staff offered tours of the plant and the Foundation set up a table to provide educational information to each of those in attendance. At the table, visitors spun a mini prize wheel and were asked a water-related trivia question. The wheel has been a big hit and really engages people at community events.

The Foundation will use the prize wheel to help educate, raise awareness, and inspire action in the other two communities soon as well. Reetz participated in the Grover Cleveland Alexander Days celebration in St. Paul on July 9 and the Jefferson County Fair in Fairbury on July 15-16.

The Growing Groundwater Awareness program/Let's Keep It Clean is sponsored by the Nebraska Department of Environmental Quality and the Nebraska Environmental Trust.

the AQUIFER
A PUBLICATION OF THE GROUNDWATER FOUNDATION

The Aquifer
Summer 2011
Volume 26, Number 1

***The Aquifer* is published quarterly by:**

The Groundwater Foundation
P.O. Box 22558
Lincoln, NE 68542-2558
Phone: 402-434-2740
E-mail: info@groundwater.org
Web: www.groundwater.org

The Groundwater Foundation is a nonprofit educational foundation dedicated to educating the public about the conservation and protection of groundwater.

***Aquifer* Staff:**

Editor:
Jennifer Wemhoff
jwemhoff@groundwater.org

Design & Illustration:
Carla Otredosky

Editorial Contributors:
Cindy Kreifels
Jane Griffin

♻ Please consider the environment before printing.

Follow The Groundwater Foundation Online!
We're on Facebook, Twitter and YouTube

Membership, Materials and Publications Order Form

ITEM	PRICE	QTY	AMOUNT
Groundwater Foundation Memberships Ripple Creator .....$35-$74 Big Splash Supporter.....$150-$249 Groundwater Defender.....$500-$999 ☐New Membership ☐Renewal Your contribution as a Groundwater Foundation member helps support the Foundation's educational programs. You will also receive *The Aquifer*, a 10% discount on all Foundation Catalog products, and reduced registration fees to all Groundwater Foundation events. Visit www.groundwater.org for more information.			
Awesome Aquifer Kit Build your own working aquifer model! Includes instructions for six advanced groundwater demonstrations.	$34.95 10 or more at $32.95		
Water Facts CD-ROM Over 150 ready-to-print fun facts, figures, and trivia about water to help enhance a water festival or community education event.	$10.95		
Making A Bigger Splash: A Collection of Water Education and Festival Ideas Hands-on activities, games and science experiments.	$16.45		
Rainmakers: A Photographic Story of Center Pivots Center pivots are used world-wide to bring food to our tables, over 100 intriguing photos enable readers to view the beauty and marvel of this unique technology. Great gift idea.	$24.95		

NAME

ORGANIZATION

ADDRESS

CITY STATE ZIP

DAYTIME PHONE

EMAIL ADDRESS

PLEASE CHARGE MY: ☐VISA ☐MASTERCARD

CARD # EXPIRES

3-DIGIT SECURITY CODE / SIGNATURE OF CARDHOLDER

ENCLOSED, PLEASE FIND: ☐CHECK ☐MONEY ORDER

Send completed order form and payment to:
The Groundwater Foundation,
P.O. Box 22558, Lincoln, NE 68542-2558

Shipping Charge Table*

Total Price of Items	Shipping Charge
$0.00 - 14.99	$10.50
15.00 - 29.99	13.35
30.00 - 49.99	15.45
50.00 - 74.99	17.85
75.00 - 99.99	19.65
100.00 - 149.99	21.75
150.00 - 199.99	24.15

Subtotal:
Groundwater Foundation members, don't forget to subtract 10% from the subtotal for your member discount. Sorry, discount cannot be used on Foundation memberships (new or renewal).

Shipping Charge:
*See table below at left. *Please call 402-434-2740 for orders totaling $200 or more, for orders shipped outside of the United States, or for special rush options.*

Sales Tax:
Nebraska residents only: please include appropriate sales tax for your area. Do not add sales tax to membership dues.

Total Amount Enclosed: