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▲ *Demand for water beyond the recharge rate eventually leads to a stressed supply. By 2025, two-thirds of the world's population may be under water-stress conditions. By 2030, urban sprawl could result in demand exceeding water supply by 40 percent.*

Gone Water Gone

New Study Suggests 11 US Cities Could Exhaust Water Supply

By Kelly A. Reynolds, MSPH, PhD

A new study highlights that nearly one in 10 watersheds in the United States is considered stressed. Without intervention, stressed watersheds are not sustainable given that the demand is greater than the natural rate of replenishment. Considering current, regional trends in water supply and demand, researchers have compiled a list of 11 US cities projected to completely deplete their water supply in the not so distant future. Water-stressed regions frequently suffer from multiple economic and public health adversities, including food and water quality issues. The need is clear for the development of a sustainable water use/management plan for the future.

Global Supply and Demand

Of all the water on earth, only 0.3 percent is usable by humans. The vast majority of the usable water is in underground aquifers followed by freshwater lakes and rivers. In the US, the demand for freshwater is primarily associated with industry withdrawals (i.e., thermoelectric power, 41 percent) followed by agricultural practices (37 percent) and municipalities (19 percent).[1] Globally, the majority of annual water withdrawals is for use in agriculture (69 percent) followed by industry (23 percent) and domestic use (eight percent including municipal, household and personal water uses). The minimum standard to meet basic human water needs for drinking, hygiene, sanitation and food preparation is 50-100 liters (13-27 gallons) per person per day. A minimum of five liters per day are needed for drinking, 20 liters per day for sanitation, 15 liters per day for bathing and 10 liters per day for food preparation.[2] Consumption in the US is approximately 578 liters (150 gallons) per person per day compared to greater waterstressed regions like Africa, where the per capita use averages 47 liters (12 gallons per day).

Demand for water beyond the recharge rate eventually leads to a stressed supply. In the global arena, the Falkenmark Indicator of water stress is commonly used. Based on per

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INSIDE

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

Groundwater Shorts

EPA Launches WaterSense H2Otel Challenge to Encourage Water Savings

The U.S. Environmental Protection Agency (EPA) today launched the WaterSense H2Otel Challenge as a way for agency partners and other organizations to encourage hotels to use best management practices that will save water and money, while reducing greenhouse gas emissions that contribute to climate change.

"Hotels that reduce their water use will not only help their community save precious resources, but can gain a competitive edge in today's green marketplace," said Nancy Stoner, acting assistant administrator for EPA's Office of Water. "Since 2006, WaterSense has helped Americans save more than 487 billion gallons of water, and we're building on that success to help hotels take their sustainability efforts to the next level."

From New York City's Times Square to the Las Vegas strip, hotels across the country will take a pledge to "ACT"—assess, change, and track their water use in the following ways:

- Assess water use and savings opportunities.
- Change products and processes to more water-efficient models and methods.
- Track water reduction progress before and after incorporating best management practices.

Caesars Entertainment is the first company to sign up for the H2Otel Challenge.

"At Caesars Entertainment's resorts throughout the country, we know that sustaining our local water supply is as important as providing the best entertainment experience we can to our guests. Over the last few years we successfully implemented several water saving projects, such as adding low-flow showerheads and sink aerators at our Las Vegas resorts. We are excited to participate in the WaterSense H2Otel Challenge and to identify where we can make even greater improvement to our operations," said Eric Dominguez, Corporate Director of Engineering, Utilities and Environmental Affairs for Caesars Entertainment.

"Here in Las Vegas, the hospitality industry is critical to our local economy. Fortunately, our hotel and resort industry has long been a valuable partner in our successful efforts to improve water efficiency in the hospitality sector", said Doug Bennett, Conservation Manager for the Southern Nevada Water Authority. "We are excited that some of our largest resorts will share their knowledge and participate in the H2Otel Challenge."

By tackling projects throughout their properties, hotels can find ways to improve their water efficiency and performance while providing the highest quality experience for guests. To help hotels make operational changes and meet growing customer demand for green lodging, EPA initiated a series of educational webinars in February 2014 and provided free tools based on the online guide, WaterSense at Work: Best Management Practices for Commercial and Institutional Facilities. WaterSense will also offer outreach materials for hotels to publicize their efforts and celebrate their successes with guests and employees.

For more information about the challenge, visit the WaterSense website at www.epa.gov/watersense/challenge.

New Toolkit Offers Step-by-Step Guide for Partnering with Conservation Districts

The Source Water Collaborative (SWC) recently announced a new online toolkit to facilitate partnerships to protect drinking water sources through agriculture conservation practices, stormwater and forest management.

The toolkit offers effective steps source water protection professionals working at the local or state level can take to build partnerships with conservation district staff. The toolkit is designed for a variety of audiences – from those who have never worked with their conservation district, to those who have attempted but without success, to those who would like to enhance their current efforts.

Vetted by the SWC's National Association of Conservation District, the toolkit offers key information to help you understand what conservation districts do, how they are structured, their funding sources and partners; easy connection to the right contacts in your area; preparation tips and suggested meeting approaches to be more successful in collaborating with the conservation district; success stories from peers who worked with conservation districts to protect drinking water; tips for getting involved in the state technical committee meeting; and useful information for a variety of audiences – from those who have never worked with their conservation district, to those who have attempted, but have not had success.

"The nature of the challenge we collectively face, in seeking to protect sources of drinking water, is that none of us can do it alone. We must work collaboratively with an array of partners," said Jim Taft, SWC Steering Committee Co-Chair and ASDWA Executive Director. "One of our most valued partners, in this endeavor, is the National Association of Conservation Districts. Through their extensive reach and breadth at the state and county levels, NACD members make tangible, positive impacts on water resources generally, and on sources of drinking water, in particular. This online tool is designed to make it easy and convenient to understand where, when and how to interact with our NACD partners in collaborative efforts designed to protect drinking water sources."

Kate Keppen, Watershed Coordinator for the Berks County, Pennsylvania Conservation District says, "The Berks County Conservation District believes that working together with other stakeholders that have similar goals is one of the ideal ways to protect drinking water resources. Working together is proven to better achieve common goals and be more efficient in both time and money. Thus, by working with the Schuylkill Action Network, which connects multi-leveled government agencies, nongovernmental organizations, and private businesses, I feel that our Conservation District has been able to more effectively achieve our mission to protect soil and water resources for future generations. The SWC's online tool makes it easier to identify those other organizations that may have similar goals."

Find the toolkit at http://www.sourcewatercollaborative.com/swp-conservation-partners-toolkit/.

Florida Friendly Landscaping

By Alys Brockway, Hernando County, Florida Groundwater Guardian Team

Promotion of Hernando County's Florida Friendly Landscaping™ (FFL) Program is one of the Hernando County Groundwater Guardian's most important "Result-Oriented Activities." It was one of the first efforts of this committee and continues to be in the forefront of the group's educational pursuits. The FFL program, formerly called Florida Yards and Neighborhoods (FYN), began in Hernando County in 1999. FFL is a program of the University of Florida/Institute of Food and Agricultural Sciences and is commonly housed under county extension offices. In 2011, Hernando County's FFL program moved from the extension office to the Hernando County Utilities Department. Interest in environmentally sound and practical landscaping practices grows each year. One of the highlights of the program is an annual half-day workshop that attracts nearly 90 county residents. Other outreach brings FFL information and education to area homeowners associations, civic groups, schools and businesses. Social media and articles written for internet publishing are also a part of the effort. There are 48 FFL programs in the State of Florida, and of course we believe Hernando County's is one of the best!

Scientists have discovered that fertilizers and pesticides from residential areas are real threats to Florida's water and ecosystems. Runoff containing nitrogen from fertilizers or toxic substances from pesticides can damage aquatic plants and animals that live in fresh and salt water environments. The Hernando County FFL Program makes it easy for residents to learn how to have a beautiful landscape that can save time, energy and money while protecting Florida's water and natural resources. The education engages homeowners and business owners in the battle to save our natural environment and protect our groundwater resources from the serious problems of disappearing habitats and pollution.

By following the nine FFL principles, area residents and business owners can transform their landscapes into a beautiful oasis that will help conserve precious water resources and reduce pollution. Below are the nine principles and a brief description of their intent.

1. Right Plant, Right Place

Achieving a healthy, low-maintenance Florida-Friendly landscape starts with putting the right plant in the right place. Select plants that match the sites soil, light, water, and climatic conditions. Once these plants are established, they'll require little—if any —supplemental water, fertilizer or pesticides.

2. Water Efficiently

It is estimated that at least 50% of water use in the west-central region of Florida is used for watering lawns and landscapes. We know that water is a valuable and limited resource and should be used wisely. Overwatering does more than deplete the water supply it also makes plants more prone to disease and pests. Grouping plants with similar water needs and zoning the irrigation system properly will help to conserve water. Efficient watering is the key to a healthy Florida yard and conservation of limited resources.

3. Fertilize Appropriately

Fertilize only to the recommended rate and timing to prevent the fertilizer from leaching down through the soil rather than being absorbed by plant roots. Look for fertilizer with slow-release nitrogen and little or no phosphorous. If you water the landscape with reuse or reclaim water be aware that it does contain some nutrients and adjust the amount of fertilizer accordingly. Less is often best. Overuse of fertilizers can be hazardous to the plants and the environment.

4. Mulch

Maintaining a 3-inch layer of mulch will help retain soil moisture, prevent erosion and inhibit weed growth. Be sure to choose sustainably harvested mulch like pine straw or pine bark, melaleuca, or eucalyptus. The FFL Program does not recommend the use of cypress mulch.

5. Attract Wildlife

Use a variety of plants in your yard that provide food, water and shelter to attract and sustain Florida's diverse wildlife.

6. Pesticide Management

Unwise use of pesticides can harm people, pets, beneficial organisms and the environment. Always try handpicking insects or pruning first before turning to a pesticide. If using a pesticide becomes necessary, choose the least harmful product, such as a insecticidal soap or horticultural oil.

7. Recycle

Leave grass clippings on the turf to provide nutrients to the soil and reduce waste disposal. Never dump grass clippings into storm drains or waterways. They can pollute water systems and clog drains.

8. Reduce Stormwater Runoff

Water running off your landscape can carry pollutants such as soil, debris, fertilizer, gasoline and pesticides that can adversely impact water quality. Reduction of this runoff will help prevent nonpoint-source pollution.

9. Protect the Waterfront

Waterfront property, whether on a river, stream, pond, bay or beach, is very fragile and should be carefully protected to maintain freshwater and marine ecosystems.

Florida has over 10,000 miles of rivers and streams, about 7,800 lakes, more than 700 springs and the U.S.'s second-longest coastline. By incorporating the FFL Principles into all landscapes, all residents can improve the watershed they live and work in and provide for an aesthetically pleasing and healthy environment.

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capita use, volumes <1,700 m3/person indicates water stress, whereas water scarcity is defined as <1,000 m3/person.[3] A recent study, however, evaluated US water supplies by region to quantitate the level of stress on that supply relative to the regional demands. In consideration of projected use, population changes, climatic events and other factors, watersheds were defined stressed if demand for water is higher than the natural supply. Globally, there is no shortage of water but there is a growing number of regions with scarce water sources. According to the CDC, 1.1 billion people (one-fifth of the population) lack access to clean water and 2.6 billion people worldwide lack access to adequate sanitation. By 2025, two-thirds of the world's population may be under water-stress conditions.[4] By 2030, urban sprawl could result in demand exceeding water supply by 40 percent.

US Woes

Thirty percent of the water used in the US is applied outdoors. Only a small fraction (0.4 percent) is actually used for drinking. Flushing toilets alone accounts for 100 liters (27 gallons) of water use per person per day. While water sustainability has been a buzz word for decades in the US, there is still the cultural perception that there is plenty of clean, fresh water available. Interestingly, despite a growing US population, total water use has changed very little, with overall consumption increases below six percent since 1985. More efficient water use has a net effect of balancing population increases. However, specific regions in the US report declining water resources, particularly in the southwest.

A bird's-eye view of national available water averages disguises the deficiencies in some of our most vulnerable cities. Economic factors, technological innovations and social behaviors promise to drive future water demands. Infrastructure support in the form of reservoirs, inter-basin transfers or use of recycled or reclaimed water sources can change the overall landscape of stressed regions as well. Given current and projected use patterns, researchers from the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado and others evaluated 2,103 watersheds and found that 193 (9.2 percent) have greater demands than the natural freshwater supplies can support.[5] (see more information about the CIRES study on page 5)

Regional Effects

While the majority of the predicted water stress is in the western US, less obvious regions such as the Great Lakes, along the Mississippi River and some regions along the Appalachian Mountains are also experiencing negative useable water replacement values. Whereas many regions in the west rely on reservoirs with large storage capacity for snow melt, climate variations and long drought spans add to water-stress indicator levels. Climate variations and shifts in water availability are not uniformly distributed, leaving some regions with more than enough water and others severely lacking. As the CIRES report details, national averages do not provide the full picture of water shortages in highly regionalized areas. The report further details sector-specific trends and use patterns relative to agriculture, municipalities and power plants, using geospatial mapping tools. Overall, withdrawal trends are driven by irrigated agriculture, particularly in the western US. Water demand in the eastern US is driven by population and industrial centers, as well as the more common thermoelectric power plants that use fresh water for cooling. Popular media summarized the CIRES report, and others, by listing 11 US cities that dramatically exceed their natural water source's rate of replenishment. Salt Lake City, UT is one city determined to be at high risk for water shortage where even minor increases in climatic temperatures can affect the flow of important creeks and streams. Lincoln, NE is also at risk given extreme drought conditions that affects 96 percent of the state. Other cities on the list: Cleveland, OH; Atlanta, GA (drought patterns); Miami, FL (low-storage capacity); San Francisco, CA (population growth, climate change, salt-water intrusion); Houston, TX; Washington, DC and El Paso, TX. The number-one most at-risk city for exceeding supply is San Antonio, TX with a population of over 1.3 million. Most of California is also at high risk for water stress. Los Angeles and much of the western cities rely on supply from the Colorado River to meet demand, which is likely unsustainable.[6]

Water Quality Impacts

Water from the Colorado River is delivered to central and southern Arizona via an open canal that spans over 330 miles from Lake Havasu City to Tucson. When the Colorado River water first entered the pipes in Tucson, residents were horrified to turn on their faucets and find a stream of red, rusty water flowing freely from the tap. The different pH and mineral content of the water caused a sloughing of rust from the city mains and household plumbing. The event was a public-relations disaster for promoting Colorado River water use. Regional water shortages can have an impact on water quality. Water shortages also prompt increasing efforts for water reuse along with new challenges for effective treatment. As supplies are stored or transported across the miles, the opportunity for contamination is also a reality, requiring new assessments for water quality assurance.

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About the Author

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Demand in 1 of 10 Watersheds Exceeds Natural Supply

Demand for water exceeds the natural supply in watersheds across the U.S., according to a new analysis of surface water in the United States. What's more, the lowest water flow seasons of recent years—times of great stress on rivers, streams, and sectors that use their waters—are likely to become typical as climates continue to warm.

"By midcentury, we expect to see less reliable surface water supplies in several regions of the United States," said the study's lead author, Kristen Averyt, associate director for science at the Cooperative Institute for Research in Environmental Sciences (CIRES) at the University of Colorado Boulder. "This is likely to create growing challenges for agriculture, electrical suppliers and municipalities, as there may be more demand for water and less to go around."

Averyt and her colleagues evaluated supplies and demands on freshwater resources for each of the 2,103 watersheds in the continental United States, using a large suite of existing data sets, and determined that nearly one in 10 watersheds is "stressed".

They identified times of extreme water stress between 1999 and 2007, and they estimated future surface water stress—using existing climate projections—for every watershed. In the paper, published online in Environmental Research Letters on Sept. 17, the authors also diagnosed the reasons contributing to stress.

Across the United States, the team found that water supplies are already stressed (i.e., demands for water outstrip natural supplies) in 193 of the 2,103 watersheds examined. In addition, the researchers reported:

1. The U.S. West is particularly vulnerable to water stress, for two reasons: 1) the differences between average demand and average supply are relatively small, so slight shifts in either supplies or demands can trigger stress, and 2) Western water users have long relied on imported and stored water to supplement natural supplies, in order to meet demands.

2. In most parts of the country, agriculture requires the most water, and contributes most to water stress.

3. In Southern California, thirsty cities are the greatest stress on the surface water system.

4. In scattered locations, the cooling water needs of electric power plants represent the biggest demand on water.

"A single power plant has the potential to stress surface supplies in a local area," said co-author James Meldrum, a researcher in the Western Water Assessment, a program of the National Oceanic and Atmospheric Administration (NOAA) and CIRES. It's critical to understand how various sectors contribute to the stress on a water system, Meldrum said, because effective remedies depend on accurate diagnosis.

Agricultural and municipal demands are spread among many users, for example, allowing flexible changes in water use and efficiency of use. "But because power plant decisions are so capital intensive, they tend to be locked in for a long time," Meldrum said. "With the potential for increasing water stress in the next few decades across parts of the United States, power plants—and our access to electricity —may be put at risk when water is not adequately considered in planning."

The authors deliberately didn't account for future changes in demand for freshwater. Rather, this analysis was designed to identify the sensitivity of U.S. watersheds to changes in surface water availability.

The researchers hope that the analysis will provide useful information for people reliant on surface waters. "We hope research like this helps us understand challenges we might face in building a more resilient future," Meldrum said.

The research was funded by the Union of Concerned Scientists; NOAA, through the Western Water Assessment; and CIRES. Other co-authors are Peter Caldwell, Ge Sun, and Steve McNulty from the U.S. Department of Agriculture Forest Service at Raleigh, N.C.; Annette Huber-Lee from Tufts University, at Medford, Mass.; and Nadia Madden from the Union of Concerned Scientists, Cambridge, Mass.

CIRES is a joint institute of the National Oceanic and Atmospheric Administration (NOAA) and CU-Bolder.

Maintenance a Must

On-Site Wastewater Treatment Systems Benefit from Regular Maintenance

By Brennan Hallock, Groundwater Foundation Volunteer

On-site wastewater treatment systems are a popular method of sewage disposal in the U.S., especially in rural areas that do not have readily available sewer lines. About 25% of the U.S. population owns an on-site wastewater treatment system, according to the National Environmental Services Center. If you are the owner of an on-site wastewater treatment system, you must take steps to ensure you are not causing damage to your property, your family, the environment, and the property and families of those around you.

Installing an on-site wastewater treatment system on your property can be much more beneficial to the environment than running miles of sewer lines to your property. Unfortunately, in many cases, once an on-site wastewater treatment system is installed, it is often forgotten until it malfunctions. When the system is installed, you are the one responsible for it. According to the U.S. Environmental Protection Agency (US EPA), about 10-20% of on-site wastewater treatment systems malfunction each year. More often than not, system malfunction or failure is a result of improper maintenance by the owner.

The first important step to take in ensuring a functioning on-site wastewater treatment system is how and where to construct it. If you are moving into a house that already has an on-site system, it is essential to have it inspected to make sure it was properly installed and is up to your state's codes. If you are considering installing an on-site system on your property, it is necessary to have this done by a professional. The location and size of your septic system will vary greatly depending on the type of soil, number of bedrooms in your house, and fixtures which contribute to wastewater such as a dishwasher or clothes washer.

Once the system is installed, it is imperative to properly maintain it. Having your system regularly inspected can protect your family's health and save you money. Repairing or replacing a septic system can be costly; replacement prices ranging from $2,000 - $15,000 and even more. The best method to prevent this unnecessary cost is regular maintenance. The US EPA recommends having your system inspected every three years, and pumped as recommended by the inspector. Pumping your septic system removes excess scum and sludge build up inside the tank.

The drainfield, also called the absorption field, consists of buried perforated pipes within a series of trenches or mounds lined with gravel. It too is important to maintain. It can become overloaded or compacted by having too much weight placed on it. The soil must stay uncompacted and unsaturated in order to continue treating waste properly.

An on-site wastewater treatment system can fail for a number of reasons, but usually points to improper maintenance. Not having the system inspected often enough can cause the owner to miss key factors contributing to a system failure, such as improper installation, household toxics in the system, excess household cleaners in the system, or overuse of garbage disposals. Household toxics can include oil-based paints, solvents, and cleaners which kill important bacteria in the system.

Large amounts of water rushing into the system at once can be hard on it as well, causing the water to not be processed correctly. The US EPA estimates that the average water use in a typical home is 70 gallons per person, per day. This is an enormous amount of water, and not all of it is necessary.

To protect your wastewater treatment system and conserve drinking water at the same time, it is good to pay attention to excess water entering the system. Leaky faucets, toilets, and showerheads can waste many gallons of water every day. Run water-using appliances such as dishwashers and clothes washers toward the middle of the day rather than at peak water use times, which are the morning and evening, to avoid excessive water entering the system. In addition, runoff from roofs, driveways, and roads should be directed away from the drainfield to prevent the soil from becoming saturated and overload the system.

If maintained correctly, your wastewater treatment system can be beneficial and environmentally-friendly, but without regular maintenance, it has the potential to affect groundwater supplies and cause harm to you and those around you. Having your wastewater treatment system regularly inspected and pumped can avoid unnecessary expenses, damage to your property, damage to neighbor's properties, damage to the environment, and damage to the health of you, your family, and families around your property.

Find out more about on-site wastewater treatment systems:

- Groundwater Foundation Get Pumped! Septic Education Toolkit: http://www.groundwater.org/action/resources.html
- U.S. EPA: http://water.epa.gov/infrastructure/septic/index.cfm, http://water.epa.gov/aboutow/owm/upload/2009_06_22_septics_septic_systems_factsheet.pdf, http://water.epa.gov/infrastructure/septic/manuals.cfm
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About the Author: Brennan Hallock is a freelance writer in Kansas City, Kansas.

Wildfires Impact Drinking Water

Study Helps Water Utilities Prepare and Respond

Wildfires can have significant impact on water utilities due to their potential widespread effect on source water quality and related treatment costs.

From January 1 through November 8, 2013, 42,538 wildfires were reported in the United States, burning almost 4.1 million acres of land, as reported by the National Interagency Fire Center on their website, http://www.nifc.gov/fireInfo/nfn.htm.

These wildfires have far-lingering effects beyond just the loss of forestation. Burned areas are vulnerable to erosion and mud slides that can fill up sources of drinking water with ash, silt, fire retardant chemicals and contaminants, impacting both water quality and quantity.

To meet this need, Water Research Foundation (WRF), an internationally recognized leader in water research, just completed a new study, Effects of Wildfire on Drinking Water Utilities and Best Practices for Wildfire Risk Reduction and Mitigation (project #4482).

The October – December 2013 issue of WRF's Advances in Water Research publication goes on to note that wildfires can affect a number of water quality parameters, such as nutrients, sulfate, pH, total dissolved solids, turbidity, organic carbon, chloride, iron, color, taste and odor. In addition, wildfires have an impact on how water systems can provide water to their customers.

The project compiles information gathered from a survey administered to drinking water utilities that experienced or are at risk of experiencing effects from wildfires; feedback gathered at an industry workshop convened in Denver that explored related topics in detail; and a review of related industry, academic and scientific literature. The project was jointly funded by WRF and the U.S. EPA's Source Water Protection Program and Urban Waters Federal Partnership.

"Unfortunately, many areas of the country continue to have a significant risk of wildfires, given the average rainfall they are experiencing, and those fires pose a very real threat to both the quality and quantity of source water available for many drinking water utilities," explained Rob Renner, Executive Director of WRF. "While it is impossible to prevent forest fires, there are steps utilities can take to prepare for them and to mitigate their impact. This report lays out the issues and challenges as well as the steps utilities can take to ameliorate them."

Survey participants reported that collaboration with other drinking water systems, landowners, non-profit organizations, and local, state, and federal government agencies was a critical aspect of effective wildfire mitigation. Collaboration helped survey respondents expand their knowledge base and leverage financial resources. Other best practices identified through the survey included:

- Conducting strategic fuel reduction activities (such as burning, mechanical removal, grazing, etc.) in the watershed and areas immediately surrounding reservoirs.
- Ensuring proper maintenance in and around the wells, pumps, and storage tanks.
- Providing education in the form of staff training and awareness among rural residents.
- Encouraging state or county ordinances to require fire safe activities around rural residences.
- Creating a network of shaded fuel breaks at key locations to provide firefighters access to remote areas.
- Developing partnerships and cooperation with other organizations to ensure upstream reservoirs have sediment containment capacity.
- Being prepared in the event of a fire, including diversifying water intakes and establishing redundancy of treatment plants and raw water supplies.
- Planning for wildfire appropriately, such as having a formal plan, implementing fuel hazard reduction, reducing wildfire severity, and developing pre-permitting sediment control structures downstream from high hazard areas.
- Managing forest area in a way that will aid in delivering the highest water quality possible, such as considering the age and species composition of the forest.

A 1½ day workshop in Denver provided a range of participants in the water industry with the opportunity to share lessons learned and best practices for mitigating the impacts of wildfire on water quality and quantity at drinking water systems.

About the Water Research Foundation

The Water Research Foundation sponsors research that supports the water community in holistically and cooperatively managing water from all sources to meet social, environmental, and economic needs. WRF's research provides reliable and relevant solutions to the most critical challenges facing the water community today and into the future. Founded in 1966, WRF is a 501(c)(3) non-profit organization that has sponsored nearly 1,500 research projects and serves more than 1,000 subscribing organizations.

For more information, go to www.WaterRF.org.

No Pain, No Gain

By Bill Bieck, CGCS, Heritage Hills Golf Course, McCook, Nebraska

▲ *Bill Bieck, CGCS*

The phrase used as the title of this article usually associates itself with the agony of losing weight or the dedication of an athlete in his pursuit of athletic perfection. The concept implies that one needs to sacrifice in order to achieve a goal.

We can also relate this axiom to the profession of golf. Hard and diligent work habits should breed success. If we expend ourselves physically, mentally, and financially it should yield a successful operation... but sometimes it hurts...and is painful.

I have a deep passion and concern for water conservation and protection and how it relates to the golf industry. Of equal importance to actual water usage is the image we portray to other water consumers locally, regionally, and worldly. I do believe we will encounter "painful" accusations and mistruths as water issues will become more and more critical. Will the golf industry be ready and able to defend past standards? Will we be able to justify our actions? I believe the Golf Course Superintendents Association of America and several chapters have done a great job preparing for these potential confrontations. Advocacy will be a major tool to validate our actions. The GCSAA will continue to advocate for our industry.

But when water issues become regional or local it needs to be US who stands up. Many will say water is a global issue, but the world is not going to turn our "tap" off. It will be regional or local regulators that will control the spigot.

Can we advocate? Absolutely! We can and should be vocal and express to others – our members, community, region – the good stewardship practices we have integrated into our water management plan. Meter, document and track water usage. Routinely audit the golf course. Use technology to develop more efficient irrigation practices. Recognize that perceptions are changing and becoming more scrutinizing. The industry is evolving. Evolution is a gradual process in which something changes into a significantly different, more complex or more sophisticated form. We need to communicate that we are a business that contributes substantially to local economies, and we also have a positive environmental footprint in a proactive way. Greg Lyman, director of GCSAA's Environmental Programs, has stated, "If you're not seen as proactive, you're going to be legislated to be proactive."

The sphere of water law and regulation is dynamic. Change is eminent. We as Golf Course Superintendents cannot run and hide from the issues anymore. Regulators and opponents will be seeking us out. We will be asked to clarify our position and actions. Do we have a plan? What is the plan? Environmentally-sensitive golf course superintendents are constantly monitoring, benchmarking, and evaluating every aspect of their water management. What was acceptable and the standard 20 years ago is unacceptable today. What is the standard today will not be appropriate in the future. It is important to have both a "Water Management Plan" and a "Drought Management Plan" that can be modified as newer technology is introduced and to plan for the future.

Oil is often described as "liquid gold". Will water become the next "liquid gold"? Can we learn from the past actions of the oil industry? I think so! Oil has taught us that scarcity breeds value. When oil production declines or becomes scarce the basic economic principle of "supply and demand" is evident, and the price increases. It becomes painful.

Water, like oil, is a limited resource and is increasing in value and scarcity. Water will be a major factor in our industry's future drive toward sustainability. It will be painful, but it is a necessary step for us to transition into the future. I would encourage all of us to embrace the change. Resistance will only prolong failure. No pain, no gain.

Editor's Note: Heritage Hills Golf Course in McCook, Nebraska has participated in The Groundwater Foundation's Groundwater Guardian Green Site program since its inception in 2007, and implements a number of groundwater-friendly practices to maintain the course.

The Green Site program recognizes green spaces managers, like those of golf courses, parks, office and educational campuses, nature centers, and more, for their environmental stewardship.

To find out more and how sites in your community can get involved, visit http://www.groundwater.org/action/community/green-sites.html.

News From The Foundation

Growing Groundwater Awareness in Nebraska Program Moves into Phase II

Thanks to generous funding of the Nebraska Environmental Trust, The Groundwater Foundation's Growing Groundwater Awareness in Nebraska (GGAN) program is moving into its second phase. GGAN Phase II is aimed at increasing awareness of Nebraska's water resources, assisting communities as they take action to conserve and protect groundwater from threats, and encouraging communities to participate in long-term conservation and protection programs.

The Groundwater Foundation has been working hard in recent months to connect with Nebraska's youth through the GGAN program. Program Manager Heather Voorman has been working with Emerson Elementary School in Columbus, Nebraska to teach students about the importance of caring for groundwater through hands-on activities. The school was given a groundwater education toolkit to share with future classes.

The Groundwater Foundation has also been working closely with the Spirit of Nebraska Girl Scout program in GGAN Phase II. Last October, The Groundwater Foundation helped host a groundwater day camp in Valentine, Nebraska for local Girl Scout Troops. The camp provided an opportunity to share the importance of groundwater protection with the Girl Scouts while also allowing the Groundwater Foundation to make valuable connections with local concerned citizens. One of the troops from nearby O'Neill, Nebraska loved the program so much that they asked Groundwater Foundation staff to come to O'Neill Elementary School's after school program to present the day camp program earlier this year.

The GGAN program has many exciting events coming up in 2014 including presentations in libraries, parks, and festivals across Nebraska. We are still looking for more communities to participate in Phase II of GGAN, so if you know of any communities in the state that would be interested in this program, please contact Heather Voorman at hvoorman@groundwater.org or at 402-434-2740 ext. 111.

Groundwater Foundation Teams Up for Safe Medication Disposal

In 2002 the U.S. Geological Survey (USGS) released a study showing low concentrations of medications in 80% of 139 waterways across the country. In response to this study and heightened concerns about personal care products being found in drinking water across the U.S., The Groundwater Foundation has partnered with the Nebraska Pharmacists Association, the Nebraska Department of Environmental Quality, the Nebraska Board of Pharmacy, and the Lincoln-Lancaster County Health Department to create the Nebraska MEDS (Medication Education on Disposal Strategies) Program. The focus of this program is to educate the public about proper disposal of prescription and over-the-counter medications.

Pharmaceuticals and personal care products can be introduced to the environment as pollutants in a variety of ways including flushing medications and discharge from municipal sewage systems or private septic systems. Currently, the potential human health risks associated with the very low levels of personal care products in our water is still being determined. Until more is known, The Groundwater Foundation along with the rest of the Nebraska MEDS partners are working to educate the public about the risks and best practices concerning the use and disposal of medications

What can you do? Never flush medications. If flushed down the drain, leftover medications can contaminate our water. Even over-the-counter medications such as acetaminophen should not be disposed of by flushing.

Dispose of medications properly. The best way to dispose of medications is to take them to a local pharmacy that participates in medication take-back, or bring them to your local National Prescription Drug Take-Back Day location. This year the Take-Back day is April 26, 2014. A list of drop-off locations can be found at http://www.deadiversion.usdoj.gov/drug_disposal/takeback/.

Want to know more? If you want to know more about the Nebraska MEDS project or how your community can get involved in safe medication disposal, contact Heather Voorman at hvoorman@groundwater.org.

Big Milestones Ahead for The Groundwater Foundation

The Groundwater Foundation is preparing to celebrate big milestones in the years ahead. 2014 marks the 20th anniversary of its Groundwater Guardian program, and 2015 is the 30th anniversary of the Foundation itself.

Groundwater Guardian began in 1994 with eight pilot communities, with the goal of connecting, recognizing, and motivating communities of all types as they implemented local groundwater education and protection activities. Twenty years later, over 400 entities of all types have been involved in educating the public and protecting the drinking water of millions of people across North America.

Susan Seacrest began The Groundwater Foundation in 1985 after seeking out information related to groundwater contamination in the Platte River Basin of Nebraska. Thanks to the urging of Dr. Dennis Weisenberger, who challenged Seacrest to learn all she could and engage and involve other citizens, The Groundwater Foundation was born. In 30 years, the Foundation's programs, projects, events, and resources have helped people better understand groundwater and how they can take action to protect it.

The 2015 National Conference will celebrate both these milestones, and The Groundwater Foundation has a few other surprises to celebrate along the way. Stay tuned to www.groundwater.org to see the latest! If you have ideas as to how we should celebrate Groundwater Guardian's 20th anniversary or the 30th anniversary of the Groundwater Foundation, please email info@groundwater.org.

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