# More Precious than Gold - Water!

*By Frank A. Brigano and Susan Mathews*

## Introduction

Last year brought many challenges surrounding the availability and quality of water which will promise to impact all of us economically and environmentally throughout 2013. While manmade and natural contaminants continue to taint the global water supply for drinking and agricultural use, the predominant concern from 2012 was the catastrophic drought that has affected much of the world.

Throughout 2012, short-term global drought conditions intensified on almost every continent. The intense North American drought in the midwest shifted to the Pacific northwest. In Europe, drought remains focused in the south, particularly in Spain and Greece. Asia's drought intensified notably east and south of the Caspian Sea and in South America it is impacting nearly the entire continent, with the exception of the areas around the equator and central Argentina. Likewise, much of non-equatorial Africa is experiencing drought while in Australia it continues in the west and intensified in the central and eastern parts of the continent. Among other things, a global food crisis will be the inevitable outcome of this drought.

## Global Water Solutions

So why is this important to the water treatment industry? As the ground water levels and reservoirs are lowered there is the potential to concentrate salts and other contaminants in the water. Thus, there is an opportunity to improve water quality for the consumer. Point-of-use (POU) or point-of-entry (POE) equipment can improve water taste; reduce water hardness, total dissolved solids (TDS), various other inorganic and organic contaminants that may or may not have a health effect. It is without a doubt that our products provide a benefit to the consumer by improving water quality aesthetically and reducing potential health contaminants from the water. But the water treatment industry also has a responsibility to protect and conserve our environment, especially our water environment.

There have been numerous efforts to improve the water and salt efficiencies of water softeners. New technologies are under development, such as, the development of new water hardness reduction and anti-scale products. These technologies have the potential to save our water resources by using less water and reducing the amount of salt put into the environment. Immediate improvement can be accomplished with demand initiated regeneration (DIR) water softeners installed at their maximum salt efficiency, especially on water without iron or other fouling attributes. Replacing time-clock softener models with DIR units will save water and reduce salt discharges.

## Water Efficiency

Improving the water recovery of reverse osmosis equipment is also a must. Efficient reliable shutoffs are typical in the industry. But water efficiency ratings are often much less than 25%. For example, at 25% efficiency it takes 8 gallons of water to produce 2 gallons of filtered water resulting in 6 gallons of water going to drain. The water treatment industry needs to strive to reduce the amount of water wasted by increasing water efficiencies.

In addition to improving our technologies to reduce water wastage and discharges we also need to evaluate how the water treatment industry can facilitate the reuse or process waters for consumption.

Richard Heckmann, the founder of US Filter, frequently would cite his desire for a product that would be located "between the urinal and the tap" and would provide "recycled" water for consumption. Though admittedly not a very appealing concept, it is in reality a concept that is achievable (note the Space Station) and one that is practical especially for the reuse of grey water.

The water treatment industry has the technology today to make this happen. I would expect we will see more grey water applications in the near future.

Capturing, treating and using rainwater is another approach to satisfying our need for potable water (see October 2012 Water Quality Products). Capturing rainwater is not new, as cisterns have been used for centuries (they are used in many parts of the US today). Rainwater fills the need when ground water or municipally treated waters are not readily available. Once again the water treatment industry has the technologies to process and treat this water to make it safe for use.

One problem in addressing global filtration is that many parts of the world require point-of-use (POU) systems that can operate in low-pressure areas. There are technologies in the marketplace that can provide microbiologically safe drinking water and also have the ability to reduce heavy metals, organic contaminants and improve water taste at gravity and very low water pressures.

However low-pressure and gravity water treatment solutions prove to be a challenge especially on waters of unknown water quality.

For example, India has specific guidelines regarding distributed water quality. But, is this water safe to drink? Unfortunately, Indian water delivery often is intermittent to the consumer. To insure a constant supply of water most consumers have rooftop storage tanks. The reduced pressures in the water mains during "off periods" can facilitate the intrusion of contaminants into the distributed water. Additionally, the consumer's water quality and pressure are largely dictated by their storage tank. That is, the water pressure in the home is determined by the height of the water tank and its water level. Typical water pressures in an Indian home range from 0.2-0.7bar (3-10psi) rendering many conventional filtration devices ineffective without the addition of a booster pump.


If the rooftop tank water supply is not properly secured or sealed, it can be impacted by birds, animals and debris, resulting in possible contamination from microorganisms. Individuals are fortunate if these tanks are cleaned on a yearly basis. Water temperatures in these tanks can reach 55ºC (131ºF) which can contribute to microbial growth. Microbiological contamination is typical, in fact, our microbial analyses of water from these systems showed a plethora of microorganism species including coliforms.

Many Indian families, as well as many families around the globe, rely on gravity-type systems to supply their drinking water. New technologies developed specifically for gravity applications can deliver microbiologically and chemically safe water. Unfortunately these waters are often shown to be high in silt and other organic particulates that can shorten the life of filter. Technologies that can reduce these contaminants and continue to supply potable drinking water given these unusual water characteristics will prove vital.

These technologies must also have an appropriate service life. Many cultures measure filter life in terms of time and not by the amount of water processed. There is the propensity of some cultures to clean and reuse the filter element. It is going to be a challenge to shift this cultural paradigm in order to provide safe, reliable products to these populations.

To secure the safe performance of POU systems, the water treatment industry has and continues to take the lead in developing testing protocols and standards. We salute the Water Quality Association (WQA) along with NSF International (NSF) for leading product testing protocol development in India and other countries around the globe. These efforts should insure a level playing field for manufacturers and more importantly provide safe, reliable products to the consumer.

Experience has taught us that while water may leave a treatment facility meeting drinking water standards, the infrastructure plays a significant role in water quality at the tap. In the United States, for example, there will be more emphasis on improving and maintaining our infrastructure for the coming years. The need to refurbish and upgrade the water distribution infrastructure is evident by the increasing number of boil water alerts throughout the country due to microbial and chemical excursions. Consumers will use POU products as solutions to drinking water contamination of distributed water. The government must reach a definitive resolution on the use of POU systems for compliance purposes as it no longer makes sense to treat all the water when only a few liters of water are used for drinking and cooking.

## Conclusion

The goal of our generation should be to leave an environment and a culture that will allow future generations to prosper. Efforts to measure and document our products and their effect on resources are critical to the sustainability of our environment and resources. Product sustainability and how that is measured is a daunting task. The water treatment industry has efforts underway to provide sustainable metrics for our products while offering technologies that can provide microbiological and chemical safe drinking water globally. 2013 promises to see significant progress in developing these methodologies. ☞ www.kxtech.com

## About the Author

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**KX Technologies** provides innovative technologies and custom-designed filtration systems. It operates one of the world's largest solid-state extrusion facilities for the production of activated carbon filters. The company was originally formed in 1989 as a limited partnership between Exxon Chemical Corporation and KT Corporation. In 2007 Marmon Water LLC acquired the assets of KX Industries, LP, with the business going forward as KX Technologies LLC. In March 2008, Berkshire Hathaway Inc. acquired majority interest in The Marmon Group of companies.

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