Water Sustainability: A looming Global Challenge

By Dan McCarthy, President and CEO of Black & Veatch's global water business

The future of water is anything but clear. We face a future world fraught with water challenges too much, too little, too contaminated or inaccessible to meet our needs.

We live in a rapidly changing world in which many of our expectations about natural resources may no longer be met. The seeming abundance of safe, low-cost water may falsely lead us to assume perpetual easy access to all the low-cost, high-quality water we want, when we want it.

The water industry today must examine these assumptions. Although water covers 70 percent of our planet's surface, less than one-half percent is freshwater available for our use. Most of our planet's water is in oceans and too salty for many uses. Much of the remainder is locked in frozen glaciers, is remote from population centers or circulating in our atmosphere. So this seemingly abundant resource is actually quite constrained.

What's changing?

Three factors are having an impact on our freshwater resources:

Population growth

The world's population is 6.6 billion and growing. As a result, humans are demanding more of the earth's resources to sustain life and economic activity. Science and engineering have been developing and implementing technologies to alleviate some of this burden. However, there is a limit beyond which little can be done. It appears probable that we are nearing this limit.

Economic growth in water scarce regions increases water demand. Last year the planet's urban population exceeded the rural population for the first time in history. Fifty percent of the world's population resides in metropolitan areas, increasing demands on water systems.

Climate change

Planning and design criteria based on historic records may no longer be applicable in a world where water resources are heavily impacted by drought, flooding and/or an increase in mean sea level. As a result, facilities may be found to be at significant risk in the face of rapid climate change.

Then and now

Previous generations had the luxury of the earth's excess natural "bio-capacity." The capacity of the natural systems and cycles that renew our "wastes" and enable the conditions to support our human and ecological environments was far greater than the demands of the world's population.

Currently, however, the growing demand for earth's natural resources, like water, is creating an imbalance between the earth's bio-capacity and its inhabitants' desired standard of living.

The good news is that we never destroy water. The earth's water supplies are fixed: what we had yesterday is the same as what we'll have tomorrow. Though many of the resources needed for economic development are being depleted, water at least in terms of quantity is a constant.

The problem is the location, timing and distribution of rainfall. Our industry's challenge is to help communities ensure that water is always where we need it, when we need it, which is not necessarily where it falls to the earth as rain.

Water, water everywhere, but competition for available water is increasing because water is not distributed evenly over the globe. Nine countries possess 60 percent of the world's available fresh water: Brazil, Russia, China, Canada, Indonesia, the United States, India, Columbia and the Democratic Republic of Congo. However, local variations of population distribution and freshwater supply are highly significant. Many communities, once water-rich, are facing a new challenge as water supply and demand are now imbalanced.

In most European cities with more than 100,000 people, groundwater is being used at a faster rate than it can be replenished. Available water costs more and more to capture or draw from aquifers. Large cities like Mexico City, Bangkok, Manila, Beijing, Madras and Shanghai have experienced significant aquifer drops of between 10 to 50 meters.

Other water scarcity examples include the Yangtze River Basin in China; Australia, now in its 10th year of a record drought; the Colorado River basin, also

in the midst of a long-term drought of historic proportions; and parts of the Southeast United States, especially northern Georgia.

Droughts or increased flooding may not be the only unfortunate consequence of changing rainfall patterns. These changes may also result in storm sewers and drainage systems that are inadequate to handle current and future needs because they were built on past assumptions that may now be invalid.

Preparing for an uncertain future

We are moving from what has been viewed as a time of certainty within our industry to a time of great uncertainty; we're being driven by the forces of change in our climate and in the water business.

The challenge for key global water industry players, like Black & Veatch, and for our clients around the globe is to develop and implement sustainable solutions that will better manage the entire water cycle and help their customers and communities prepare for an uncertain future.

These solutions will focus on how best to protect water at its source, treat it to the highest standards, deliver it to homes and businesses, and then collect and again treat the wastewater before reintroducing it safely back into the environment. We also seek methods of sourcing "new water" through reuse, aquifer storage and recovery or desalination of water, for example.

Political leaders at all levels and the general public want to know what their utility leaders are doing to prepare for these challenges. They realize that water suppliers, regulators and customers can't simply discuss or debate the future as it arrives; they must plan and take action today to minimize uncertainty and risk. All stakeholders must work together to craft robust long-term strategies and implement cost-effective solutions for mitigating and, if necessary, adapting to the potential impacts of climate change.

Taking the long view

The water industry must focus on the long view when facing the challenges of rapid population and economic growth, along with supply deficiencies or wet weather problems. And added to those trends are other pressing issues, like aging water infrastructure, degradation of water quality, changes in water rights and tightening regulations.

That's why Black & Veatch and other leaders in the global water industry are working to develop innovative solutions to address climate change, water scarcity and sustainability planning. We are seeking triple-bottom-line solutions

that meet our clients' social, economic and environmental goals; are sustainable; and are politically and commercially viable.

Just as in the 1990s, when decision making shifted from capital costs to life-cycle costs, now in the early part of this century, the importance of triple-bottom-line decision making is being recognized and emphasized during all stages of planning.

Managing the future

The ultimate stakeholders in this debate are yet to be born. One thing is certain: coming generations will not take water for granted. Because the future of water is dynamically bound to the present, now is the time for far-sighted leaders to act.

Sustainable planning is no longer an isolated challenge; regional solutions require integrated planning among municipal, industrial and agricultural water users. Proactive watershed management is key to helping a community optimize its water opportunities. A holistic water review should examine the best combination of solutions for a community conservation, non-potable reuse, indirect potable reuse, impaired waters from brackish or contaminated waters, desalination or water sharing among adjacent communities. These are not easy decisions but they must be addressed.

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