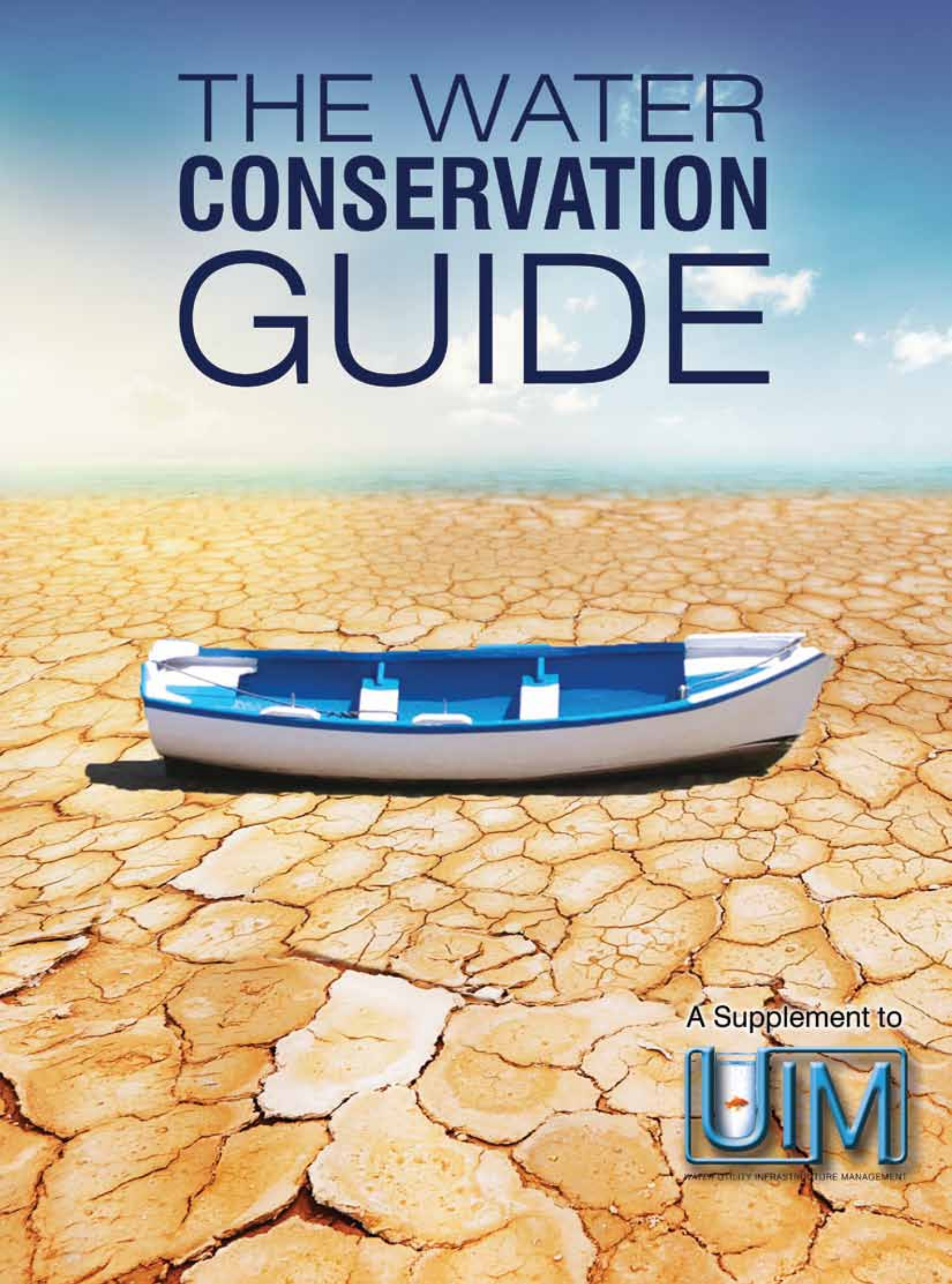
THE WATER CONSERVATION GUIDE



A Supplement to

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WATER UTILITY INFRASTRUCTURE MANAGEMENT

THE CHANGING WATER PARADIGM

Exploring Non-Traditional Water Sources and Reimagining Water Delivery Philosophy

By Graham Symmonds

For those of us living in the southwest United States, the recent announcement by the U.S. Bureau of Reclamation of a reduction of the discharge from Lake Powell to Lake Mead is a stark reminder of the peril lurking around the corner for water utilities. Indeed the volatility of water supply is increasing world wide — in both traditionally water scarce areas and those once considered water rich. Changes in the timing and intensity of the natural water delivery systems are demanding that we, as water professionals, reimagine what the new water delivery infrastructure and philosophy needs to be.

Municipalities and utilities have always relied on a combination of surface water and groundwater to meet the needs of the community. In the recent past, it was felt that multi-year storage of surface water and the use of groundwater as a reserve would be indefinitely sustainable. However, population growth, declining availability and volatility have each conspired to reduce the water available for use dramatically. While groundwater can be considered as a reserve source, and in some instances "excess" surface water is banked through ground storage, data from NASA's GRACE satellite has revealed that in real terms, there is a continuing loss of groundwater in many areas of the United States — most notably in areas that have seen rapid population growth (see figure 1).

The message is clear: we cannot continue to rely on the earth's natural systems and our engineered response to meet our water demand at the timescales we require. For the first time in the modern era, large scale water scarcity is colliding with human activity. The instability of natural water delivery systems demands that we do a better job of managing our physical resources. This means minimizing the amount of new water required and using our existing resources in the most efficient manner possible.

FRAGMENTATION AND FINANCIAL DISTRESS

Clearly we need to augment our supplies and invest in the infrastructure and means to maintain water withdrawals at a sustainable level. From the perspective of supply-side management there are very interesting developments in the field of employing non-traditional water sources for potable water use. Indirect Potable Reuse and Direct-to-Potable water schemes have been or are being developed across the world — from Namibia to Texas to the International Space Station. In addition, advances in forward osmosis and energy recovery from reverse osmosis are continuing to drive down the power consumption for production of potable water from sea and brackish sources. Unfortunately, responses of this scale can be extremely expensive and take years to permit, construct and commission.

Water scarcity, on the other hand, is being played out on geospatial and temporal scales unseen in the past, and on a stage of declining revenues in a highly fragmented industry. A recent analysis of over 800 utilities across six states in the United States has shown that year over year, more utilities are experiencing declines in revenue. This means less money for capital intensive new water initiatives and increasing competition for operational dollars.

The water industry also is highly fragmented limiting the capital and resource efficiency of large-scale water production projects. The EPA records more than 52,000 community water

systems in operation in the United States serving more than 300 million people. The reason for this is obvious: water is extremely heavy and bulky to transport. This physical nature of water precludes many of the benefits that electric, gas and other utilities have with dealing with resource supply and delivery efficiency. We are not likely to connect Los Angeles to the Mississippi River any time soon.

Solutions must therefore be developed that are cost efficient and save utilities (and customers) money.

A NEW PARADIGM

The most cost effective drop of water is the one we didn't need in the first place. Utilities must be better at eliminating non-revenue water (NRW), actually billing and getting paid for all water delivered, and engaging the customer in meaningful and sustainable conservation. While conservation has historically been a conundrum for utilities (less water sold means less revenue), in combination with NRW reduction and financial efficiency utilities can achieve both fiscal and resource sustainability.

These goals can be achieved through a better understanding and use of existing systems – or investing in data systems versus heavy infrastructure. In many cases, utilities are leaking more data than they are water. For instance, in Qatar, the apparent losses — those losses associated with meter accuracy, billing errors, missing meters, etc., represent twice the losses of physical leaks.

This fact reveals that we can do much to support our water utilities by investing in data systems, and platforms that drive errors out of data or immediately notify us when data is anomalous. It is also a singular opportunity for utilities to achieve economies of scale in this fragmented market. In contrast to water, electrons are extremely light and represent a significant possibility to create a smart grid for water — not one based on production efficiency, as it is for the electrical sector, but one based on data efficiency.

When applied to the meter reading/billing/customer service systems, this approach can have immediate impact on utility efficiency. In one utility, advancements in meter technologies and customer service data systems resulted in increased annual revenue of $1.63 million. In another utility, non-revenue water was reduced from 34 percent to 14 percent with an increase in annual revenue of 40.6 percent.

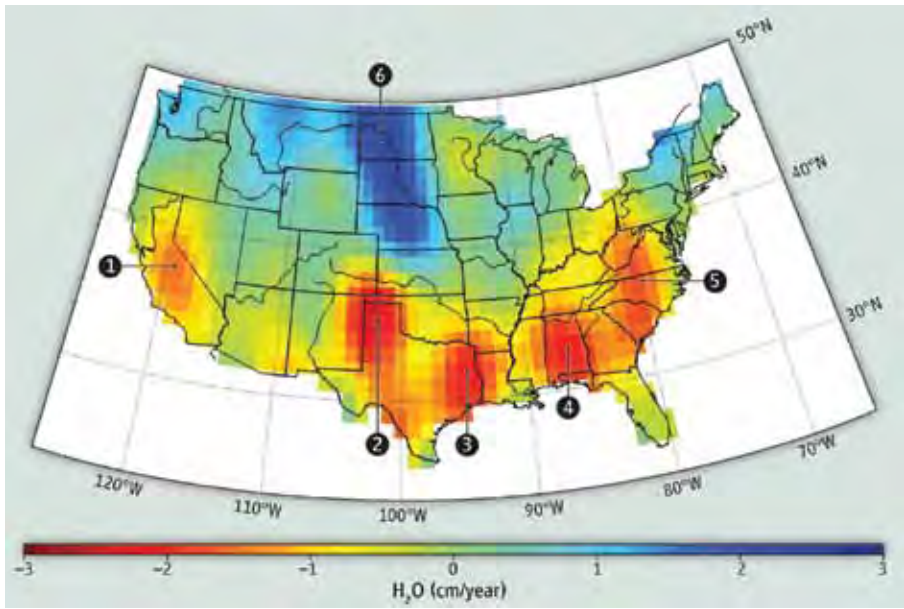

FIGURE 1:
Data from NASA's GRACE satellite shows a continuing decline in groundwater availability.

Not only does the smart grid for water find revenue and water, it is also a key system for improving the financial operations of the utility. Many utilities suffer from the related problems of increasing aged receivables and bad debt. In some cases — particularly in poor economic times, or where statutory prohibition of disconnection for non-payment exists — utilities can see accounts become increasingly delinquent, leading ultimately to the write-off of 10 to 20 percent of billed revenue. By linking the customer information system, payment systems with geospatial tools along with analytics and dynamic interactive platforms, utilities can significantly improve the collections capability.

And finally, we should not forget the customer. Offering real insight into utility operations and personal consumption can have a direct impact on customer behavior. Even the mode of receiving a bill can have a sustained impact on water use.

FUTURE OPPORTUNITIES

Historically, access to advanced data tools has been the sole purview of the large utility. Today, however, emerging technology delivery methodologies such as cloud-based applications and Software-as-a-Service (SaaS) allow all scales of utilities to enjoy the data tools of their larger counterparts. Using these data-centric tools, utilities can harness the power of their data realizing significantly improved process optimization with sensor-driven decision analytics, enhanced situational awareness and optimized resource consumption.

These deployment strategies also eliminate the need for utilities to incur significant investments in information technology teams, simplify deployment and maximize the availability of computing power and storage.

Concurrently, the deployment of communication networks across the utility estate is enabling a revolution in data opportunities, and for utilities to derive a key understanding of their operations. With this knowledge, utility revenues can be returned to sustainable levels, costs can be significantly reduced, infrastructure use can be maximized and customer service dramatically enhanced.

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