

STORM WARNINGS

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Worldwide Water Woes

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A water crisis of global proportions is a growing threat to billions of people. A ticking time bomb, its exponential growth is roiling other perfect storm forces; a game-changer we can no longer ignore. In this issue, R. Michael Conley provides an assessment of the fresh water crisis and what's at stake if we don't get on top of it soon.

WTS: Give us a context: What makes the water crises the "perfect storm" type of threat you suggest it is?

Conley: Water is an indispensable resource. It's vital to life and there are no substitutes for it. The threat may be an abstract concept for those blessed with ready access to fresh water, but it's a growing crisis of life and death proportions for billions of folks worldwide.

Like the characteristics of other perfect storm threats, the water crisis: a) is growing exponentially, b) has a "multiplier" effect that inflames other perfect storm threats, and c) has a direct impact on large sectors of the global population. And yet, it doesn't register on our radar screens as the imminent threat it truly is.

WTS: Can you be more specific about the exact nature of the water crisis we are facing?

Conley: Broadly speaking, it's a global train wreck in the making with a ton of moving parts, but to get more specific it breaks down into three major categories:

First, it's a classic supply and demand challenge with all trajectories heading in the wrong direction. Second, it deals with the unequal distribution of water by regions throughout the world – a problem that is turbo-charged by climate change and disruptions in global hydrologic patterns. Last, it is exacerbated by our ineffective efforts to manage, conserve, distribute and maintain the quality and accessibility of fresh water.

The interrelated nature of these threats calls for a comprehensive global approach, but that's not likely to happen until we take a broader planetary view of the threat. Still, wouldn't it be a great opportunity for countries to unite around a common global challenge – fresh water shortages – like we did so effectively in addressing the ozone depletion crisis years



R. Michael Conley
Founder

"We are heading into a perfect storm and don't see it coming," according to R. Michael Conley, Founder of Weathering the Storm, LLC and this website.

The WTS mission is to "Awaken, engage and help others to weather the storm."

The WTS website provides the following on a regular basis:

Storm Warnings: An in-depth quarterly newsletter.

News Flash: Frequent postings on topical perfect storm issues.

Best Practices: Featuring leaders in sustainability practices.

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WTS Guide: A free “how-to” Guide for beginners.

Info & Resources: Books, articles information & resources:

weatheringthestorm.net

About the Founder:

Mike Conley is the Founder of Weathering the Storm, LLC and Chairman & CEO of the Conley Family Foundation. As a former Fortune 500 business executive, author, lecturer, and public policy activist, Conley has written and spoken on topics related to the perfect storm. He graduated from the University of Minnesota, after serving in the U.S. Navy, and later completed a post-grad program at Stanford University. He is active on several boards and advisory groups.

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WTS: Let’s start with the first water challenge you mentioned: What can you say about supply and demand and the wayward trajectories we’re on?

Conley: For openers, the *supply* of water – in one form or another – has remained fairly constant over time. While about 70% of the Earth is covered by water, only 2.5% of that is fresh water; the rest is saline or ocean-based. The problem is that less than 1% of the fresh water is easily accessible; the remainder locked in polar ice or glaciers. Though replenishable, this finite supply of fresh water is really all we have to support human life.

Demand, however, has grown exponentially as both the population and per capita usage of water has increased. The global demand for water comes from three sources: roughly 70% of the water is used for agricultural production, 20% for industrial usage and 10% for domestic consumption; the actual mix varies by country. Regardless, fresh water is being consumed faster than its rate of replenishment; an unsustainable proposition by any definition.

Here’s the rub: We are making up these water deficiencies by drawing down on our ground water “savings accounts” – primarily our aquifers. An aquifer, like any savings account is unsustainable if we draw out more water than we put back in. And since it takes several hundred years to replenish an aquifer, it means that in our lifetime, once it’s gone, it’s gone. Then what? Chalk up one more intergenerational time bomb we’re passing on to the generations following us.

WTS: What about the second area dealing with the unequal distribution of water and climate change?

Conley: The global distribution of water is uneven. In many respects, the wet get wetter and the dry get dryer. About 85% of the world’s population lives in the driest half of the planet. Roughly one in nine people lack access to fresh water and a far larger number find fresh water scarce and/or lack access to a sanitized water supply.

Climate change is aggravating the problem. As the planet warms and draws more water into the atmosphere through evaporation, ice melts and altered hydrologic systems, weather patterns also change. Storms become more severe; flooding and droughts worsen; and the loss of snow melts at higher altitudes – with a commensurate loss of run-off water to the regions below – becomes a major threat to a water-starved population. A decline in run-offs from the Rocky Mountains – now providing water for

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over 40 million people in the Southwest – pales in comparison to a shortfall in the Himalayas; now providing about half the drinking water for over 40% of the world's population.

Droughts and famines are destabilizing events that plague much of the world. As ground water levels drop, aquifers deplete and deeper water drilling costs skyrocket, the strains on the food production and budgets of these countries and their citizenry will become more acute.

WTS: How about the third area; the lack of a cohesive approach to managing, conserving, distributing and maintaining the quality and accessibility of fresh water?

Conley: Sadly, though it's one area that mankind can control more than all others, we are failing miserably. Many think of fresh water access as a given and pay little attention to wasting, polluting, or over-consuming it on a grand scale.

For example, we are drawing down – or contaminating – our aquifers like there's no tomorrow. Our infrastructures to pump and distribute water are aging, and leakage and waste is a growing problem. Our concrete urban jungles fail to capture and retain rainwater – sending much of it downstream in a highly polluted form, and our dietary patterns are water-intensive; something I'll talk about later. Energy production is another water hog; every fracked shale oil well requires a water *enema* of from 3-7 million gallons of water. Do you see my point?

Water consumption varies by country; the richer the country, the more water it uses. In the United States, the annual per capita consumption of water is about 215 cubic meters. By contrast, that number is 106 in France, 52 in India, 32 in China and 4 in Mali. The correlation between affluence and access to fresh water and the manner in which it is used is striking. While the challenge today is more about *accessibility* to water than supply, the equation could quickly change with the mass depletions of aquifers and mountain ice melts now taking place.

WTS: You seem deeply concerned with aquifer depletion; is there any evidence to suggest this is actually happening?

Conley: The data is unequivocal and overwhelming from both ground measurements and satellite data; we are guzzling down our aquifers at an alarming rate.

In 2002, NASA launched the Gravity Recovery and Climate Experiment (GRACE) satellite system to measure Earth's changing gravity fields from space. Among other things, it measures precise changes in the depletion rates of aquifers and thinning ice sheets. The data is alarming:

GRACE has shown a large scale melting of ice sheets in West Antarctica; alarming changes in groundwater, soil moisture and hydrologic systems and massive drawdowns of major aquifer systems all over the world. To the extent possible, ground measurements have corroborated these findings. Believe you me, this is serious business.

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It often takes a crisis like the droughts in California and Southwest to get our attention. Media coverage of falling water tables, rationing and other water-related challenges are gradually awakening us to the threat at hand. Bad as it is, it pales in comparison to the water threats confronting other drought and famine-filled countries. Truly, it's a global problem.

WTS: The California drought is alarming, but can you say more about the correlation between food production, dietary habits and our "water footprint?"

Conley: As the country's number one food producer, about 80% of California's water is used for agricultural production. To the extent that much of their production is exported to other states or countries, we all contribute in some way to their water shortage. California is a harbinger of water-related agricultural threats cropping up everywhere.

For example, some crops are more water-intensive than others. A pound of lettuce, tomatoes or potatoes requires about 24 gallons of water to produce. A pound of corn requires about 147 gallons, and a pound of almonds requires a whopping 1900 gallons.

Meat and dairy products are far and away the largest water guzzlers of all. The amount of water needed to provide the feedstock and water to "grow" a pound of beef is about 2500 gallons per pound. (This figure varies from study to study). To put that in perspective, a seven minute daily shower with a 2 gallon per minute flow rate uses about 14 gallons of water per day, 100 per week or 2600 gallons in half a year. Think about it: The water footprint of eating one less pound of beef every half year is roughly equal to a half years' worth of showers.

With 70-80% of all water used for agricultural production, even a modest change in dietary habits could have a profound effect on agricultural production and water usage. As living standards rise, the per capita consumption of meat and dairy products often increases. In a country like China, imagine the ripple effect on water supply of even a modest change in diet.

As fresh water problems worsen, we'd be wise to think about our water footprint in much the same way we do our carbon footprint. We don't have to become vegetarians, but even modest changes in our meat consumption could, in the aggregate, make a huge difference. For more information on your own personal water footprint, Google "[*National Geographic water footprint.*](#)" It will help get you started.

WTS: Are there other ways we can conserve water at a household or local level?

Conley: Oh my, yes. Years ago, I lived in Contra Costa County – across the bay from San Francisco – at the height of a multi-year drought. Our water was rationed at 190 gallons per day per household, and it was amazing what we learned to do to save water. We didn't water our lawns; toilet flushing was limited by the protocol of "if it's yellow let it mellow; if it's brown, flush it down." We *reused* water wherever possible, washed clothes less, limited our shower and bath times and had a good handle on the water usage rate of almost every drop of water we used. Water conservation was on everyone's mind, and we were amazingly resilient. Local businesses also adjusted – though a lot of dirty cars lined the scorched-lawn streets.

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Lessons learned: Water shortages and rising prices will drive innovation and make us better users of water. The days of lavish green lawns in the desert are numbered – replaced with a focus on water-saving, low maintenance landscaping schemes. Our diets may also change as the rising costs of water-intensive meats, dairy products, and processed foods redirect our buying decisions and change behaviors.

WTS: Are there other water issues we need to think about?

Conley: Most certainly; we've only scratched the surface. Water pollution from waste water, sewage, farming and industrial waste has reached epidemic proportions. Though solvable, there will be a cost factor to farmers, businesses and end-users alike; get used to it. On the other hand, it's unconscionable to pass these problems off to future generations just so we can live a little easier today. Why mortgage their future?

Unfortunately, many countries lack the water resources, capital, infrastructure and expertise to insure their citizenry have access to fresh water. The stats are horrifying: At least a third of the world's population lives with inadequate water sanitation and are exposed to cholera, typhoid fever and other waterborne diseases.

There are other water-related issues we won't have time to cover today such as the rising ocean acidification and pollution levels that threaten sea-life and coral reef systems. There are also geopolitical "threat multipliers" that will hit countries susceptible to droughts, famines and severe water shortages. The mass migrations and regional wars sparked by the need to secure access to water are growing. A potential Asian conflict arising from future reductions in Himalayan ice melt runoffs is but one chilling possibility.

WTS: Are there any "best practice" models out there of nations that have successfully addressed their tight water situation?

Conley: There are many. Israel, Australia and Singapore – all subject to intermittent droughts and water stress – have developed remarkable models. Some common features include:

Education: Job one was convincing people that water was a finite commodity to be conserved, traded, priced and carefully tracked and managed. Awareness and a sense of common effort was critically important, and they had to secure public "buy in" to address the crisis.

Comprehensive Planning: Successful plans covered all aspects of society – supply and demand – under one overriding umbrella. Waste reduction, recycling of "gray" wastewater and infrastructure improvements were all parts of the plan. Changes in the agricultural crop mix to less water-intensive crops and improved irrigation practices – like "drip" irrigation – were often adopted. Household and business conservation and recapture initiatives were embraced.

Incentives/Disincentives: Water rationing was imposed and demand reduction increased. Financial penalties were imposed for excess usage, and accountability was built into the system. Market forces, in turn, drove innovation and new conservation techniques.

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Technologies: Desalination efforts were used by some to increase water supply; improved infrastructures were built, and use of water-savings devices were used everywhere to align with a cultural shift toward conservation.

WTS: Can you say a little more about desalination?

Conley: Desalination uses a proven technology known as “reverse osmosis” to convert salt water into fresh water. It has been used effectively in Israel and Singapore and draws on sea water as an endless feedstock. A large plant is now scheduled to go on-line in the Carlsbad area of Southern California this fall. We’ll see how it all works out.

It has a number of seductive elements to it, but there are also problems with respect to the costs to build and operate; the high energy usage required, and greenhouse gas impacts. All are trade-offs for consideration. My larger concern would be that desalination not be used as a supply-side solution that preempts the demand reduction and conservation efforts needed. As a back-up system, however, it has merit.

WTS: You’ve covered a lot of ground; do you have any parting thoughts about the fresh water crisis – as a perfect storm threat – and the growing threat it presents the world?

Conley: I’d say your question sums up the problem very well; it is a perfect storm type threat and, perhaps, one of the most immediate and pervasive problems we now face. We don’t talk about it as much as we should in America because it hasn’t been the life or death threat for us as it has others. But make no mistake; its growing ripple effect will directly and indirectly affect our food and water supply, health, pocketbooks, national security and way of life.

The water problems in California and the Southwest could be harbingers of our future. It’s a good time to start thinking more about our *water footprint* and what we can do to reduce it.

For more information, visit our website at www.WeatheringtheStorm.net