The Future of Our Drinking Water Supply Is in Jeopardy

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Author "Don't Drink the Water" (published by Lotus Press, Twin Lakes, WI, 2003 - www.lotuspress.com)

Introduction

As Mark Twain once said: "Water is for fighting over." He was right. The recent spate of bad news about water reveals a nexus of hidden water problems that will most certainly cause the price of water to skyrocket as its quality and safety continues its inexorable decline. Consumers can no longer take the quality of drinking water for granted. We will have to learn how to take unaccustomed personal responsibility to insure that our supply of this vital commodity is safe and our use far more responsible than it has traditionally been.

Problem #1: Demand for Water Far Outstrips Supply

About everywhere in America the demand for water to run our homes, businesses, farms and industries far outstrips supply. Growth along the front range of Colorado is a prime example of how increased population densities are creating a huge demand for new water resources. At the same time, the supply of clean water to meet this demand is quite literally - drying up.

Surface water supplies are tapped out. Water stored in underground aquifers is being pumped out far faster than it can be replenished. As a result, water diverted for new uses has to be taken from existing users. The price for this kind of thing is very high – not only in terms of money, but also in terms of its effect on our environment.

High mountain pastures that used to be rich habitat for wildlife in Colorado only a generation ago are now lifeless because the water that once irrigated them has been diverted to water parks, golf courses, and lawns in the rapidly growing cities along the front range. Throughout the rest of the country pavement is replacing prairie grasses. As this happens the ability of precious rainwater to replace dwindling ground water supplies is significantly curtailed.

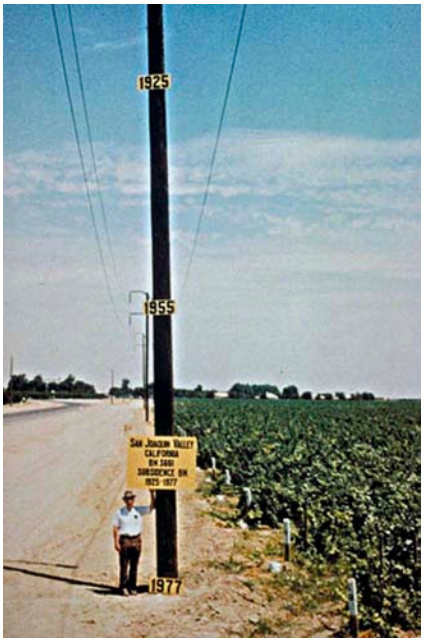
It is now clear that in many areas estimates of available groundwater supplies were wildly optimistic.

Over-pumping of wells is rapidly depleting aquifers that took hundreds, thousands, and even millions of years to create. These aquifers hold water that feeds rivers, streams, and wetlands and keeps them flowing during droughts.

But demand means groundwater is being pumped out far faster than rainwater can replenish it. The result is lowering of water tables in the last 25 years by as much as 100 – 800 feet and land subsidence in many parts of the country at a rate that is shocking.

Land subsidence occurs when large amounts of ground water have been withdrawn from certain types of soils. These soils compact because ground water is partly responsible for holding them up.

In many areas of the arid Southwest, and in more humid areas underlain by soluble rocks such as limestone, gypsum, or salt, land subsidence is an often-overlooked environmental consequence of our land- and water-use practices.



The above photo from a USGS website (http://ga.water.usgs.gov/edu/earthgwlandsubside.html) shows that the San Joaquin valley, southwest of Mendota California, an agricultural area that feeds much of our country, has subsided by nearly 30 feet since 1925! Much of the intermountain west now exhibits the same problem to a lesser degree.

The problem is more troublesome than it may appear. Sinkholes, out-of-kilter buildings and damaged utility infrastructures are obvious but relatively minor problems compared to the fact that once water-bearing soils compact, they cannot be recharged to any significant degree. In other words, once the water is gone – it is gone forever! Given our dependence on this precious natural resource, the consequence is more dire than running out of oil because there is no substitute.

Groundwater depletion can take years before the damage becomes visible. By the time it does, the damage is permanent. Lakes, ponds, rivers, springs and wetlands dry up. Trees and other riparian foliage die. This results in irreversible declines in the populations of insects, birds, fish and wildlife.

While an aquifer may hold plenty of water, pumping from it may steal water from a nearby river, stream or wetland, producing decreased flows, higher water temperatures, or dry it out altogether.

What this all means today is that in many states including Colorado, Utah, New Mexico, Arizona, Nevada, Texas, and California, there are far more water rights then there is water to fulfill them. Because the stakes are so high, the inevitable lawsuits that result from this kind of problem will cost untold millions to litigate and will clog our water courts for decades to come.

Balancing the needs of population centers versus the need to feed those populations is certain to become increasingly difficult. Doing it while maintaining some sort of ecological balance may become impossible.

Problem #2: Increased Water Pollution

Increased population densities means increased pollution of existing water supplies. Upstream users of surface waters cannot avoid introducing pollutants that must be dealt with by people downstream.

Many rural areas are filling up with homes built on small parcels that depend on poorly funded community water systems or private wells for their water. These users do little to monitor their water quality in the belief that if their water comes from a well – it must be safe. Nothing could be further from the truth.

Septic systems, landfills, and leaking underground fuel tanks are known hazards, but there are others. Ethylene Di-Bromide (EDB) is an extremely toxic chemical that was sprayed a decade ago by the Forest Service to control mountain pine beetle infestations. Now banned by the EPA, it is turning up in private wells near areas where the spraying was done. The levels at which this chemical is found is sufficient to cause a variety of nasty cancers, liver damage, and nervous system disorders.

The increased use of RO systems and water softeners is causing other difficulties. RO wastes 3 – 5 gallons of water for every gallon it produces. This waste contains concentrated levels of pollutants. Water softeners introduce large loads of brine as a by-product of their operation. These waste streams of water combine to become a problem for users downstream.

As population densities increase, even natural pollution becomes more of a problem because people are drinking waters that were previously left underground where they couldn't create health problems. Now, naturally occurring but toxic levels of fluoride, arsenic, and radioactivity are common drinking water contaminants in many areas of the country.

Problem #3: Poor Monitoring & Enforcement

Many small, rural, community water systems and owners of private wells can't afford to deal with difficult water problems. Many won't deal with high levels of iron, manganese and hydrogen sulfide that can make water supplies nearly undrinkable, much less pollutants like arsenic, fluoride, and radioactive contaminants that are far harder to remove, yet have no taste or smell. Small users simply don't have the resources that it takes to deal with these contaminants in spite of the federal mandates imposed by the Safe Drinking Water Act. So what do they do? If they are so small they don't have to file monthly reports they ignore them. If they have to report they file false reports to avoid being fined.

Removing certain contaminants to levels that are considered safe by the EPA can be a major stress even for large water users.

For example the EPA permits arsenic levels far higher than what would ordinarily be considered safe, just because it is economically unfeasible for municipal suppliers to meet stricter requirements.

Problem #4: Aging Delivery Systems & Infrastructure

No matter how many laws and regulations our government passes, the truth is that in many areas of the country the infrastructure required to treat and deliver safe water is so old it is literally falling apart.

Water treatment plants may meet EPA guidelines for water treatment, but getting that treated water safely to all points in the distribution system is another thing entirely. Broken water lines can lead to infection with dangerous microorganisms like E. Coli and Salmonella.

Add to this the fact that many water mains throughout the country are actually made out of lead, and many homes contain plumbing made with lead. Replacing damaged sections of this plumbing increases the health hazard because manipulating these old pipes and fittings causes flakes of lead to enter the water supply. Those who drink it might as well eat a few chips of lead-based paint.

Recent estimates by the EPA indicate that our aging water delivery infrastructure will require at least 300 billion dollars of repairs over the next decade to insure the safe delivery of clean water to our nation's citizens. Consumers can look forward to paying those costs in the form of water bills that won't be anything like what previous generations of Americans took for granted.

Problem #5: Disinfection By-Products

This need to disinfect water supplies creates its own set of problems. When chlorine and chloramine react with water contaminants, they create toxic by-products that have health related consequences.

For years we were told that the levels of disinfection by-products produced by chlorine were safe until overwhelming evidence demonstrated otherwise. Now many suppliers have switched from chlorination to chloramination (chlorine mixed with ammonia) in order to comply with new EPA mandates. The problem is that chloramination is now coming under greatly increased scrutiny because it creates its own set of problems that may be far more hazardous than the ones created by chlorination.

Potential health problems of chloramination include gastrointestinal irritation, exacerbation of skin problems, and the creation of other disinfection by-products known as Nitrosodimethylamines (NDMA's) that may be more carcinogenic than their predecessors.

In addition, a study conducted by the University of Illinois demonstrates that a by-product of the chloramination of drinking water known as iodoacids (EYE-O-doe-acids) may be the most toxic ever found in drinking water. The concern is not only the genetic damage they can cause in mammals (including humans) that drink chloraminated water, but also the fact that these dangerous chemicals are being released back into the environment where fish, wildlife, and the food chain may be adversely affected.

By far the biggest health concern is that no long term, and very few short-term studies have been performed that can clarify the effect of chloramines on human metabolism.

What we know for sure about chloramines demonstrates that they are both reactive and persistent — not only in water, but also in human tissue. One study demonstrated that after 5 days, over 95% of a single dose of chloramine administered to laboratory rats was still concentrated in tissues including plasma, blood, skin, packed cells, kidney, nerves, testes, thymus gland, spleen, liver, muscle tissue, bone marrow, etc.

It is also known that chloramines can cause DNA damage and are potential carcinogens. They are extremely dangerous to all forms of fresh and salt-water fish because they are absorbed by the gills then transported directly into the blood causing death in a short period of time.

Notwithstanding this information, utility companies around the country routinely misinform their customers, telling them that stomach acids effectively neutralize chloramines before they can reach the blood.

Remarkably, based on very few poorly designed studies, and virtually no long term studies, the Environmental Protection Agency (EPA) routinely declares that the addition of chloramine to drinking water is absolutely safe!

Problem #6: Misguided Policy

Americans used to be a self-reliant people. Nobody counted on the government to do things for us that we could do for ourselves. When it comes to water, this attitude can be dangerous.

The simple fact is that no matter how hard a municipality tries; it cannot make your personal water supply safe.

Over 95% of the water any municipality treats gets sprayed on lawns or flushed down sewers. Less than 5% is used for human consumption. To demand that a city render that 5% ideal for consumption is asking for more than is possible.

If water providers would let people know that, it wouldn't be such a dangerous problem. Instead, they insist on acting as if such a thing is actually being accomplished. One glance at a newspaper shows this isn't true.

Problem #7: Confusion

As aquifers become depleted and surface water sources become more polluted, the need for radical change in the way we use water will most certainly occur. Wars (at least legal ones) will erupt between farmers who need water for irrigation and people who need water to run their homes. In many places, gardens and lawns will become things of the past. Today in Las Vegas, Nevada the "water police" are on continual patrol looking through neighborhoods for signs of illegal water use. Even a small infraction can result in a fine of $1,000. Expect this kind of enforcement to become commonplace.

In the near future, people who want to insure that their family's supply of drinking water is safe will increasingly turn to some kind of water treatment appliance.

There are environmentally friendly drinking water systems capable of producing a reliable supply of safe drinking water at a reasonable cost.

The problem for consumers is sorting out the ones that work from all the hype. Slick advertising can delude all but the most discerning and educated buyers. This is where government could really help if it had a mind to do so.

When it comes to the sale of water treatment products, false and deceptive advertising is commonplace, and high-pressure sales tactics rather than honest education are the norm. This happens because certification of products is far too confusing, expensive, and ultimately counterproductive.

There is no reason a manufacturer of a water treatment appliance should have to pay thousands of dollars to get a single product certified by some independent organization like the National Sanitation Foundation (NSF), then to the same standards again by the various states where they may want to market that product. Given that any manufacturer may have a dozen or more products the current system becomes untenable for all but the biggest players. The unintended consequence is that competition and innovation are stifled, and consumers don't get leading edge products at prices they can afford.

Instead, because virtually all the components used in the manufacturing of any water treatment system are fairly standard, and NSF certification of those components by their manufacturer's is commonplace, it would be a much simpler process to certify water treatment systems based on the components they use. Such a rating system could be made very simple and easy for consumers to understand.

Conclusion

At some point people will be forced to realize that water is a precious resource that must be used far more wisely than past use demonstrates. Communities will be forced to restrict growth and strictly limit pollutants that can affect users downstream. Pumping water from underground aquifers will have to be severely curtailed so that overall withdrawals are at least equaled by the ability of rain to regenerate these vital resources.

As consumers demand a quality of drinking water that utilities cannot deliver, people in increasing numbers will turn to water treatment appliances as the only way to assure themselves of a reliable supply of safe drinking water. Hopefully, government will be able to respond so that purveyors of these products are required to make complete and accurate statements about the capabilities of their products without unduly restricting competition and innovation. What we can know for sure is that the days of cheap, abundant, and clean water resources are over. Soon the only relevant questions will be "How much?" and Which One?"

About Lono Ho'ala

Lono Ho'ala is an internationally recognized expert in drinking water technology. He is the author of the best-selling book on water "Don't Drink the Water (Without Reading This Book)" published by Lotus Press, Twin Lakes, WI, 2003 - www.lotuspress.com.)

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