



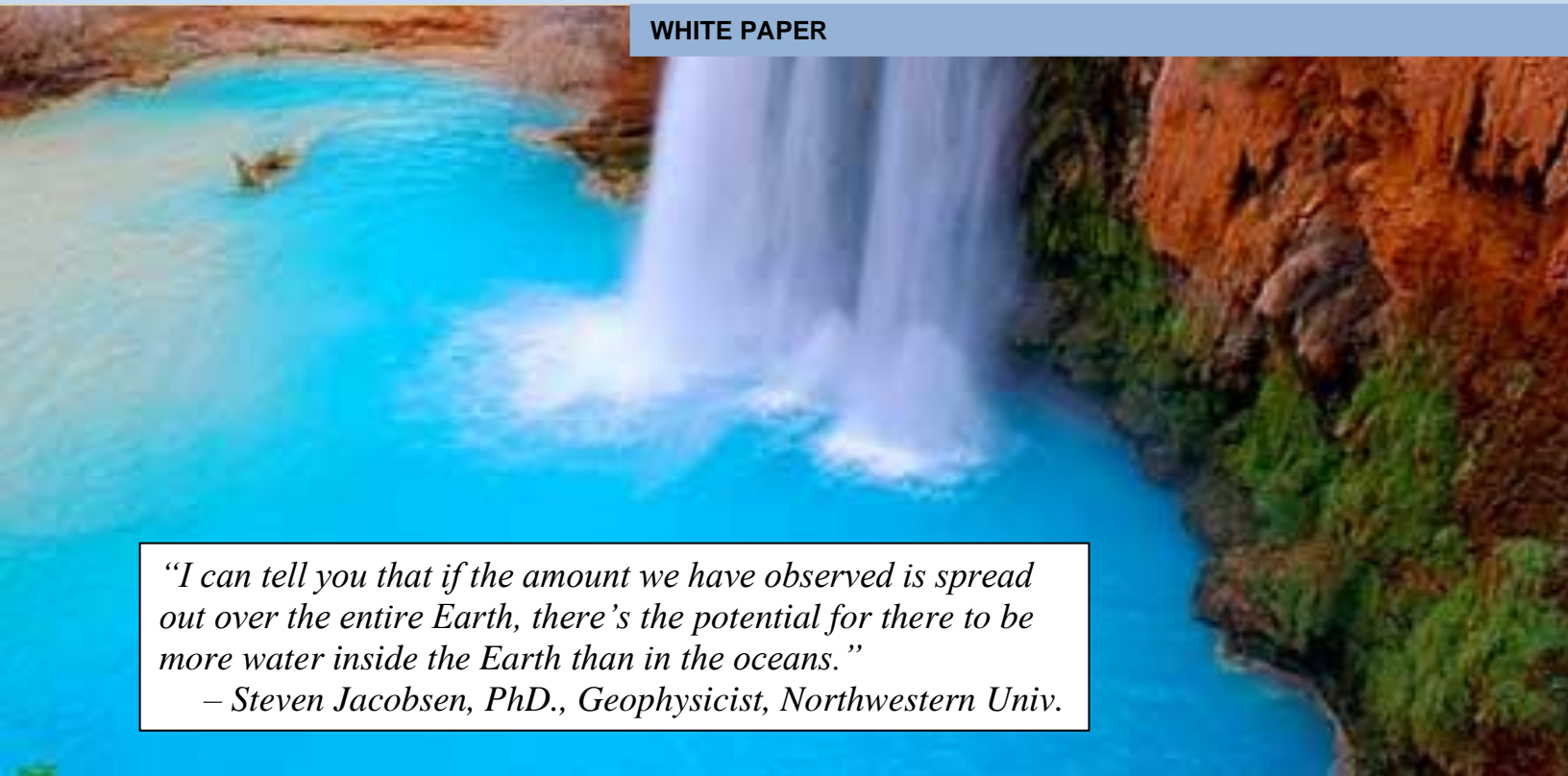
The Water Crisis

A Solution for the 21st Century

WHITE PAPER

“I can tell you that if the amount we have observed is spread out over the entire Earth, there’s the potential for there to be more water inside the Earth than in the oceans.”

– Steven Jacobsen, PhD., Geophysicist, Northwestern Univ.



The Water Crisis: A Solution for the 21st Century

Summary

There is a crisis in water. Not only on a global but also a national scale. While the extended drought in California has been covered extensively in the media, it is often overlooked that a state such as Iowa, in the breadbasket of America, is 49th in groundwater quality. According to the United Nations, some 800 million people worldwide do not have access to clean water; millions of Americans are now being added to this number. High quality water is at a premium—as evidenced by the outsized margins in the bottled water industry—in every region of the country. While technology is being called upon to provide solutions, it is no less incumbent upon stakeholders to welcome disruptive paradigms in both the science and business of water. Hydrology has become the science of long distance plumbing while hydro-geology has limited itself largely to avoiding the contamination of water in the process of extracting oil, gas and minerals. Yet drilling water wells is possibly the most critical of the extractive industries, producing the most fundamental and precious resource required daily by humans, livestock, agriculture and industry.

On a given property of even modest size it is possible to have a relatively shallow residential well, a deep agricultural well, a pure natural spring and even a highly mineralized thermal source. Each has a completely different profile from the others. And yet modern hydrology insists on describing large swathes of thousands of parcels as having uniform aquifers. The picture is complicated with descriptions of unconfined aquifers near surface and deeper confined aquifers. Some are rechargeable while others are deemed non-rechargeable. Technology exists, however, to locate groundwater and conduct pinpoint well drilling for each category of well. High quality water can be predicted using the latest tools and multi-disciplinary advances in the earth sciences for the benefit of all users. When a well is required (thousands are drilled every day) then why not maximize the chance of success?

Such wells, properly drilled and completed to suit their purpose, will support rural and exurban development of small farms and ranches closer to the towns and cities of volume consumers. It should go without saying that a clean, sustainable local supply of water and food is proven to have a direct impact on public health while increasing natural immunities and lowering healthcare costs. The virtuous water-food-health cycle affects us all and is the greatest economic multiplier. Get this right then individual freedom and creativity is liberated to take care of the rest. As always, nature presents us with solutions—if we are willing to set aside preconceived theories and challenge entrenched interests—to harness new resources combined with American ingenuity and the strength of our farms (family and Big Ag), businesses (small and corporate) and industry to solve problems locally, nationally and globally. When America leads, the World follows.

*“Discovery consists of seeing what everybody has seen
and thinking what nobody has thought.” – Albert Szent-Györgyi*

The Challenge

There are over 15 million groundwater wells in the United States, with some 800,000 added annually. Residential wells are required for the vast majority of homes outside of municipal water districts, as they are for most farms and ranches of any size. Many industries develop only where they find water security and water independence. Nevertheless, drillers in every state will tell you that no science or technology is employed in 99% of water well site selection. Most bores are located more on the desires of the client than where the water may or may not be on the property. At a time when



advancements in satellite imagery, geophysical data analytics, and down-the-hole technologies are transforming the oil and gas industry, the groundwater sector has largely resisted modernization. And yet wells are only being drilled at an increasing rate as building more dams and canals to divert diminishing flow from rivers is proving unsustainable. It is

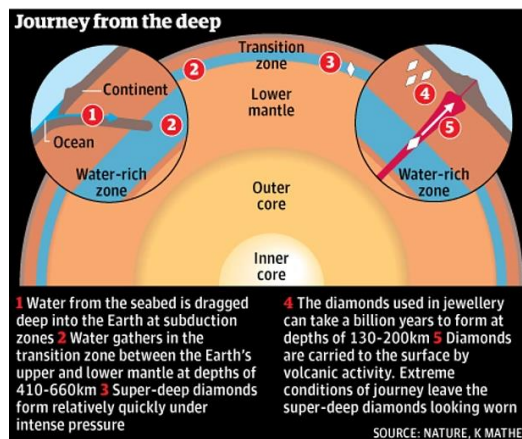
time for America to embark on a Moonshot Mission right here at home: to develop high quality groundwater resources, using the latest in scientific and technological advancements, to provide high quality drinking water and further invigorate the organic and small farming initiatives that are changing the way we grow, what we eat, and how we interact with our environment.

Clean water. Sustainable farming. Regenerative ranching. Healthy lifestyles. It all adds up to greater productivity, personal responsibility, unbound entrepreneurship, and the ultimate Pursuit of Happiness.

The Solution

News Flash: There are “oceans of water” beneath our feet! Hydrogen and oxygen combine under the electromechanical forces deep within the Earth’s mantle to create H₂O in all its phases. Advances in deep earth

seismics, geochemistry, geophysics and mineralogy have led to the identification of the critical transition zone between the inner and outer mantle where water (and our silicate bedrock) is formed. Without the ability of water to form deep within the Earth, our planet would be as dry as Mars. This water emerges under tremendous pressure and temperature as steam, the great dissolvent, and seeps outward under the centrifugal force of our spinning planet toward the crust where it cools and disseminates through the fractured rock formations of the lithosphere. This is the source water of our wet planet.

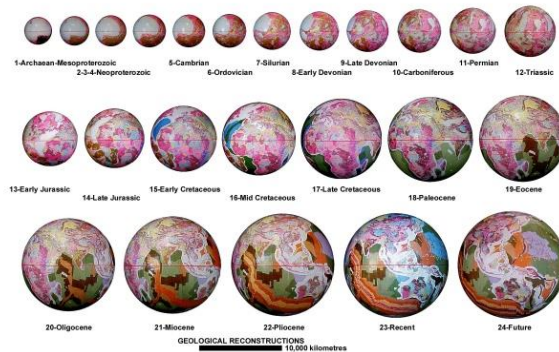


“The ultimate origin of water in the Earth’s hydrosphere is in the deep Earth—the mantle.” – Graham Pearson, et al. (2013)

Geothology, both religious and scientific, has inhibited the advancement of mankind for millennia. The ancient Greeks concluded the world was round; after all, you could see its shadow on the moon! And yet it took Magellan circumnavigating the globe to “prove” that Earth is not flat. The ancient Greeks also proposed that Earth and the planets revolved around the sun, but it took another two thousand years before the physical laws of our solar system would be accepted. As the globe was mapped, the rock strata graphed and fossils catalogued, it was discovered that, lo and behold, not only did South America appear to fit with Africa but all the landmasses once formed one supercontinent. This led to various theories of continental drift and plate tectonics with multiple schools of thought. Although you would not know intense debate still exists if you listen only to government funded science. The sinecures of the secular age have proven no less beholden to dogma than the high priests of the dark ages. We are at the tipping point of another great transformation.

It has now become overwhelmingly evident, based on the accumulation of paleogeographical, paleomagnetic, paleoclimatic and metallogenic data that not only did the continents emerge from one landmass but the only way they could have done so is on a planet of much smaller diameter. Yes, the earth is expanding, just like the Universe, and has been doing so at an accelerated rate

since the end of the Paleozoic era less than 300 million years ago. A full 70% of the oceans are less than 60 million years old. We now have an extraordinary array of satellites together with a global geodetic network proving the current rate of expansion of 18 millimeters *per year*. That is massive when calculated on a galactic scale. The

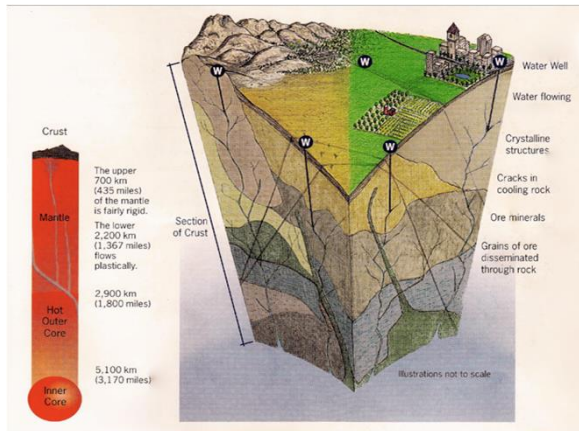


NOAA and NASA data showed this by the 1990s...and yet the data has been zero’ed because, arguing *a priori*, it must be wrong because, well...Earth is “steady state”. Unlike everything else in the Universe! We have suffered such orthodoxy for millennia.

Earth has been growing from the inside out, producing all the elements and minerals and water that encompass the natural resources of our planet. The massive heat and pressure of the earth’s core and inner mantle creates enormous steam from the hydrogen and oxygen present in the hydrous transition zone where the silicate bedrock is formed. It then cools as it reaches the outer mantle and crust where it converts from steam to liquid. This water then starts to move through the fractured mineral-silicate rock of the crust where it becomes the source water for the deepest confined aquifers, the oceans, most lakes, streams originating high in mountains, and the natural springs and thermals that dot the earth. This is why Earth is the Blue Planet!

“Only the naïve would believe that at last our dogma is pure. The most likely site for error is in the most fundamental of our beliefs.” – Samuel Warren Carey (1988)

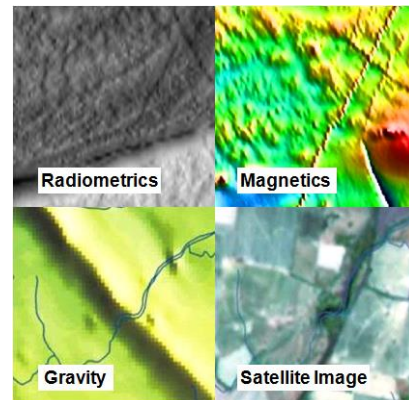
High quality, earth-generated water can be located and developed using the same methodology of exploration and production (E&P) employed in all the other extractive industries. America has gone from cries of “Peak Oil” to an oil and gas glut in less than a decade. We have succeeded in disrupting an industry dominated for 40 years by a foreign cartel.



This was accomplished through a combination of scientific advancements (long overdue recognition of abiotic oil and gas formations), technological innovation (horizontal drilling) and simple regulatory modernization (allowance for larger individual leases to accommodate horizontal drilling). The same transformation is underway in Water E&P—but with a much safer impact on our environment and enormous

implications for an explosion in small farming, regenerative grazing, abundantly available potable water, and industrial renewal. All on the greenest of foundations. Nature always provides for prosperity when we remove dogma from science and allow American entrepreneurship to flourish.

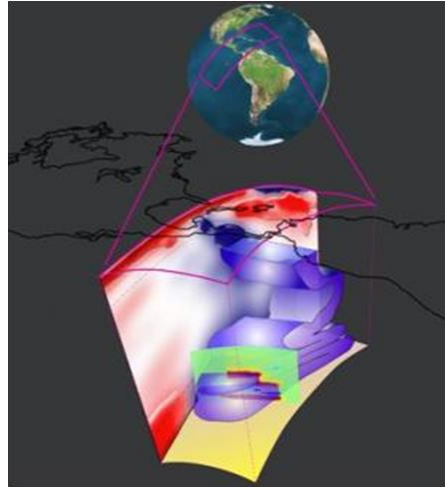
Both Silicon Valley and Silicon Alley teach us that real change often requires a complete re-orientation of perspective. This is no different in the case of our understanding of groundwater. Instead of “looking up” for rainwater, then watersheds, water tables and aquifers...we must “look down” for the capillaries, veins and arteries of the Earth. Whereas hydrologists read faults, dikes and other anomalies primarily as dividing lines between aquifers or "tubs" in a basin, we actually are interested in drilling on or near these fracture zones for non-aquifer sources. It is a radical difference in perspective. These same planetary sources produce thousands of natural springs—which ironically appear in greater numbers the farther West one travels and the more arid the region. Nature hydrates those who pay attention to the signs! Thousands of such “primary water” wells have been drilled over the last century across the U.S. and throughout the Southwest.



These wells exhibit continuous flow without correlation to precipitation or drought. They provide high quality “mineral water” that almost always can be consumed without filtration and only minimal processing for bottled water. Most of the nation’s “spring” water in fact comes from wells drilled into the Earth’s sustainable water sources—often at high elevations emerging through bedrock.

“Besides rain, there is another kind of water by which the interior of the earth is soaked, so that being heated it can continually give off halitus [water vapor], from which arises a great and abundant flow of waters.” – Georgius Agricola, De Re Metallica (1556)

Our forefathers knew how to locate these waters using the “low tech” remote sensing techniques of dowsers, water witchers and diviners. Because they looked down for water and intimately understood that it is possible to get “water from rock”, up and down Appalachia and across the early and later frontiers of America they located these waters and dug wells that developed and sustained communities for generations. Even today dowsers are in high demand across California—but of course the hydrologists employed by municipalities across the state prefer to keep this fact quiet. We have nothing against any method that is proven and practical! But why not employ the modern tools of any exploration science? With blinders off... Satellite imagery is ubiquitous and geophysical data is readily available and more inexpensively collected (even by sensors mounted on drones). Mapping techniques using GIS layering and 3-D modeling are used extensively in other sectors before a business venture sets foot



on the prospect area. Advanced resistivity testing, radiometrics, geomagnetics and even quantum physics are being applied in the location of water wells to increase success rates above 90%. It is all about correlation. Such primary water wells can be located often within sight of an existing rainwater well that is producing less water in drought and of worsening quality. The power of pinpoint locating and precision drilling.

Even a brief survey of drilling companies and their rigs will reveal an aging fleet (using techniques a mid-century operator would recognize) drilling wider boreholes deeper in unconsolidated formations with the belief that such methodology will produce more volume from drying, over-pumped atmospheric water aquifers. Yet earth-generated



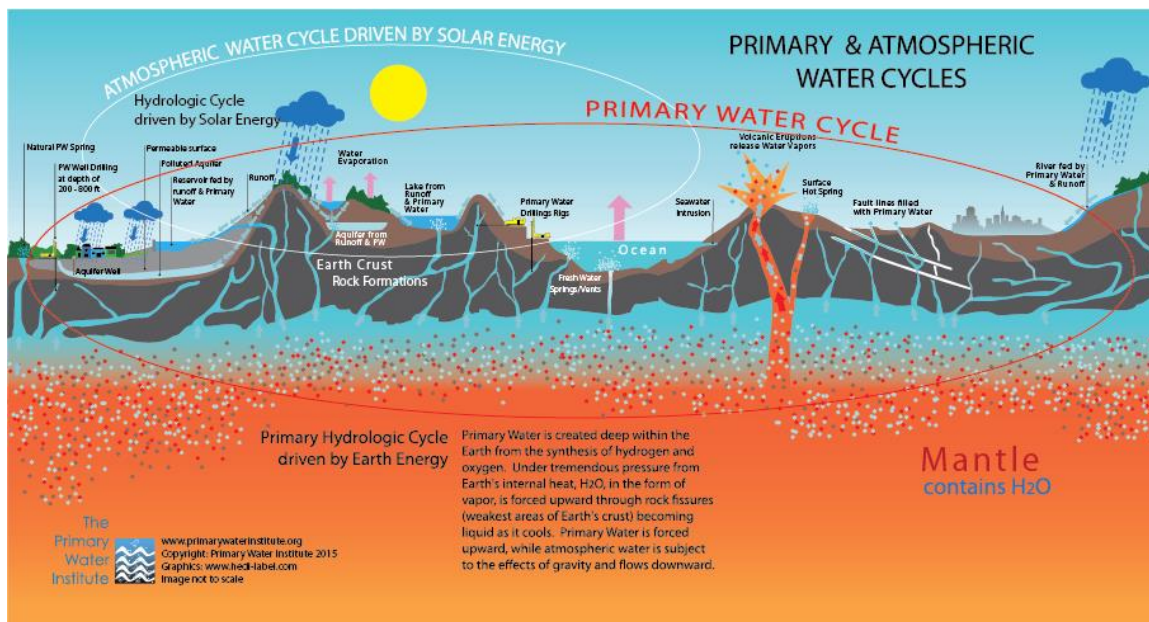
water, almost always rising under hydrothermal pressure, can produce hundreds and even thousands of gallons per minute from a 12” (or less) well pipe drilled through fracture zones in granite and basalt bedrock—and especially in the volcanics where some of the purest water on earth issues forth. Static levels are near surface allowing for less expensive submersible pumps (even mechanical pumps for areas of the world without electricity) with minimal draw down. Locate wells where they are needed, often at higher elevations allowing for gravity flow, minimizing long-distance pumping and costly infrastructure. This is the groundwater development promise of the primary water paradigm. Proven. Disruptive. Transformative.

“There are millions of good water producing wells – all the result of someone’s decision. Dowsers account for a large proportion of these. Until science discovers a fool-proof, or at least reliable method to locate underground water...Dowsers must continue their work with seemingly unorthodox scientific instruments and methods.” – Bill Cox (1970)

Conclusion

Traditional hydrologists have many terms for earth-generated water that is anomalous to their meteoric water cycle: juvenile, magmatic, plutonic, connate, fissure, telluric, paleo... At least they agree it does in fact exist! And rather than arguing *a priori* that it must be radioactive or contaminated or too mineralized, we prefer to point to the abundant evidence—on all continents, in all geologic formations, regardless of soil or precipitation—that this sustainable water source can be located using the proven methodology of exploration and production practiced and continually developed in the other extractive industries. A growing array of technologies can be employed to map, predict and pinpoint well sites. Lastly, the water well drilling business model is unquestionably due for a complete overhaul. Currently there is a disincentive to seek shallow well sources when drillers charge by the foot, and they are paid whether the borehole is dry or low producing. And why stop to swap between rotary and hammer bits, or check intermittent water quality and flow, or use techniques to release fissure water from tight fractures? This is language almost foreign to modern water well drilling. No industry should be immune to the disruptive forces of new paradigms.

We have a crisis in water. It can be solved! It is already happening...



“Inexhaustible supplies of this “Primary” or Virgin water, vaporized by earth’s internal heat, squeezes up through rocky fissures under tremendous pressure, bringing it into high mountain elevations throughout the world. It is New water and may never be depleted. When large amounts of this Virgin or Primary water are pumped from wells, the internal steam pressure lowers slightly. This allows more water to leak in, thereby replenishing the original subterranean supply in an endless cycle.” – Verne Cameron (c. 1968)



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Stephen Riess with 1,500 gallon-a-minute well he drilled above bone-dry Simi Valley, California. Courtesy of The Riess Institute

"At no time is water static. It is constantly changing form. It is either a liquid or gas, or it is bound up in crystalline form in rocks and minerals. The cycle of gas to liquid to crystal is repeated over and over. Oxygen and hydrogen combine under the electromechanical forces of the earth to form liquid water. Not only is water being constantly formed within the earth, but also rocks, minerals, and oil. What I seek is water in its liquid state." – Stephen Riess