PRIMARY WATER

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This paper examines the evidence for the presence of primary water or Earth generated water as a major source of water supply for the future needs of humans and animals. There is a major issue with perceptions held by some public scientists, bureaucrats, environmentalists and sceptics that primary water (as a continuous supply of water from the Earth's crust) is unproven. Dogma says that our water exclusively originates from the hydrological cycle, but this begs the question: how did the Earth kick-start the hydrosphere and this cycle?

Introduction

There is a looming water crisis in Australia, particularly for urban areas. Rural areas are also under pressure because they do not have access to the large surface water storages of major cities and regional towns. While some irrigation areas will mange on limited supplies many dryland farmers have had their groundwater supplies cut, and this water is often the main source of water for their enterprise. However, most Australians rely heavy on surface water supplies that will always be limited, and perhaps become increasingly polluted.

Undoubtedly, Australia has to become far more efficient at water use and minimise water wastage. These strategies alone will not the secure the water reserves that the Australian economy needs for nation building. There is a new source of water that is available for all Australians, yet is not part of the national water plan.

Firstly, we must ask, how was water first produced within and on Earth, and in such great quantities, and does this production system still exist today?

There is a theory that water is generated within the Earth's crust or mantle and is often called primary or proton water and based on claims by Leonardo Da Vinci, Adolf Nodenskjold, Frank W. Clark, Svante Arrhenius, William Rubey, Stephen Riess, Michael H Salzman, Morad Eghbal, Lance Endersbee and many others.

This water can be accessible deep, often in excess of 200m to 3km underground in a never-ending source, as is the main water supply to Beirut from a bore in the adjoining mountains. Scientists probing the Earth's interior have found a large reservoir of water equal to the volume of the Arctic Ocean beneath eastern Asia. This seismic anomaly is under the Asia plate and within the mantle. Other such primary water reservoirs exist within the Earth's crust and mantle.

If our planet did not have the ability to store oxygen in the deep reaches of its mantle there would probably be no life on its surface. This is the conclusion reached by scientists at the University of Bonn who have subjected the mineral majorite to close laboratory examination. Majorite normally occurs only at a depth of several hundred kilometres under very high pressures and temperatures. The Bonn researchers have now succeeded in demonstrating that under these conditions the mineral stores oxygen and performs an important function as an oxygen reservoir. Near the Earth's surface the structure breaks down, releasing oxygen, which then binds with hydrogen from the earth's interior to form water. Without this mechanism our "Blue Planet" might well be as dry and inhospitable as Mars. The findings of the Bonn-based scientists have been published in the journal "Nature" (doi:10.1038/nature06183). Further information is at *http://www.eurekalert.org/pub_releases/2007-09/uob-lrf092407.php*

Also, Japanese researchers say *Molten rocks deep in the Earth's interior may be surprisingly wet. From laboratory experiments, they have concluded there may be more H_2O deep underground than in all oceans, lakes, and rivers combined. The scientists first heated "mineral cocktails" to a white-hot 1600 degrees Celsius (2900 degrees Fahrenheit) and squeezed them until the pressure reached more than three million pounds per square inch (200,000 kilograms per square centimetres). Then*

they cooked the samples for an hour. The experiments replicated the environment and conditions deep in the Earth. Based on what they witnessed in their lab, the researchers concluded that more water probably exists deep within the Earth than is present on Earth's surface—as much as five times more. "Our results suggest that the lower mantle can potentially store considerable amounts of water," said Motohiko Murakami of the Tokyo Institute of Technology, where the experiments were conducted. "The presence of water in the crystal structure of [deep-Earth] minerals would be expected to soften the minerals and change their flow behaviour," he added. That, in turn, could affect how the innards of the planet mix and shift over time, and could indirectly affect conditions and forces near the surface, such as plate tectonics. Further information is at http://news.nationalgeographic.com/news/2002/03/0307_0307_waterworld.html

Therefore, given that the Earth's oceans make up just 0.02 percent of the planet's total mass, this means the vast lower mantle could contain many times more water than floats on the planet's surface.

Research undertaken by Stephen Riess in 1934 showed *enormous quantities of virgin water could be obtained from crystalline rocks. This involved a combination of geothermal heat and a process known as triboluminescence, a glow which electrons in the rocks discharge as a result of friction or violent pressure, that can actually release oxygen and hydrogen gases in certain ore-bearing rocks. This process, called cold oxidation, can form virgin or primary water. Riess as able to tap straight into formations of hard desert rock of the right composition and produce as much as 8,000 litres per minute*.

The Australian Academy of Science defines groundwater as *the water that exists underground. While it can be present as underground lakes beneath the Earth's surface, it's more commonly the water that lies in the tiny spaces between grains of sand or bits of fractured rock. It's a bit like the effect you'd get if you poured water into a jar of sand or pebbles – the water wouldn't float to the top, but instead would settle in the spaces between grains, filling the spaces between sands or stones.* That is, groundwater is considered by the Academy to be all water below the surface of the land. The problem with this definition is that soil water processes (say within metres of the surface) are quite different to water confined with a crystalline rock structure that might be 300-500m below the land surface.

Water on the Earth can be defined as follows:

- Atmospheric water is water vapour that comprises about 60% of atmospheric gasses.
- Seawater is water confined to the oceans or seas and represents the major component of water on the Earth surface.
- Land surface water is tied up in ice, dams, rivers or creeks, wetlands, ponds, etc, and often the most readily available water for drinking or reservoir storage. This water is a major part of run-off to surface reservoirs or flows and evaporation to the atmosphere.
- Soil water is all water within the soil system and confined between the upper most layer of soil (ie. the A horizon) and by either the uppermost clay layer (ie. soil C horizon) or rock strata. Most soil water is either transpired by plants or finds it way through lateral flows to the surface reservoirs or flows, eg. ponds, wells, creeks and rivers, etc. About 2% of soil water finds it way to the groundwater. Soil water is also the main salt transport system associated with salinity and this process is driven by soil health degradation (see papers at http://www.eric.com.au/html/papers_salinity.php)
- Groundwater is mainly water confined below the soil water between clay layers (aquitards in depositional systems) or rock strata in aquifers or fissures. This water can include buried rivers (palaeochannels, often at 100m deep) and unconfined aquifers that express water at the surface (ie. springs). Groundwater is the major source of water for bores. Groundwater is not the source of salinity as promoted by public science agencies.

- Primary water is created within the Earth's crust or mantle and found in the crystalline rock system often at depths greater than 300m. This water is the source of all water on the Earth and eventually reaches the groundwater, soil water and surface through vents and unconfined aquifers. Therefore, this water can eventually become part of the hydrological cycle once extracted or when it finds its way naturally to the surface. Primary water is also known as earth generated water, juvenile water and proton water.

The hydrological cycle primarily involves atmospheric, surface and soil waters. Groundwater is replenished mainly from primary water (a variable rate based on flows within fissures, pressures, depth from surface, bore extractions, etc.) and 2% from surface or soil waters. The amount of primary water available is unknown and not part of any public water accounting system, or public science theories. However, this primary water source is potentially massive and significant in water access and usage terms.

Anyone involved in groundwater exploration knows that in rural areas divining or dowsing finds most groundwater and primary water. The success rate of divining is high compared with traditional hydro-geological techniques that rely on geological structures to target locations. I personally find that the combination of geophysical mapping, field observation and divining is the most reliable approach to groundwater and primary water exploration.

Primary water supplies are providing huge volumes to many urban areas around the world and these sources continue to flow at the same rates over centuries/decades, eg. Beirut's water supply comes from bores in the mountains of Lebanon and similarly water is provided to Damascus through continuously flowing bores.

Primary water as fractured rock water is potentially the greatest source of sustainable water supply. However, this does not suggest that this water can be pumped at higher rates than can be sustained by pressure that moderates the flow rates. All groundwater or primary water bores need to be assessed for sustainable flow rates (a rate that has no draw down or the draw down level is recovered prior to further pumping).

The shallow groundwater system, along with surface supplies from rivers/ dams, etc. is at greatest threat from over exploitation. However, this water should not be accounted in the same manner as primary water that is infinitely greater in volume and a major source of supply to the shallow groundwater system where most bores access these waters. Primary water is the least of all fresh waters sources that are exploited for human and animal consumption.

Water from the atmosphere (13,000 cubic km) is another major source of water that can be used as new water.

Primary Water Theories

The key theory is that primary water is formed deep inside the crystalline rock strata of the Earth's crust or mantle.

One view is that this water may be formed as a residue from volcanoes under the Earths surface. These eruptions create gas that either escape to the surface as gas or turn into primary water. That is, these gases are electrically and chemically fired into the rock itself and the rock fuses the water out.

Organisms within the crystalline rock structure may are also be involved in an electrical and chemical reaction (remembering that marine organisms have been around for about 3 billion years or more and organisms within the rock system may have been around for much longer)

The modern day theories on primary water were first postulated by Adolf Nordenskiold in the nineteenth century, and raised in the book *A Journey to the Earth's Interior by M.B. Gardner*

(1913). Nordenskiold wrote an essay on the subject of primary water which resulted in him being nominated for the Nobel Prize in physics.

In the 1930's, Stephan Riess, Bavarian-born mining engineer and geologist had a theory that primary water was generated in the rock strata when the right temperature and pressure were present. This water is then forced into fractures/fissures in the rock where it transverses over 100's of km. Some of this water is sometimes expressed as springs, and can be either hot (thermal) or cool (17 C). This water is always moving and therefore can be detected by dowsing.

The first experience with primary water for Reiss was an unexpected gush of water while working in a mine shaft. The temperature, chemistry and purity suggested to Riess that it must have a completely different origin than ordinary ground water considered part of the hydrologic cycle. Following further independent research, and building on the work of other eminent geologists, he concluded that in various rock strata, deep in the earth, water was continually generated under particular conditions of temperature and pressure and forced up in rock fissures where it could be drilled for and tapped.

Toward a New Hydrology

Conventional hydrology speaks of a static supply of water created once early in the Earth's history being constantly recycled. Stephan Riess saw new additions of water flowing vertically, from beneath the surface adding to the hydrologic cycle. This water in turn, becomes bound up on the surface partially in plants, sediments and subduction zones on its way back to the Earth's mantle.

These new additions occur frequently where there is faulted, igneous and metamorphic rock and can be intercepted to replace contaminated supplies and provide new sources of water in arid areas. Riess' concept of Earth-generated water adds a new dynamic to the science of hydrology.

Water from the Trinity Springs of the Idaho (USA) batholiths rises under its own pressure from an isolated, ancient source through the faulted granite quartz formations. The spring water spends time inside the Earth at temperatures exceeding 300F and surfaces at its source at 140F after travelling from a depth of many miles underground.

Ongoing research on the Trinity Springs water has revealed an interesting geochemistry and remarkable recharge/discharge and travel mechanisms for these thermal waters unlike any other water source in the region. The scientific investigation continues in laboratories specially equipped for high pressure experiments and with new techniques for isotope analysis.

Stephan Riess, through his study of mine flooding, developed a science of locating flows of Earth-generated water. These waters which often deposit minerals and flood out mines occur worldwide as spectacular springs and are even more accessible by drilling into hidden rock structure. The Riess Institute's scientific application of petrology, mineralogy, structural geology, aerial reconnaissance and remotely sensed data, offers "new water" for a thirsty world.

Several active Riess wells today are:

1. Escondido, California: Riess and his successor, Morad Eghbal, each located several wells in the late 1970's on private property both for the personal use of the owner as well as for the commercial water development for surrounding towns that needed to purchase water. These well are in operation and producing today.
2. Cottonwood, Idaho: The city of Cottonwood was running out of water and the traditional, professional geologists the city had hired to find water declared that there was no hope of success. The city then turned to Stephan Riess who immediately located two wells for them. The first generated more than 600 litres per minute. The second well produced over 1,200 litres pre minute. At the city's request, Riess returned to locate a third well for Cottonwood's

future expansion. This well produced over 1,200 litres per minute. All three wells continue to supply the city of Cottonwood today.

Conventional water locators pick a spot to drill, looking for an aquifer or saturated zone in the overburden. Recently, with sophisticated airborne geophysical and satellite data groundwater and primary water can be located in rock using a technique called "fracture trace analysis." Large fractures are identified by through analysis of the airborne and satellite for exploratory drilling. An example of this technique can be viewed at http://www.eric.com.au/docs/products/assessments/eric_ground_water.pdf

The Riess method uses mineralogy, petrology and structural geology precisely to locate high pressure/low temperature hydrothermal systems that have previously been encountered randomly by engineers in mine and tunnel flooding incidents.

Historically, all water is believed to come only from the hydrologic cycle. Yet, a growing body of evidence suggests that water might be generated deep within the Earth in great quantity. The Riess Institute at its Totten Field Laboratory, over the last decade, has drilled, collected and tested waters captured from great depths in a number of bore holes. Totten well 3, at 2,000 metres, known to be the deepest 10cm cored water research well in the continental US. Results from Totten 3 now indicate some waters there may not be part of the hydrologic cycle at all, but rather from deep-seated geologic interaction within the Earth's interior.

The Riess Institute identifies the dynamics of *new* water generation deep within the Earth's interior, which, after rising to the surface, is added to the Earth's hydrosphere. This vertical component of our model is linked to the horizontal components of water distribution (i.e. hydrologic cycle and theories of watersheds). As such, the Institute is able to obtain specific water signatures which identify sources of waters originating from deep within the Earth.

Conclusion

Public science has ignored the concept and evidence of the presence of primary water (deep groundwater) and failed to account for this water as a new water production source. The understanding, location and exploitation of this water has occurred outside of the public science system for centuries, and is perhaps destined to remain that way unless public monies are expended in the assessment of this new water production source.

The public science consensus is that Earth generated water (primary water) does not exist and that all groundwater is part of the hydrological cycle and exploitation of groundwater reduces surface water supplies (ie flows in rivers). This science is wrong and must be challenged through the evidence.

Ultimately, governments worldwide will have to access primary water to sustain water production for human and animal consumption, as this water along with atmospheric water are the only remaining new sources for a thirsty populations. This is not to say that efforts to conserve water use should not be paramount in government planning. However, the utilisation of primary water that is located within 100m to several kilometres of consumption areas (ie. urban and industrial centres) is more energy efficient to deliver than water piped over 10-100km to consumers.

This being said, it can be expected that during the current water supply crisis in Australia public scientists will promote a policy that groundwater is a *scared cow* and should be left where it is.