

# Welcome to Planet Water: Time for a Reverential Rehydration Revolution

By BROCK DOLMAN

**H**ere on our so-called Goldilocks planet, amid the vastness of our Milky Way galaxy and beyond, the provenance of the adage “location, location, location” has never been more apropos. As we orbit our gigantic starry nuclear power plant, fusing hydrogen atoms into helium, showering massive amounts of energy with the dizzying speed of light, our heliocentric planet is perfectly placed at 93 million miles away; thankfully, we are neither in the Venus nor Mars location.

Life in the known universe is endemic to Planet Earth—or Planet Water, as the late Lynn Margulis aptly named it. The reality is that carbon-based life is mostly water.

And while we may call ourselves Earthlings—more uniquely we are Waterlings!

As a biologist, I am one who, by definition, studies life. One who loves life—an unabashed bio-philiac! And clearly all life-lovers must fundamentally be water-lovers. I have come to guide my life and work on the foundational clarity of: No Water, No Life. Or, as astutely stated by Jacques Cousteau: lest “we forget that the water cycle and the life cycle are one.”

Water—the word, the molecule—is so seemingly simple due in large part to its ubiquity here. Water provides a perfect foil for the definition of underestimation as an understatement. While some have valiantly tried to estimate the myriad values of water, its

availability, and its purity for all of life, truly understanding water is inestimable. The essence of water epitomizes the scientific idea of an emergent property. In this case, it may be said that the whole of water is greater than the sum of its parts, with the parts being, quite simply, two hydrogen atoms and one oxygen atom held together by a “weak hydrogen” bond—a molecule that chemically could be described by the ominous sounding name of Dihydrogen Oxide.

A primary character trait of this amazing three-atom molecule is that when hydrogen atoms and oxygen atoms solely fraternize with their own kind, they form gases which are notoriously explosive. Yet when they combine as H<sub>2</sub>O, a wholly novel set of substances are created that can be found widely distributed on our planet in any one of the three most easily viewed phase states—liquid, vapor, or solid. Of additional importance is the fact that the two hydrogen ears of one H<sub>2</sub>O molecule carry a slight positive charge that enables them to nicely nestle into the negatively charged oxygen face of our miraculous, Mickey Mouse molecule, creating a “fluid bond” that allows for continuous morphing of form and state, depending on external factors such as temperature, pressure, and motion.

How is it that solid water floats on its liquid self? How amazing is the process that allows just enough of the sun’s energy to catalyze seawater to shake off its chemically bound up salts and rise up invisibly as

a distilled, purified vapor that wisps en masse, only to eventually condense as a form of precipitation: liquid rain, crystalline snow, or fog drip? With new sensing and satellite technology, science is now able to determine and to document that at certain times of year along the west coast of the continental United States, in the eastern Pacific, the phenomenon now called “atmospheric rivers” occurs. When this happens, it has been calculated that concentrated flows of water vapor and liquid “flying rivers” can make landfall. According to the National Oceanic and Atmospheric Administration, they can discharge an amount of water vapor equivalent to 7.5 to 15 times the average liquid discharge at the mouth of the Mississippi River. The myriad list of multifaceted facts about water’s unique life-supporting characteristics is legion. For those of us who wonder, “What would water want?” and are willing to work for water, life is never dull.

amounts of energy. One example is infrared light, which has an eight-minute, twenty-second transit time from the sun to the surface of Planet Water. Considering that 70 percent of the surfaces these energy waves strike are water—specifically ocean water—our home is truly a pelagic planet. We are bathed in the saline solution of the salty reservoir of left-behind distillates. Fresh water is continuously being created by the boost of streaming solar-thermal power that allows it to leave the salty solvent behind for a fresh journey up, up, and away—a journey that may take it over land to be combed out as coastal fog and embodied as a giant redwood tree for the next two thousand years!

The idea that we live on Planet Water, where life is endemic, is worth a bit more pondering and unpacking. The operative scientific notion is that roughly 3.8 billion years ago a nascent reaction occurred and what we now call organic life seized the day and



Now back to this fusion-powered star of ours. Many forms of electromagnetic energy are spiraling down in waves, showering the earth with massive

emerged in the primordial seas. For the first billion years or more, life was anaerobic, making a living on the available earthly chemistry, exuding sulfur-relat-

ed molecules in an otherwise oxygen-free atmosphere. Over the next one billion years, all that solar energy and light streaming down upon the liquidity of the planet was an opportunity too great for evolution to ignore. Around 2.7 billion years ago, life forms known as cyanobacteria found their first successes with photosynthesis, converting photons of sunlight into sugar and scaling up what was truly a watershed moment for evolutionary diversification of life. Then carbon-based life enmeshed in an aqueous solution commenced a new level of metabolic activity to feed itself off light energy from our central star.

With each input, there is an output, and in this case the novel notion was gaseous oxygen. Over a period of roughly 400 million years, due to the advent of photosynthesis, excess oxygen likely became a detriment to all anaerobic life, which had evolved in a mostly oxygen-free atmosphere. The ingenuity of revolutionary life processes allowed this excessively oxidizing world, caused by a runaway train of oxygenated cyanobacteria flatulence continuously accumulating in the atmosphere, to literally rust over the planet. Geologic evidence indicates that during this period, banded iron formations were created all over the planet as iron that had been in seawater solution precipitated out into sedimentary layers of magnetite. These rich deposits have been the source of over 90 percent of the iron ore humanity has mined. It is amazing to imagine that we owe the Iron Age and the bulk of the iron in your car to oxygen-producing cyanobacteria from over 2 billion years ago. And yet, in what has become one of the great hallmarks of the supreme adaptability of life, the observation that “waste equals food” springs forth, as some early bacterial life-forms figure out that there is a selective advantage to utilizing this free “toxic” oxygen to fuel metabolic processes. Thus, one of the next most profound mega-moments in this grand experiment known as life on this planet commenced. Solar-powered photosynthesis produced excess oxygen, which was then consumed by life forms that as a result output a gas composed of two oxygen atoms adhered to a carbon atom, making this miraculous molecule called carbon dioxide, or CO<sub>2</sub>.

On Planet Water it can be said that there is no away, since earth is functionally a closed system in terms of matter. In grand terms of symbiosis, we get a reciprocal relationship between the cycling of outputs and inputs—specifically, between cyanobacteria, archaea, and what become plants in trade with what become both fungi and animals such as ourselves. At this

point, it might be worth stopping to take a breath of gratitude for the grand O<sub>2</sub> and CO<sub>2</sub> Trade Agreement, whose permutations and oscillations of equilibrium have dynamically danced about for the past several billion years, thanks to the gaseous warmth trapping the biologically based Greenhouse Effect. And we may wish to re-evaluate the idea of away relative to the fact that the combustion by-products of our fossil fuel addiction are not going away, and instead are steadily accumulating and retaining heat in our atmosphere and oceans—what might be considered a global fossil-fool-fever.



Over the past 3.8 billion years, the emergence and subsequent evolution of life has generally created conditions conducive for more life. This idea—that the presence of life begets life—is encapsulated in the Gaia Hypothesis put forward by James Lovelock and Lynn Margulis in the early 1980s. And again, to reiterate: you and I live on this wondrously unique planet—the only one, to the best of our knowledge, that hosts organic life.

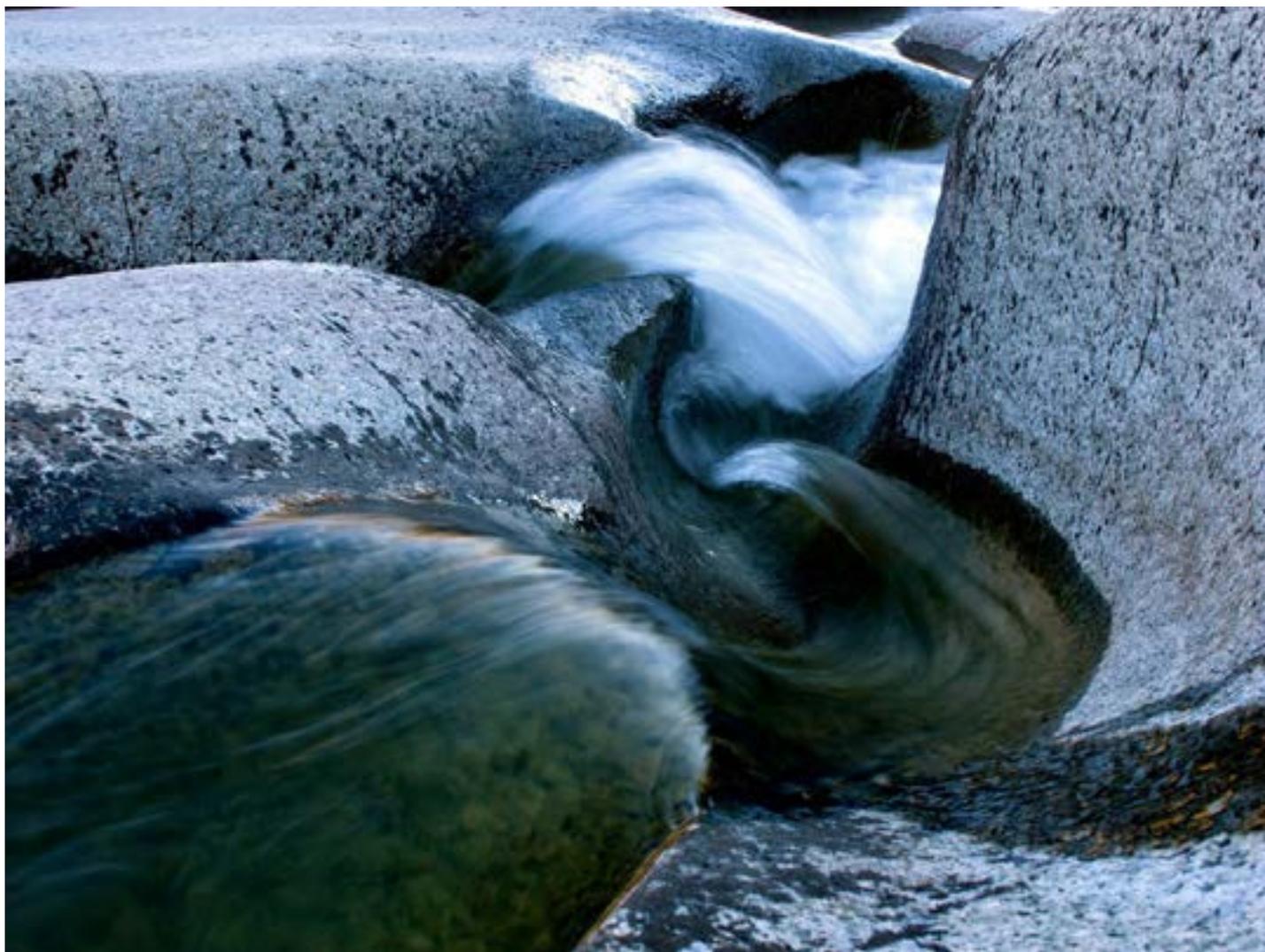
Through myriad trials and tribulations, with multiple near misses of full extinguishment, the unbroken presence and process of life on Planet Water for the past 3.8 billion years ought to warrant consideration for being a mega-miracle. All life that currently exists is the direct progeny of the earliest proto-life-forms that have carried forward to the present—this unbroken lineage of life our greatest gift from Gaia. Immortality of life as a force of continuum over 3.8 billion years is the longest running and most successful expression of an attempt at thwarting the Second Law of Thermodynamics—where the orderliness of Gaia, due to the presence and processes of life, has crafted more

order than disorder in our otherwise expanding dark and cold universe.

In some respects, then, the presence of life writ large as an unbroken continuum of populations, whose replication was favored through naturally selecting modified descendants, at least temporally appears to contraindicate the idea of entropy and chaos. At least, on this one special planet, and for the time being? Pluripotent populations over the entirety of time immemorial have been giving entropy a run for its money. While individuals will live and die accordingly, we face the emergent opportunity to recognize the whole of life as greater than the sum of the individuals as parts.

the pursuit of personal rights abdicates responsibility to the whole of the community of life, we run into problems. Fixation solely on birth rights in the absence of equal focus on birth responsibilities runs into problems when the rights of individuals as parts are preferred over the responsible whole of community. How shall we reclaim our focus toward an understanding of life as an emergent property rather than the ominous collective feeling of dying as an emergency property?

At the edges of dynamic equilibrium, where rights and responsibilities meet, is the nexus where reverence and resilience result over time. There are no



Upon our passing, how our carbonaceous carcasses feed back into creating conditions conducive for life is key to the sense that sustainability is about our ability to sustain the cycles of life. In a number of our societies we confer rights (private property, water, civil, etc.) to individuals—which is critical for justice. Yet when

guarantees, and entropy is perennially and patiently omnipresent. Thus, our lived experience of endemic life on Planet Water is the most astounding and truly awe-inspiring chaordic gift of Gaia one could hope for. All of which would seem to demand our deepest reverence for life, human and non-human forms alike.

If we embrace this idea, then how can humanity consciously and strategically ensure that our collective behaviors, with our needed inputs and associated outputs, be done in ways that optimize the conditions which best support life on this planet? Currently, we operate from the anthropocentric paradigm, the hallmark of which is the fact that our single species is unequivocally the driver of a great extinction vortex, the magnitude of which, by some accounts, is currently of a scale to be called the Sixth Great Extinction. When human settlement patterns of population and consumption are such that they begin to express die-offs to the net diminishment of life, we can see the pattern of this behavior as expressly anti-biotic—literally against life. Anti-life is fundamentally what extinction implies—permanent death. Certain species of life that have evolved over eons into the form and function they represent today are being forever removed from the family of living life now. To some of us, this collective expression of our anthropocentric fetish appears to be the epitome of shortsighted hubris. Astute predictions are that this ignorance will not be bliss for the future of humanity and life overall. Nonetheless—Welcome to the Anthropocene.

At some level a fundamental conundrum facing humanity today is the question of the sustainability of our various settlement patterns on the planet. While the anthropocentric perspective tends to take up the bulk of the “airtime” in our collective consciousness and conversations, the fundamental non-alternative fact is that non-living laws of physics and chemistry continue to be the raw resources for a reciprocal revolution upon which life depends. It is our choice to compose with rather than to impose upon the fundamental life-supporting elements and keystone processes of living systems, awakening to the reality that human life is entirely dependent on the health of all life. Considering again that all of life is mostly water, we are called to add in two additional R words to our reciprocal revolution—rehydration and reverential. Rehydration may be the easiest of them to grok—again, simply put, No Water No Life. Reverential is a much thornier prospect for many.

Mathematician and meteorologist Edward Lorenz once put it: “Climate is what you expect; weather is what you get.” Now, as we face the flummoxing reality of climate change, that aphorism is disturbingly up for grabs. The smart money would be best spent on patterning our watersheds to produce more rehydrative and resilient returns on investment. For instance,

many are newly cognizant of the drought-to-deluge pendulum, which is more wildly swinging all over the planet, notably affecting California’s Mediterranean climate over the past five years or so. It is incumbent on our societies to aggressively pursue changing how we perceive and enact life-literate land-use patterns—from forestry, rangeland, and agriculture to urban, suburban, and rural development designs. All must be reflectively re-thought and retrofitted from the current dehydration and degradation design toward a new rehydration and regeneration design. We must move from the “drain-age” to the “retain-age.” All the tools in the toolbox are known for how to retrofit for retentive resilience at each land use at scale. While sadly it is not the norm, we do have the practical knowledge and case studies to enable us to practice eco-forestry and regenerative agriculture, and we know how to design green cities that are just for our ever-growing and urbanizing human community.

What is lacking is the social will and collective incentive, due in large part to the smothering dominance of an economic model called capitalism that at its foundation is ecologically illiterate. Extinction, genocide, and climate chaos are but a few of its more charismatic externalities. The powers that be are loath to change a system that has been working to consolidate their wealth and power, while the urgent demand for rapid change has never been felt more greatly by the masses of all life.

With this sinking feeling, some may be inclined to look for a lifeboat to float their familial future upon. For me, when I look at landscapes, the shape of the lifeboat I am looking for looks exactly like a watershed—that area of land where all precipitation that falls within it eventually drains out to a single exit point. From ridgeline to river to reef, those that choose to retrofit their living lifeboat watershed from stem to stern may fare better than those that don’t. The beauty of a no-regrets policy would suggest that strategic time and energy best be invested in regenerative, community-based food, water, waste, energy, housing, and transportation systems independent of the pressing climate chaos crisis. Success looks like a thrivalist movement more than a survivalist movement. We need an all-hands-on-deck call to action to transform each of our watersheds into living lifeboats. And Dr. Luna Leopold’s prescient insight is as timely as ever: “The health of our waters is the principle measure of how we live on the land.”

It is oft said that planning is best done in ad-

vance. The time is now for how best to plan for batten-  
ing down the hatches on each watershed lifeboat.  
We have a supreme opportunity for society to come  
together with comprehensive purpose and ample job  
security for a cleaner, healthier, more family-friend-  
ly future. Our communities must be rigorously re-  
silient to weather the coming storms of uncertainty.  
All bets are off—but my 3.8 billion-year-old invest-  
ment advisors suggest that looking into What Would  
Water Want by optimizing its quality and quantity  
might be wise. Where water flows, the well-spring of  
life grows. Are you willing to work for water? Willing  
to think and act like a watershed? Those that do will  
more likely have grandkids grateful for their grand-  
parents than those that don't. As bi-pedal sacks of  
saline solution, the choice is ours—may we choose  
the way of life. May we choose the way of water.

### Mostly Water, Brock.

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