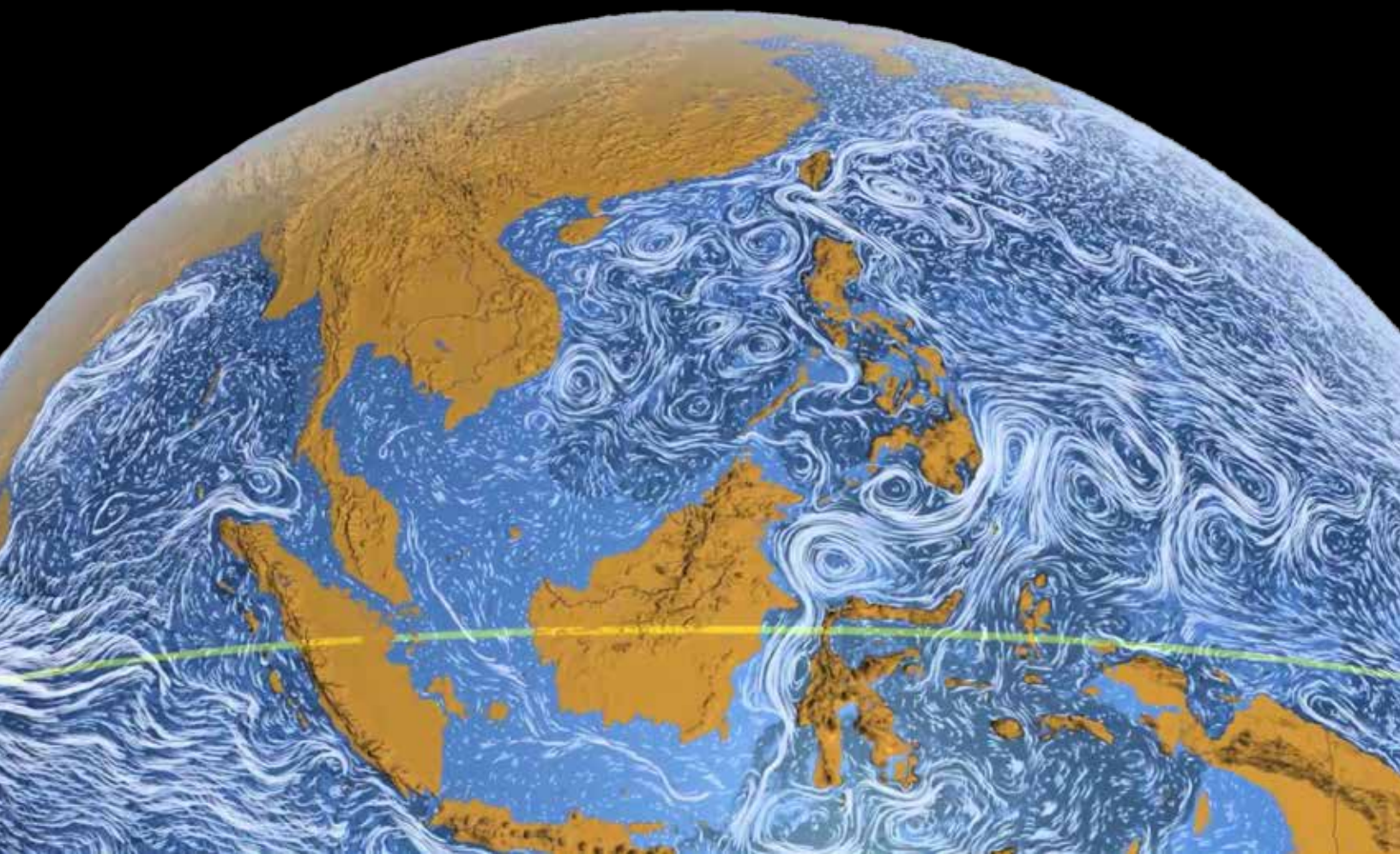
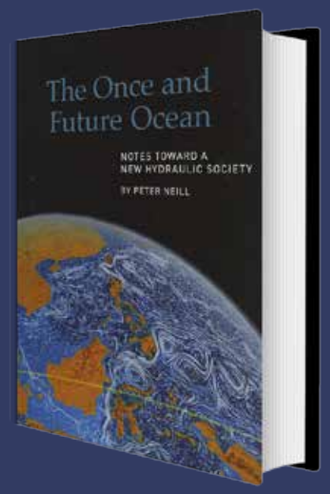
WORLD OCEAN JOURNAL

WORLD OCEAN OBSERVATORY

VOLUME THREE, 2016

WATER IS LIFE





THE ONCE AND FUTURE OCEAN

Notes Toward a New Hydraulic Society by Peter Neill

With a foreword by
Dr. Paul Mayewski
Director, Climate Change Institute
University of Maine
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ON THE COVER:

NASA Views Our Perpetual Ocean
An animation of ocean surface currents from June 2005 to December 2007 from NASA satellites. Watch how bigger currents like the Gulf Stream in the Atlantic Ocean and the Kuroshio in the Pacific carry warm waters across thousands of miles at speeds greater than four miles per hour (six kilometers per hour); how coastal currents like the Agulhas in the Southern Hemisphere move equatorial waters toward Earth's poles; and how thousands of other ocean currents are confined to particular regions and form slow-moving, circular pools called eddies. Credit: NASA/SVS

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WORLD OCEAN JOURNAL

VOLUME THREE, 2016

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WORLD OCEAN JOURNAL
a publication of the World Ocean Observatory, is a digital magazine on ocean culture and solutions to today's ocean issues. Each volume includes essays, interviews, art, exhibits, and performances profiling the vital impacts of the ocean on our lives. This and future editions focus on a particular theme.

WORLD OCEAN OBSERVATORY
is a major utility for ocean communication as a means to advance public awareness and political will, and is dedicated to providing information and education about the health of the ocean. It is our belief that the sea connects all things.

EDITOR'S LOG

WATER IS LIFE

by Peter Neill

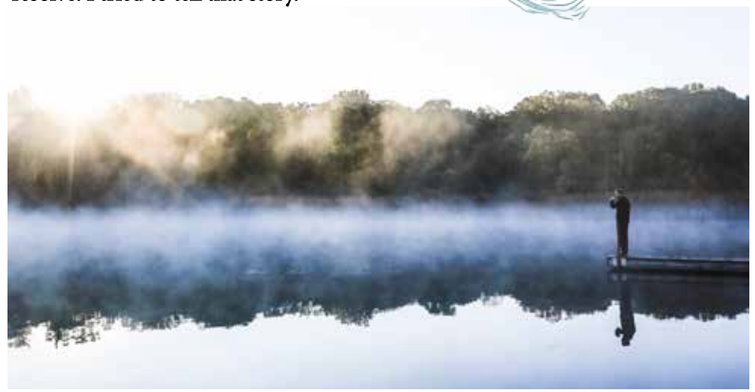
WATER REMAINS A CHAOS UNTIL A CREATIVE STORY INTERPRETS ITS SEEMING EQUIVOCATION AS BEING THE QUIVERING AMBIGUITY OF LIFE. ~IVAN ILLICH

Ocean is water, in all its forms, cycles, and values for the earth and all those who live on and within it. When writing *The Once and Future Ocean – Notes Toward a New Hydraulic Society* from which the writings in this issue of WORLD OCEAN JOURNAL are taken, I was faced with the confusion of actualities and definitions and the preoccupations with conventional perspectives that characterize how we view and understand this global resource that connects us all.

In the quotation above, from Ivan Illich's *H2O and the Water of Forgetfulness*, I found an organizing, albeit ephemeral insight whereby the appearance of chaos in the ocean-water continuum can be rationalized by a story, a narrative interpretation, past and future, that can penetrate the fog of uncertainty and convention to lead to an affirmation of being, a way forward through uncertainty and conflicted resolve. I tried to tell that story.

The argument is for a new paradigm for value, organization, and behavior to guide us in the 21st century based on the movement of water. The vision is for transformation to a "new hydraulic society" that is based around this provocative motivating principle. Water is essential to our very survival.

There is urgency here. The following excerpts suggest facets of that assertion, ideas that range from psychological to practical, that build not on ambiguity but rather on authentic application and accepted certainty that ocean-water will continue to provide its beneficence, continue to support us, our children, and what we call civilization if only we will reciprocate through our intelligence, imagination, initiative, and will to sustain it. That is the challenge we face.



WHERE DOES WATER COME FROM?

And Where Will It Go?

Where does water come from? It seems such a simple question, and the answer is known from our earliest science lessons when we are introduced to the water cycle and the global circulation system, so essential to our well being now and forevermore. Water evaporates from the ocean reservoir, captured in clouds and fog and rain, where it descends to become ground water, seeping into the underground aquifer, or surface water distributed by lakes and streams. Some of the water is captured in ice as glaciers and high mountain peaks; some is retained deep in the earth, some perhaps pre-historic in its deposit, but there for now beyond our eager, sometimes desperate, digging and drilling.

All of it is finite in volume.

We know this cycle, and if we begin to think about it at all, it becomes easy to understand the idea that the ocean, where 97% of that volume is contained, is the alpha and omega, the mouth and tail from this circle of sustenance. It becomes easy to see the edge of the ocean not at the boardwalk and beach, but rather at the distant snow-capped range where begins the long, convoluted flow of water down and across the land until it reaches its ocean origin, and the cycle begins again.

Essential to the sustainable ocean, then, is the protection and conservation of this fluid passage, the global hydraulics that can be compared to the circulation of blood through our bodies, themselves made substantially of water. Each of us is an ocean, with a comparable circulation, and a reliance on a healthy environment to sustain it. Extend the metaphor: if we treat our bodies with indifference, pollute them with excess and poisons, then we can expect them to succumb to obesity, disease, and collapse. If you think of yourself as the ocean, your family as the ocean, your community as the ocean, your nation as an ocean, then perhaps you will take the necessary steps to sustain the health of each of these many seas.

So, too, with the earth, and we return again to the geography of our living; the ocean as a vast global system of interacting, infused water that extends from mountaintop to abyssal plain and connects us all—physically, financially, politically, socially, and spiritually.

I belabor this point because it lies at the core of any strategy for change. It establishes the context for every decision that follows—the choice to conserve hillsides and watersheds, lakes, ponds, and rivers; the planning for different settlement and systems, for new construction and re-construction; the promulgation of new standards for economic development; the recognition of natural capital and new economic models as significant elements in the pricing of goods and services and the calculation of our gross national product; the re-engineering of the coastal zone; and the definition of new policies to maintain the quality of our air and water, to manage responsibly our ocean resources, and to govern the open ocean under an egalitarian and equitable set of international treaties and agreements that benefit us all.

I continue to belabor this point because without our understanding of this absolute, this measurable, undeniable fact of life, all our efforts may be for naught, all our strategies may be half-baked, all of our results inadequate. We cannot build a new society, hydraulic or otherwise, if we build it on a weak and corrupted foundation. We cannot change behaviors if we do not accept and assert new core values. This clear and present understanding of the wisdom of Nature and the knowledge revealed can guide and protect us in our first steps toward sustainable practice and global renewal.

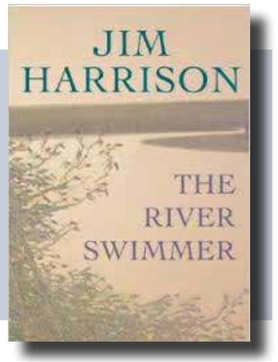
Where does water come from? That's one question, and we know the answer, but here's another, more difficult one: what will we do, who will we be, when that water has come…and gone?

A CASCADE OF BOOKS ON WATER

WE ASKED SOME OF THE WORLD'S BEST THINKERS ABOUT ENVIRONMENT, OCEAN, AND FRESH WATER ISSUES: *WHAT IS YOUR SINGLE-MOST FAVORITE BOOK ON WATER?* HERE IS HOW THEY ANSWERED.

DR. WALLACE J. NICHOLS
Scientist, water advocate, author, turtle lover

HIS CHOICE:
The River Swimmer
by Jim Harrison
I'll honor the instinct to choose the first book that comes to mind. I wish you water.

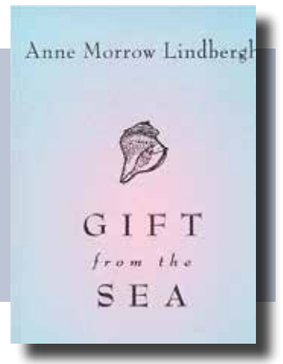


BILL MCKIBBEN
Author, educator, environmentalist, founder of 350.org

HIS CHOICE(S):
The Sea Around Us by Rachel Carson
or Outermost House by Henry Beston
Two classics that have admirably stood the test of time.

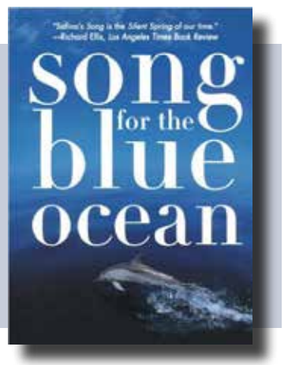
SUSAN COHN ROCKEFELLER
Entrepreneur, Conservationist, Filmmaker

HER CHOICE:
Gift from the Sea by Anne Morrow Lindbergh
A poetic and spiritual metaphor about why we are so drawn to the ocean.



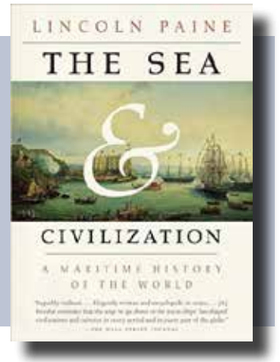
BRAD ACK
Senior Vice President, Oceans
The World Wildlife Fund

HIS CHOICE:
Song for the Blue Ocean
by Carl Safina
A great book and a great writer.



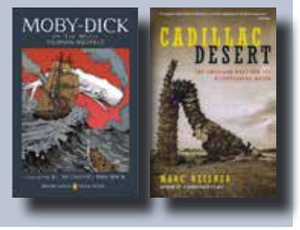
PETER NEILL
Author, advocate, director, World Ocean Observatory

HIS CHOICE:
The Sea and Civilization:
A Maritime History of the World by Lincoln Paine
Thorough, monumental, and intellectually stimulating.



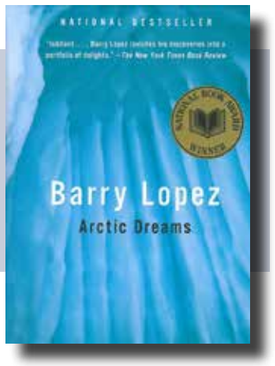
CRAIG STRANG
Associate Director, Lawrence Hall of Science,
Univerity of California, Berkely

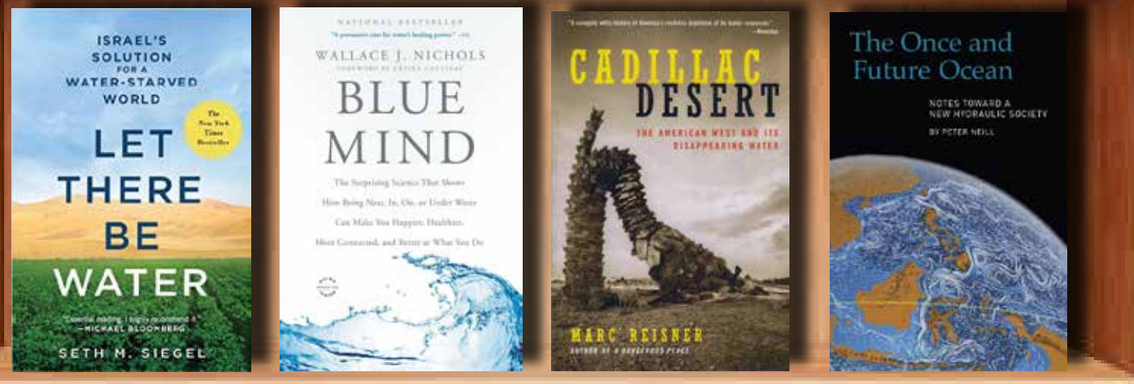
HIS CHOICE(S):
Moby Dick by Herman Melville
Cadillac Desert by Marc Reisner



DR. CARL SAFINA
Author, ecologist, founder of The Safina Center

HIS CHOICE:
Arctic Dreams
by Barry Lopez



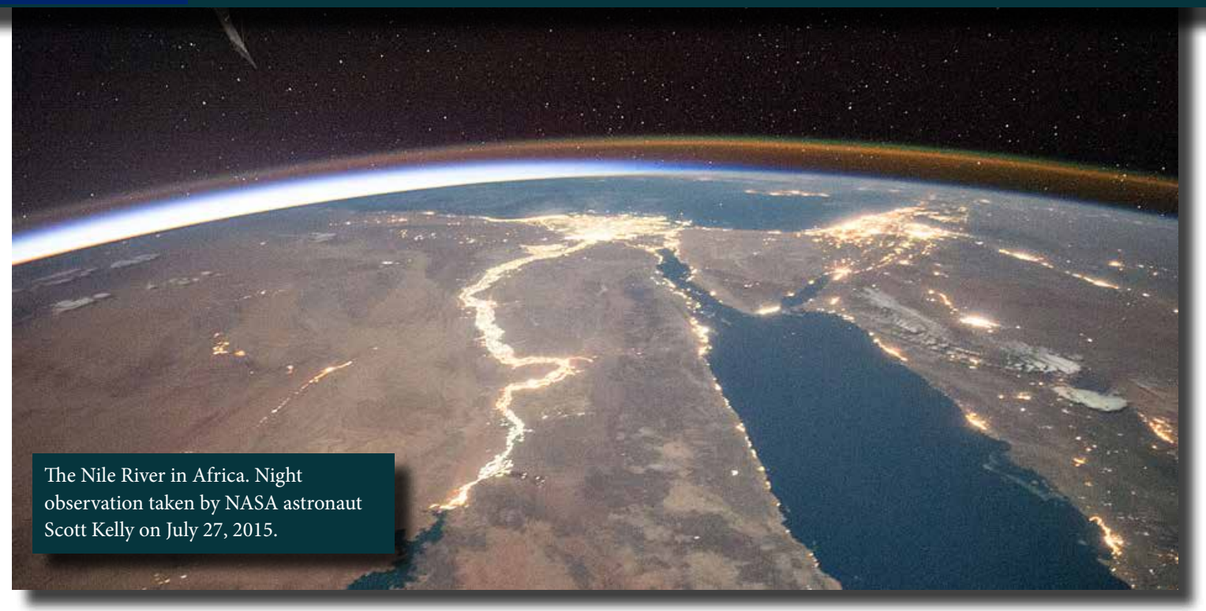


WHAT IS YOUR SINGLE-MOST FAVORITE BOOK ON WATER?

WE ARE WORKING ON A "FIFTY FAVORITES ON WATER" LIST.
FOLLOW THE CONVERSATION ON TWITTER. MAKE YOUR CONTRIBUTION WITH THE HASHTAG #BOOKSONWATER.

PLANNING WITH WATER

Building a new value premise and societal change around water as the most valuable commodity on earth.



The Nile River in Africa. Night observation taken by NASA astronaut Scott Kelly on July 27, 2015.

DAVOS AND THE WORLD ECONOMIC FORUM

The most important global risk faced to day is the world water crisis. "The world is not doing enough," a 2012 World Economic survey reports. "Though the problems of floods, drought, and inadequate water supply that were projected more than two decades ago have come true, little is being done to address them effectively. Leaders are especially ill-prepared for widespread social instability…" Circle of Blue quotes Bob Sanford, chair of the Canadian Partnership Initiative, as follows: "We didn't realize until recently how much our economy and society relied on hydrologic stability."

Well, that is not entirely true. China, for example, has been building massive water transfer systems to move water from areas in the south to the more arid north where drought, industrial irrigation, and flagrant pollution have brought scarcity as well as economic and political crises. A recent analysis by researchers at the Leeds Water Research Institute at the University of East Anglia in the UK, published in the Proceedings of the National Academy of Sciences, suggests that this extraordinary expenditure of public funds and labor may not be sufficient to meet increased economic and population growth. Dabo Guan, Professor of Climate Change Economics at the University's School of International Development, is quoted by Bloomberg News describing the system as "pouring good water after bad."

China, India, Australia, and the United States: all are grappling with these immediate, devastating, and disruptive conditions. The rising price for grain and rice resulting from severe drought has been suggested as a major contributor to social unrest, perhaps toppling a government in Egypt and crippling a regional economy in Australia and escalating prices in food dependent markets throughout the southern hemisphere. These are not problems easily dismissed or ignored. We are fighting wars for water, as much as for oil or religion.

The old solutions do not serve these extreme events. It may be that the old engineering ideas and designs like the Tennessee Valley Authority in the U.S. or the diversion of northern rivers in India cannot meet the challenge of exponential demand, degraded supply, and global warming.

There is a direct link between water abundance and human well being, between adequate supply and the sustainability of any community, rich or poor. Northern California is a verdant region in the U.S., dependent on its primary watershed, the Sierra Nevadas, and distributed by engineered solutions. Water rationing, inadequate supply at key points in growth of fruit and crops, and weak and declining harvests can bring even such a community to its knees. The response cannot be conventional, cannot be more of the same. The time for that has passed.

"We didn't realize until recently how much our economy and society relied on hydrologic stability," the Davos report states. Perhaps we do now, and if finally so, what are we going to do about it?

THE MOST VALUABLE COMMODITY ON EARTH

If global leaders at the World Economic Forum have now realized how much our economy and society rely on hydrologic stability, what do they intend to do about it? Despite the drought and water scarcity, despite the on-going pollution of existing water supply by fertilizer, chemicals, toxic spills, and all the rest, what action do you suppose might be taken by this leadership to address this evident, recurring, apparently critical need? In the United States Congress, the response is to deny climate change as a cause of such instability and to work with fervor and dedication to dilute the protections of the Clean Water Act, to weaken if not eradicate the Environmental Protection Agency, and otherwise to relieve any restrictions or prohibitions for any activity that will simply make the matter worse. It represents the most perverse intersection of short-term profit for a politically motivated interest and long term loss for everyone else; so it goes, at least until the price of oil collapses and all the numbers, justifications, and reasons for sustaining the status quo go down with a great sucking sound heard painfully from Houston to Anchorage to New York, from Moscow to Beijing.

There is of course no alternative plan. Or is there?

The most valuable commodity in the world is no longer oil. All the calculations change, even as the energy companies and their investors double down on what surely they hope will be a return to the good old days. Communities suffering from the consequences of fracking or exploding pipelines find leverage to fight back against what has been so cleverly packaged as beyond them and essential to the national interest.
What then is the most valuable commodity on earth around which a new, more viable, more realistic system of value can be built? It is water, the one natural product that every person, rich or poor, from anywhere around the globe, must rely on for life. The collapse of oil, then, could be seen as a unique opportunity to shift our value system to an alternative based on water, priced by its utilitarian necessities.

Of course we need energy to grow, not just for growth's sake but to meet the known requirements of a world population that is increasing dramatically by the millions from year to year. If we cannot provide basic living for these, in the form of health, shelter, food, and employment, not to mention the continuity of the quality of life that we enjoy, then we should be prepared to accept our responsibility for the unfortunate consequences. It does not take much imagination to envision the outcomes; we see them in the disruptive conditions of poverty, political volatility, and social injustice in those places and among those peoples already deprived of what we take for granted.

If the World Economic Forum leaders came to an understanding of hydrologic stability as an evident, valid requirement for the future, then indeed the time is now for the alternative plan that addresses the what and how such a system can be built from the ashes of coal and dirty oil and their lingering consequences that have proven so antagonistic and detrimental to communities worldwide.

Is it possible to construct a new

system on the true value of water? What decisions must be made? Do we need new technologies and more money, or can we actually change by using the technologies already in hand and re-allocating existing assets? Can we finance such a change with funds divested from the extraction industry and re-invested in alternatives? Can we move the oil subsidies away from a dying industry to bring the new alternatives to scale? Can we take back the definition of our future from those who see it only as a replication of our past? Can we make, and execute, a new plan?

Of course we can. It is, in fact, already in progress, perhaps not so publicly known, perhaps not so clearly understood, but there are amazing examples of a kind of progress based not on resiliency to post-traumatic duress but on a sharpening vision of the future. What can it be? It is a world built around the movements and cycles of water, and the ocean sits at its center.

NILE RIVER BASIN AND THE DANISH HYDRAULIC INSTITUTE

What I am suggesting here is an alternative to coal, oil, and gas as a standard around which we calculate value and organize our communities, economies, and international relationships. It may seem a drastic idea, but if you take some time to think it through, you may discover a compelling logic, a recalculation of value, a strategy for action toward a realizable future using existing technology and re-allocated financial assets.

How would it work? Let me give you an example of a planning initiative that speaks to the why and how. The Nile River Basin comprises 3 million square kilometers along a 6,695 kilometer course starting at the headwater in Rwanda and Burundi, support millions in ten riparian nations along the watershed, and descending to Egypt and the Mediterranean Sea. The river's erratic flow, and the associated activities supported by that flow, has been severely impacted by climate change factors – temperature rise, persistent droughts, extreme weather, flooding, and the inevitable social-economic consequence in terms of energy and food production, health and sanitation, employment, poverty, and regional security.

The UN Environment Programme (UNEP), in cooperation with the Nile Basin Initiative (www.nilebasin.org), with support by the Swedish International Development Agency, retained the Danish Hydraulic Institute (www.DHIGroup.com), to gather all available data regarding all activities and needs throughout the watershed, to generate from that data a complex hydraulic model through which to model climate change projected effects, growing demand, and multiple requirements for water resources throughout the entire basin over time.

The DHI is a non-profit consulting firm chartered by the Danish Government that has developed proprietary software capacity that can assimilate massive amounts of data and make it adaptable for testing impacts of projected future conditions and scenarios. It is an astonishing planning tool. The Nile model includes rainfall, runoff, lakes, reservoirs, dams, wetlands, and irrigation water demands. The projections applied cover two thirty-year periods – from 2020 to 2049 and from 2079 to 2099. Comparing the changing capacity with population growth, rural and urban shifts, agricultural and manufacturing needs revealed not just what amount of water might be available, but also how what is available can be efficiently and effectively managed. From this information, very specifically located in a place, a region, a settlement, or a nation, decision-makers were provided with informed conditions on which they could evaluate and place water dependent uses, target limited financial resources, and understand the management practices and professions for which to train personnel to operate the system in the future.

Take a moment to think about the implications of this, not only for the Nile River, but also for all the other multi-state and transnational watersheds around the world that could benefit from a similar understanding of the hydraulic reality on which their future viability will depend. For such a system to work requires local knowledge, communication, cooperation, implementation, evaluation, and further planning and action – all bringing together managers from nations sometimes antagonistic over other issues, but understanding that without such an agreement and collaborative action,

Image Credit:
Charity: Water, a non-profit organization bringing clean and safe drinking water to people in developing countries. Online at www.charitywater.org

the absence of adequate water supply at any point along the line will lead to deprivation and unrest.

Apply this methodology to any waterway you know and you immediately see how decisions made upstream or down, indifferent to conditions downstream or up, are the instigators of competition and conflict that most often does not serve anyone well.

The Nile Initiative is just one compelling example of planning with water. If nations can find consensus and compromise around water as an egalitarian human right, what else might they find possible through this first success? What other agreement might be found through the understanding and experience derived from one system that unites us all?

NON-REVENUE WATER

Hydraulic engineers speak of "non-revenue water," that which is produced by collection but cannot be valued because of the utility lost to leakage and other forms of waste. If you think about your own water usage, you can begin to understand what I mean. Whether or not you draw your water from a well or a municipal system, picture in your mind how that water flows through your home, what it provides, and where might be the places or behaviors where the value of that water is lost. Showers, toilet flushes, food preparation, car washes, lawn and garden irrigation—these represent the major functions of water in the home. For how long do you or your children shower? How many times a day do you flush the toilets? Do you leave the water on when you brush your teeth or wash your dishes? These are all typical points where each of us loses the value of water down the drain, rarely recycled, mostly wasted.

If you take this one phenomenon, add to it theft of water or inaccurate metering, or free use for fire fighting and other civic necessities, the Danish Hydraulic Institute totals for US$14 billion annually lost by water users, managers, and utilities due to non-revenue water.

To understand water use, the DHI conducts water audits, identifying and analyzing the various stages along the distribution chain. The

Human conjestion near the water's edge. Favela in São Paulo, Brazil

process examines water supplies, owned and imported, to calculate total systems input. Against this is measured water supplied and exported, consumption authorized and unauthorized, billed and unbilled consumption, apparent and real losses to construct a balance sheet that reveals revenue water minus non-revenue water showing either surplus or deficit derived from the existing system.

These analyses can reveal weaknesses and inefficiencies along the way, and can also reveal strategies for repair, modification, and increased economies to make the system better. Localized pressure tests and flow meters can point to very specific, reparable problems, reduce leaks and blowouts, and also reduce maintenance costs and failure rates, diverting funds to upgrades and replacements. Similar tests can discover areas of deteriorated pipe, broken connections, malfunctioning valves and pumps, and failed or tampered meters. In its entirety, the water audit gives a real-time picture of a system that may have been constructed decades previous, sporadically maintained or improved, and in need of a major overhaul or modernization. Finally, this information can provide the data required to make management and financial decisions, accurately predict and allocate budgets over time, and provide a schematic for capital improvement, investment in new technologies, a model for a better system with far greater efficiency and return, and dramatically reduced waste of the most valuable commodity on earth. All this from a reasonable evaluation of usage in the home or along the path of distribution. Earlier I described a much larger audit of the 3 million square kilometer area of the Nile River basin. Beyond scale, what is the difference between that endeavor and what we might do at home, a key place where a change in behavior correlates to a shift in the data set and resultant improvements? What you do each day with your water is part of an enormous hydraulic reality by which precious water moves through a global natural, financial, and political system of distribution and re-distribution, through cycles and conveyors and upwellings that too often corrupt or poison the water consumed. Removing any water from that system, even a single drop, denigrates it and denies it for the future.

If we can understand the peculiarities of our plumbing and habits at home, then we can fix them. The same holds true for a municipal water system. And the same holds true for a watershed. And the same holds true for the ocean, the greatest water system on earth. If we can understand how our patterns of water use and waste are connected, perhaps we can look to solutions evident and possible through planning with water.

WATER CRISIS IN SÃO PAOLO

Let me ask the question: what does it mean when we don't plan with water? As we have discussed, unlimited consumption, pollution, outdated treatment and distribution systems are evident in most cities and nations where population growth has created an ever-increasing demand. When you examine these specifics, you find that water management has been ever problematic, taken for granted, an essential resource otherwise left unconserved and unprotected against any change in use, demand, or circumstance.

Let's take a look at the city of São Paulo, the largest and richest metropolis in Brazil, some 20 million inhabitants located in a country of glaciers, mountains, the Amazon River watershed, and a collection of large dams designed to exploit to the maximum what seemed to be inexhaustible water. Brazil, the "Saudi Arabia of water" as repeatedly described in press and financial reports.

But today the press describes a very different picture. In a February 16, 2016 article in the *New York Times*, São Paulo is described as "a dystopian situation" where the city water pressure is critically diminished, taps are beginning to run dry, rationing is predicted, basic sanitation and hygiene are threatened, and water anarchy may be the outcome when the available supply is finally exhausted.

How can this have come to pass? First, the vast amount of water available has grown a culture of unlimited consumption and expectation. So much water has nurtured a pattern of indiscriminate use and social and political indifference. The economy of the city, indeed the nation, is based on an assumption of unlimited supply. Earlier we discussed non-revenue water, that which is leaked, stolen, wasted or otherwise not used or paid for as a result of rusted pipes,

pumps, and valves, and long-deferred system maintenance or equipment replacement over time. Some of the São Paulo water supply is estimated to be lost to such mismanagement—one third discarded without compensating return!

As city grew to megacity, from slums to industrial areas to commercial towers to suburban homes, the luxury of water was a given. But that same expansion and growth has had its concomitant, contradictory side effects in the form of vast volumes of water required for manufacturing—polluted, deposited in the local rivers, and removed forever from the water cycle. To meet the demand of growing population and need for urban space, wetlands were filled, surrounding areas were cleared and constructed, and reservoirs were left inadequate to store the increase volume required. Deforestation of the rain forest changed the local microclimate of the region, increasing run-off, erosion, and rainfall patterns. More importantly, the more extreme changes in global warming and weather patterns, rising temperatures, and storms resulted in the larger affect of reduced mountain melt, induced drought, increased the demand for irrigation, and otherwise rapidly constricted the water capacity of the nation and undermined the economy on which the nation depends.

The disruption of the predictable supply of water on the basis of daily need is a certain prelude to social and political unrest.

The politicians and managers postponed or ignored the problem, and one assumes will somehow be held accountable. But that is not good enough. The crisis, long in the making, will also be long in its solution. It will require time, immediate action, leadership, community engagement, and major investment of public funds. And São Paulo is not the only city where similar conditions exist, an incipient crisis evident as a predictable result of climate change, lack of foresight, indifferent management, irresponsible policy, failed investment in alternative systems and behaviors, and political cowardice.

What will it take to meet the challenges of our global environmental disconnection and natural resource abuse? Will we wait until it's too late, for the loss of what nature provides, for the crisis in health and welfare, for war and anarchy to make it better?

Our last chance for water is the ocean. What's the plan?

OLOMOUC: A SMALL CITY WITH A BIG PLAN

Let me give you another, more positive example to São Paulo's water crisis: the city of Olomouc, capital of Moravia on the Morava River, in the east of the Czech Republic. While dramatically smaller than São Paulo, with a regional population of 500,000 to São Paolo's 20 million, the city nonetheless evinces a comparable catalogue of critical symptoms: an old and outmoded water network, growing population, area expansion, urban renewal and reconstruction, public demand and expectation of service, and impact of the consequence of climate change, in localized but inevitable effect, on past weather patterns, industry and agriculture, and social behavior. What to do?

To its credit, the municipal government commissioned the Danish Hydraulic Institute to do a complete analysis of the overall water system and its management plan to include its current demand and future needs to integrate and redevelop regional collection and distribution, connect elements such as the sewer network, storm water drainage, and watershed culverts and creeks, and provide a process for design and cost estimation of recommendations derived.

Commissioned in 2012, the consultants produced a plan through the year 2030 by first mapping the regional drainage area; second, creating computer analyses and models to evaluate and simulate present and future conditions; and third, making recommendations for a reconstruction plan that prioritized the necessity of repairs and assessing the technical and financial aspects of future developments.

DHI describes the scope of work as follows: evaluation of network conditions; solving existing variations in water supply pressure; examining combined sewer overflows and interrelation with flow protection measures; identification of flood risk zones; integration of infrastructure improvements in city investment plan; calibration of sewer and water supply models; analyzing and updating existing sewer and water supply systems; and setting guidelines and conditions for new municipal construction. In effect, using the most sophisticated mapping, data management, and modeling software, the consultants could provide a single comprehensive visualization of integrated existing conditions, indicate weakness and priority for repair and maintenance, model impact of changing future conditions, suggest resultant infrastructure improvements, and estimate costs for municipal investment over a twenty year period. Suddenly, unlike São Paulo, Olomouc had a plan. The challenge, of course, will be to finance it, adapt it, and apply it to the inevitable changing conditions the future will bring. The politics and the costs will be real and difficult, but the plan at least provides a responsible structure for a responsible governmental response to the need of the community to manage its most important socio-economic resource.

Why do I belabor this example of a small inland city? Like São Paulo and many other cities around the world, Olomouc sits on a river somewhere in between the mountains and the sea. These habitations are both reality and symbol of the water connections and cycles on which we have and must depend. This water sustains the agriculture, industry, health, and myriad other social benefits of each place along the way, from upstream to downstream to the ocean and back again. The water provides, the watershed distributes, the ocean collects and circulates, and the cycle turns like history, like fate, like the circle of civilization.

DANISH HYDRAULIC INSTITUTE

DHI is a non-profit consulting firm chartered by the Danish Government. They have developed proprietary software capacity that can assimilate massive amounts of data, process and visualize it, and make it adaptable for testing impacts of projected future conditions and scenarios. It is hailed as an astonishing planning tool.
Online at dhigroup.com.

WORLD OCEAN Observatory™

OCEAN VIEWS

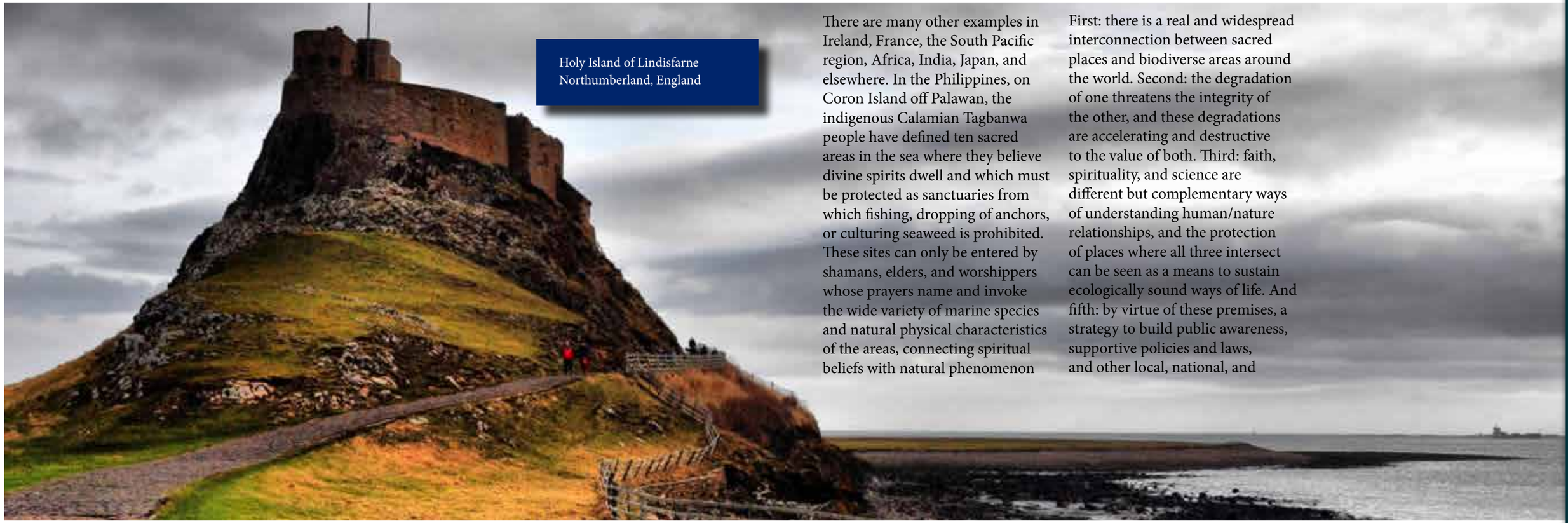
SACRED PLACES

Sacred spaces find protections through movements, enforcements, and international actions.

As each year turns we think of renewal, beginnings rather than ends, hopes instead of fears. For many, the traditions of formal religion provide the words and order of these preoccupations; for others, private thoughts and special places provide. In each of these, nature plays some part, as allegory, animation of the divine, or sacred places where in we find the source and strength for the future.

Many such spaces exist alongshore throughout the world, as both symbol and reality of the complex, intangible relationships that exist between us and the originating web of life. The ocean itself is frequently invoked for its emotional depth and dynamic breadth as a metaphor for freedom from life's burdens and tyrannies and for opportunity for passage into the future.

In a collection of essays entitled *Sacred Natural Sites, Conserving Nature & Culture* (Routledge, 2010), the editors discuss this phenomenon worldwide. Among many examples, islands hold special meaning. Lindisfarne Island, for instance (pictured below,) that since 635 AD has been a holy site for Christian pilgrimage, links nature and spirituality.



Holy Island of Lindisfarne
Northumberland, England

Located on the northeast coast of England at the Scottish border, Lindisfarne is surrounded by rich wetlands, and is accessible only at low tide, across sand and mud flats marked by an ancient pilgrim's path and a modern causeway, today home to a resident community of 150 and to half a million visitors per year who come to a place that for centuries housed Christian monastic communities and nurtured the lives of saints. Primary among them is Saint Cuthbert, described as "one of the most important saints of Medieval England and Europe," whose affinity for nature, seabirds, and the protection of wildlife and wild places foreshadowed the modern conservation movement.

There are many other examples in Ireland, France, the South Pacific region, Africa, India, Japan, and elsewhere. In the Philippines, on Coron Island off Palawan, the indigenous Calamian Tagbanwa people have defined ten sacred areas in the sea where they believe divine spirits dwell and which must be protected as sanctuaries from which fishing, dropping of anchors, or culturing seaweed is prohibited. These sites can only be entered by shamans, elders, and worshippers whose prayers name and invoke the wide variety of marine species and natural physical characteristics of the areas, connecting spiritual beliefs with natural phenomenon through unique personal and community religious practice. Amazingly, such places have found allies in the biodiversity protection movement and associated governance designed to conserve the fulsome catalogue of species and habitat typically coexisting with sacred places. Research studies, management practices, legal instruments, education and training projects abound, justifying protections, providing models and international conventions, and establishing communications and enforcement methods that meet the goals of both religionist and conservationist.

What are the premises on which this unexpected coalition is based?

First: there is a real and widespread interconnection between sacred places and biodiverse areas around the world. Second: the degradation of one threatens the integrity of the other, and these degradations are accelerating and destructive to the value of both. Third: faith, spirituality, and science are different but complementary ways of understanding human/nature relationships, and the protection of places where all three intersect can be seen as a means to sustain ecologically sound ways of life. And fifth: by virtue of these premises, a strategy to build public awareness, supportive policies and laws, and other local, national, and international actions is worthwhile and urgently needed.

Should we not all have such sacred places to access and enjoy—a river or lake to sit by, a beach to walk, a space in which to reflect and renew?

WORLD OCEAN Observatory™

OCEAN SOLUTIONS

HYDRAULIC NEW YORK

How do we envision a hydraulic society with a growing world population and its impacts on climate, watersheds, coastal areas and the deep ocean?

As a proposal for a new strategy for organizing ocean conservation and related social behavior based on the concept of "new hydraulic society," here are some examples of the successful application of the concept, both historically and today.

First, the concept of water harvesting and management is certainly not new. In communities where water scarcity is a fact of life, in Asia and Africa among many other places, the techniques are essential. In Fatehpur Sikri, for example, a 16th century city in Uttar Pradesh, India, home then to a population of 200,000, the design for collection, distribution, multiple use, and recycling of water collected from the adjacent landscape and aquifer was built directly into the architecture to supply water for storage, irrigation, cooking, hygiene, gardens, fountains, and simple cooling systems. Today, this technology long abandoned, the town population is just 30,000 and water supply is crude and inadequate to present drought-stricken needs.

How then can we envision such a system for a city of 10 million or more? We need only to look to New York City, in the United States, for a real and compelling example. The city utilizes 4 million cubic meters, or 1 billion gallons, of fresh water per day, collected and supplied from millions of surrounding acres in protected watershed areas conserved as a natural filtration system, land acquired at a cost of $1.5 billion, but thereby relieving the city from the obligation to construct filtration plants at a cost of $10 billion or more – a saving of $8.5 billion with the added value of the highest water quality *and* the protection of substantial forest land to promote air quality, sustain plant and animal habitat, provide recreational opportunities, and prohibit additional development and sprawl in the intense urban agglomeration that is New York.

The approach has been in place for almost two decades, but requires constant maintenance, improvement, expansion, and new technologies to deal with other associated problems such as leaking infrastructure, combined sewage and storm water run-off beyond the capacity of treatment plants, escalating energy costs for pumping and operations, and pollutants generated by manufacturing processes, automobile exhaust and residues, even high concentration of chemical and salt used to melt the winter snows, introduced into the system after its initial harvest.

Thus, New York has continued to invest in additional filtration facilities (one underground with a golf driving range to be built on top), repairs to regional aqueducts, a third major supply tunnel, new and expanded sewage treatment plants, a new ultra-violet disinfectant system for micro-biological contaminants, and major new combined sewer overflow containment basins to hold almost 100 million gallons of untreated water until it can be run through the system after the peak subsides.

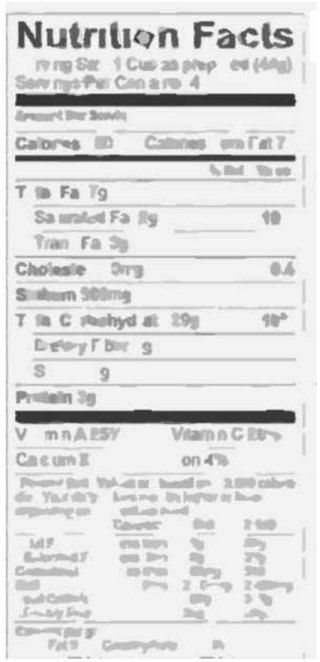
But the plan has other serious elements: first, to reduce consumption through conservation; to assess and improve the hydraulic capacity of tide gates, obstructed pipes, clogged collection sewers, and storage areas; second, to capture the first inch of rainfall from 10% of the city's impervious surfaces through street trees, swales, and sidewalks rebuilt and retrofitted, porous pavement for roadways and parking lots, constructed wetlands in parks, captured run-off from schools, multi-family residential housing, new and retro-fitted factories, vacant lots, and rooftop collectors – even rain barrels to be provided to low density single family houses – all of this coordinated through a multi-agency task force to coordinate planning, mitigate bureaucratic overlap and contradiction, reduce costs of duplication, competitive management, and purchasing, and otherwise integrate government agencies with environmental advocates, civic and community organizations.

This approach, entitled The Green Infrastructure Plan and proposed as official policy, represents a huge public investment (over $1.5 billion over the next 20 years) but it has been developed in cost-benefit comparison with the other, more conventional gray water approach and is predicted to maximize treatment per dollar invested, reduce operating cost of treatment per gallon, increase capacity through conservation and new forms of collection, extend treatment to volume heretofore untreated, and integrate conservation values, economic efficiency, and public/private collaboration into a new, vastly improved system of water treatment and instructive example of "the new hydraulic society."

How does this affect you and me? Remember, every drop of this water, before, after, and forevermore, ends up in New York Harbor, the Atlantic, and the world ocean where it, and water quality improved by other mega-cities around the world, following the New York lead, will benefit us all.

WATER CONSUMPTION LABELING

Rating water use from production to disposal



I often argue for greater public understanding of how we consume water, how we price water, and how we manage water as the single most important resource on earth and as the key component in a new paradigm for value, structure, and behavior in the 21st century.

I use as one example the image of walking down a supermarket aisle and hearing a torrent of cascading water in untold volume used for the processing, packaging, and distribution of the products found on the shelves. Water is a fundamental externality in the financing of production, rarely calculated into the price in that it is often free or heavily subsidized for the manufacturer and incidental to specific accounting for the specific product. Thus, the true cost of the most important resource, not just to the making of one item or another, but to the overall availability of the water consumed to the larger needs of society – drinking water, sanitation, irrigation, and much, much more – is left out of the financial equation.

To provide an example, I recently took from the shelf a paper package of tomato bisque soup. It was covered with notifications and labels – USDA Organic; certified organic by Quality Assurance International; 25% less sodium than the leading competitor (630 to 880 mg); recyclable only where facilities exist; Forest Sustainability Council MIX certification of paperboard from responsible sources ("buying this carton helps you care for the world's forests"); further assertion that the product within was organic, contained non-GMO ingredients, was vegetarian, and had no added MSG and no artificial ingredients or preservatives. The nutrition facts were comprehensive: number of calories, total fat, cholesterol, carbohydrates, dietary fiber, sugars, protein, vitamins A, C, iron and calcium. Finally, the ingredients were listed: organic tomatoes, pulp, and paste; organic cream or milk, organic evaporated case syrup, organic corn starch, sea salt, organic basil, organic union powder, organic flavor, organic garlic powder, citric acid, organic spices, and last but not least, water, filtered, and also, presumably, organic.

Indeed, the package declares an exhausting awareness and purposeful dedication to the health of its consumers, to the highest quality of the purest ingredients, and to the world forest ecosystem – the good people at Imagine Natural Creations and the Hain Celestial Group, Lake Success, NY, are to be congratulated for their concern and commitment. And, as added value, the tomato bisque tastes just fine.

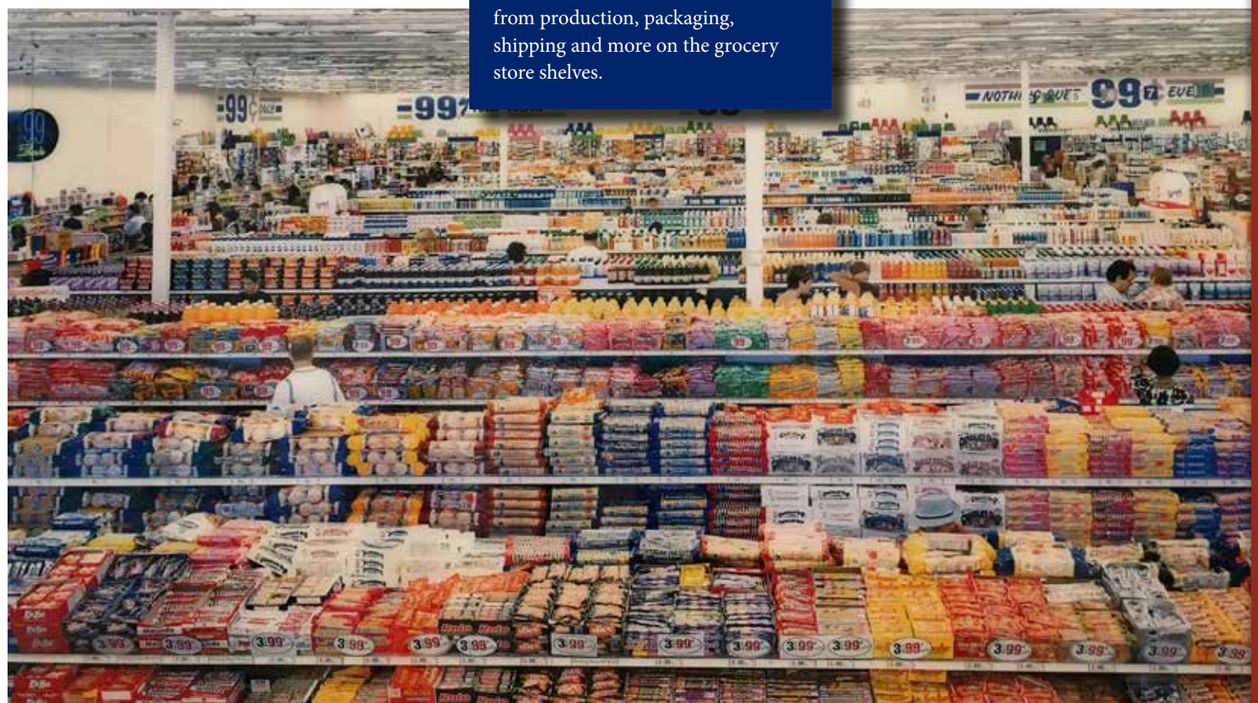
But what was missing from all this information? How much water was used in the growing of those tomatoes, pulp, and paste? How much water was used in the processing and the making? How was the water waste from production treated and disposed of? Where did the water come from and was its availability subsidized by the costs of public treatment and distribution? Do any of the certifications cited include water use in the criteria applied? How much water was used in the production of the packaging, the distribution of the product, the continuous progress from raw ingredient to point of sale? As the soup is meant to be consumed as is, at least we are not required to add the cost of our water to provide the "about two servings" per container indicated.

The point here is that the most important component remains hidden, an unarticulated value, positive and negative, that might enter our calculation of its desirability for consumption. Would it not be as useful to know a rating of water use against that of a competitor as much as the use of salt (salt and sea salt, incidentally both ocean products)? If we are concerned about GMO ingredients and demand such labeling from our legislators as a public responsibility, why should we not be equally concerned about water consumption labeling with equal and immediate impact on our individual and public health?

Would it not be a constructive project for one of our water-directed institutes concerned with water availability and use around the world to define the principles and criteria for such an evaluation. To move for voluntary, even legislative adoption of such information to be listed on every product and its packaging, from coffee to prepared foods, from smart phones to automobiles, from metal, paper and wood to iron, steel, and aluminum.

Truth in labeling. It's time for us to know and publicly declare how the circles and cycles of water work on our consummate behalf and how we must protect and recycle that essential value as the key ingredient in our future sustenance.

Let's certify water!



Water, water everywhere. A cascade of undocumented water from production, packaging, shipping and more on the grocery store shelves.

WAR AND WATER

Middle East Conflicts in the Watershed

Our time is fraught with war and water. The headlines confirm that for what seems like forever there has been conflict in the Middle east where sectarian and religious rivalries, the pursuit of oil, and the geopolitical collision between economic aspirations and impassioned ideologies continue unabated. Many thousands have died—children, women, men as combatants or collateral damage in an endless time and place of conflict.

The most recent manifestation, following a brief hopeful moment when it seemed that there was some respite to be found in elections, new political faces, and the withdrawal of american and western coalition troops, is the so-called Islamic state or IsIL, a particularly feral group of Muslim militants with the intent to re-establish the historical caliphate that once extended from the Mediterranean sea to the Persian gulf. suddenly, everything reverts to air strikes, international outrage, and the possible return of "boots on the ground."

I have been looking at the maps indicating where so quickly the IsIL forces seem to have taken control, and wondering at their length and direction that extends from the northern border between Turkey and Syria southeasterly almost to the limits of Baghdad. The obvious explanation is that the extent of their success mimics the main highway than runs from Aleppo through Raqua, Qaim, Haditha, and Fallujah to the capital city. A larger segment of controlled territory is enclosed to the east by a similar route that connects Mosul south to Tikrit, Samarra, and Baghdad where the situation deteriorates into the ambiguity of warfare and shifting political ambitions.

But if you look closely at your atlas map of Syria and Iraq, you discover an underlying revelation: that those cities are placed and those highways run exactly along the course of several major rivers—the Euphrates, Tigris, and their tributaries—that originate in the mountains of eastern Turkey, bifurcate the empty desert, and descend to and past Baghdad where they empty at Basra into what ultimately becomes the Arabian Sea. In the vast, dry, unpopulated expanse of the region, this war is being fought down a watershed.

My map is also marked by numerous three-dot symbols that are used by cartographers to designate significant historical cultural resources—indeed locating places called Zenobia, Dura Europus, Nimrud, and Nineveh, names that speak to the earliest human settlements in what the history books call "the cradle of civilization."

Those rivers nurtured our beginnings, before Islam and christianity, before conquest from elsewhere by imperialists, then and now, following the trade routes to resources and connections beyond. There are other such symbols on my map—miniature drilling rigs signifying the major oil fields that fuel this war and all others, cultural icons of our modern time.

The irony here is that after all the tumult and shouting, after all the air strikes and beheadings, all the assertions of conflicting systems of law, all the moral justifications, the only thing that matters is the water—to drink, to secure hygiene and health, to irrigate crops, and to sustain the communities regardless of sect or religious belief, to allow the descendants of those who lived in these places centuries before to continue and thrive.
The location of these cities and the caravan or highway routes between them are all testimony to the fact that for all time water has enabled the true security of the region. Take away the slogans and guns from these people, whoever they may be, let the people live there and the water will sustain them.

We speak often of the healing and unifying nature of water. Below Baghdad, along this same riverine watershed, there lies an enormous lake and swamp system into which all these waters flow, an area that has been home to so-called "Marsh Arabs" who had thrived there for a very long time in what were very fertile conditions. In the 1990s, as a strategic part of an earlier iteration of this present war, the area was drained by canals and dikes to isolate and destroy the residents by removing their shelter and livelihood. It became a desert like elsewhere, devoid of plant life and birds, of shelter and safety, until recently, through the efforts of a small activist group, the dikes were broken, the waters returned, the marshes filled, and life began there anew. It is a cautionary tale of how we might, through the free and unencumbered flow of water, build a home without terror and its collateral damage.

Boton Valley, Siirt Province, southeastern Turkey. Tigris-Euphrates River Basin, "Cradle of Civilization." Image credit: Current World Archaeology (WorldArchaeology.com)

WATER: THE UNIVERSAL HEALER

Innovative systems for a sustainable water future

Water is the universal healer.

Without it in adequate supply, we expire at every level of our being. This fact is the penultimate point that must be understood as we attempt to build new life on the detritus of the old. We have enumerated here the environmental consequences of past behaviors on both land and sea whereby we have grown and consumed more than the earth can produce to sustain us. The social results are no less challenging. How then can we place water at the center of the new paradigm by which we can hope to feed and otherwise care for ourselves and for all the inhabitants of the only world we know? The future lies in the ocean.

The drought in California has the most highly visible realization of our lack of water awareness and its destructive undermining of the financial structure and social organization we have built in that most progressive state in that most successful global economy. If we fail in California, how can we succeed anywhere else?

At the most reductive level, the traditional water supply system in California has been overwhelmed by climate, industrial agriculture, and water-rich consumption that have been the envy of the world but can survive no longer without revolutionary change. If there is not enough water on the mountaintops to feed the watersheds, rivers, and reservoirs, then where will the requisite water come from?

In 2012, the San Diego County Water Authority signed an agreement to build the largest desalination plant in the United States. The process is not new; it is applied today in some 21,000 desalination plants in over 120 countries, including Italy, Australia, Spain, Greece, Portugal, Japan, China, India, United Arab Emirates, Malta, Cape Verde, and Cyprus, producing more than 3.5 billion gallons of potable water per day. Saudi Arabia leads the world, meeting 70 percent of the daily needs of its population.

The San Diego project is proposed to come online in 2015 and to provide 7 percent of the authority's demand by 2020—56,000 acre-feet of desalinated seawater per year. The plant is to be built and operated by Poseidon water, a private investor-owned company that develops water and wastewater infrastructure. The contract is for 30 years, after which the authority can purchase the plant for $1. The company is also building a 10-mile pipeline to deliver treated water inland to the authority's aqueduct system where it can augment existing collected or natural supply to serve the needs of the 24 regional member water agencies serving 3.1 million people.

The plant occupies 6 acres of the 388-acre oceanfront site of the Encina Power station that for 50 years has run on oil and natural gas, releasing emissions, and requiring a large dredged lagoon to hold seawater for cooling and to receive plant effluent—a stagnant, stinking reminder of an old technology. The adjacent desalination plant will use a reverse-osmosis process with its source water coming from the generating plant cooling supply, treated and pumped under pressure through membranes to remove salt and other microscopic impurities.

In the past, the primary objections to desalination have been salt residue, corrosion, habitat destruction, and cost. The Poseidon plant has undergone comprehensive review by the Regional Water Quality Control Board, California Coastal Commission, California Department of Health, the City of Carlsbad, and other local, state, and federal agencies; each determined to protect its constituents and the environment. For every two gallons treated, one will be quality drinking water and the other diluted salt content for return to the ocean. The plant will run on Encina electricity to power high-speed pumps at market rates build into the contract. The approvals indicate that there will be no noise, no odor, and no environmental impact. Remarkably, the surrounding land has already been renewed by the prospect of the new plant and has been redeveloped by the authority to transform the embayment into a viable environment for marine life and community activities to include a YMCA camp, a fish hatchery, and an educational discovery center.

The San Diego region has been a center for the development of international desalination technology. The reverse-osmosis process was born from a local company in the 1960s. There are some 35 related companies in the area employing 2,200 people and generating over $200 million in annual revenue. according to the authority, the Carlsbad Project "will have significant economic benefit for the region, including $350 million in spending during construction, 2,400 construction-related jobs, and $50 million in annual spending throughout the region once the desalination plant is operational. For the region, the facility will create jobs, generate tax revenue, improve water quality and enhance water reliability with a new drought-proof supply."

Drought-proof?

These hopeful numbers and language are the typical political arguments that have been used to justify new technology for a long time. The values inherent and the prediction of consummate solution may be forgiven as an evolutionary method to get a new idea in place, a demonstration of success, and additional volume into the pipelines. The financial estimates may or may not be predicable or accurate, but the ultimate return is inevitable when there is suddenly no more water available, we need its healing, and the cost is priceless.

Joseph Conrad, one of literature's greatest observers of the sea, writes in *The Mirror of the Sea*:

> *Water is friendly to man. The ocean, a part of Nature farthest removed in the unchangeableness and majesty of its might from the spirit of mankind, has ever been a friend to the enterprising nations of the earth. And of all the elements this is the one to which men have always been prone to trust themselves, as if its immensity held a reward as vast as itself.*

THE CARLSBAD PROJECT

Carlsbad Desalination Plant
San Diego, California

"For the region, the facility will create jobs, generate tax revenue, improve water quality, and enhance water reliability with a new drought-proof supply."

SUSTAINABILITY AND THE BLUE ECONOMY

Building a world that is truly sustainable

Sustainability is the principle we hear most often in discussions of how to deal progressively with the social and economic challenges resulting from the world's radical population growth, global economy, and voracious appetite for nonrenewable natural resources to meet those needs over time. The most common usage derives from the 1987 United nations *Brutland Commission Report* that defined sustainable development as that "which meets the needs of the present without compromising the ability of future generations to meet their own needs."

From this has emerged an industry of academic proposals, new standards and accreditations, non-governmental organizations and policy institutes devoted to full amplification of the concept in the form of environmental management, financial analyses, planning processes, and the inclusion of poverty alleviation, social justice, human rights, and cultural traditions as factors also essential to the response. In some cases, sustainability may be expressed by a formula relating population, affluence, and technology as measurable elements of an equation, or to a newly inclusive accounting system, or to a calculation of previously ignored factors reduced to an index; in others, it seems more like an idealistic, unobtainable philosophical concept that at least offers hope, however illusionary and illusive.

From the specific perspective of the ocean, sustainability as a doctrine may at first seem beyond the more narrow and obvious applications regarding fisheries and sustainable seafood: species protection, regional quotas, gear restrictions, and regulated market forces; or aquaculture, a means to increase alternative supply against insatiable demand; or coastal management and marine protected areas, schemes to protect inshore artisanal fishing, coral reefs, seed ground, and sheltering habitat against extreme weather, sea level rise, and the predations of resort and high-rise developers.

But if you step back and take the broadest ecosystem view, the ocean becomes an enormous contributor to any new strategy of resilience, maintenance, and enhancement of global biodiversity and capacity, essential to the life-support system of the earth from the beginning, but ever so much more needed now. as we continue to deplete underground aquifers, to increase irrigated land, to disrupt and pollute streams and rivers, the ocean becomes even more valuable as a primary component of the world water cycle, a necessary circulation, filtration, and purification system, and an inevitable source of desalinated drinking water to meet future global demand. as the ocean is essential to our need for fresh water, as water security and food security are linked, as food security and the alleviation of poverty are linked, and as alleviation of poverty is key to civilization, justice, and peace, the ocean simply cannot go the way of the earth, be brutalized, ignored, taken for granted, or abandoned.

The ocean is the true commons, a vast reservoir of natural capital without which the mechanics of the earth will break down. There is much talk of a green economy, a shift away from relentless growth fueled by forests, minerals, and fossil fuels—resources stolen from the past and the future—toward renewable energy, pricing that incorporates the true value of ecosystem services, and development based not on consumption but rather on utility and quality of life. All those new ideas for changed behavior on land are welcome and must be supported. But the green economy will not succeed without the blue economy: the ocean as a redeeming source of renewable protein, energy, fresh water, and biodiversity with unimagined implication for the future of human survival.

The blue economy has a chance to succeed because the ocean is open and free. no one owns it, no one can fence it, no one can master it, no matter how hard they try. To be sure, governments will still assert their exclusive economic rights along their coasts, corporations will still seek to impose their extraction values offshore, but it will not be enough; it will only postpone the inevitable and prolong the decline. when we learn to see the ocean as integral to the land, when we design physical places, make financial and social decisions, and take political action based on that symbiosis, then we may well have achieved the means by which to build a world that is truly sustainable.

WORLD OCEAN Observatory™

OCEAN VIEWS

VIRTUAL WATER

Calculating the true cost of goods and services is an exercise in futility until we include the water lying behind the goods and services consumed in our daily lives.

As we continue to work toward a fuller understanding of the presence of water in all aspects of our lives, we begin to look deeper into the hydraulic systems beyond the obvious—the ocean, the glaciers, the mountain ranges, streams, lakes, rivers, and wetlands—to the place where water lies hidden, unrecognized for its significance to our health, our diet, and our way of life. Of course, we know that we need. The United Nations has established that we need a minimum of 40 liters of fresh water per day to sustain our bodies, to support physiological systems, hygiene, and the other mechanics of living successfully.

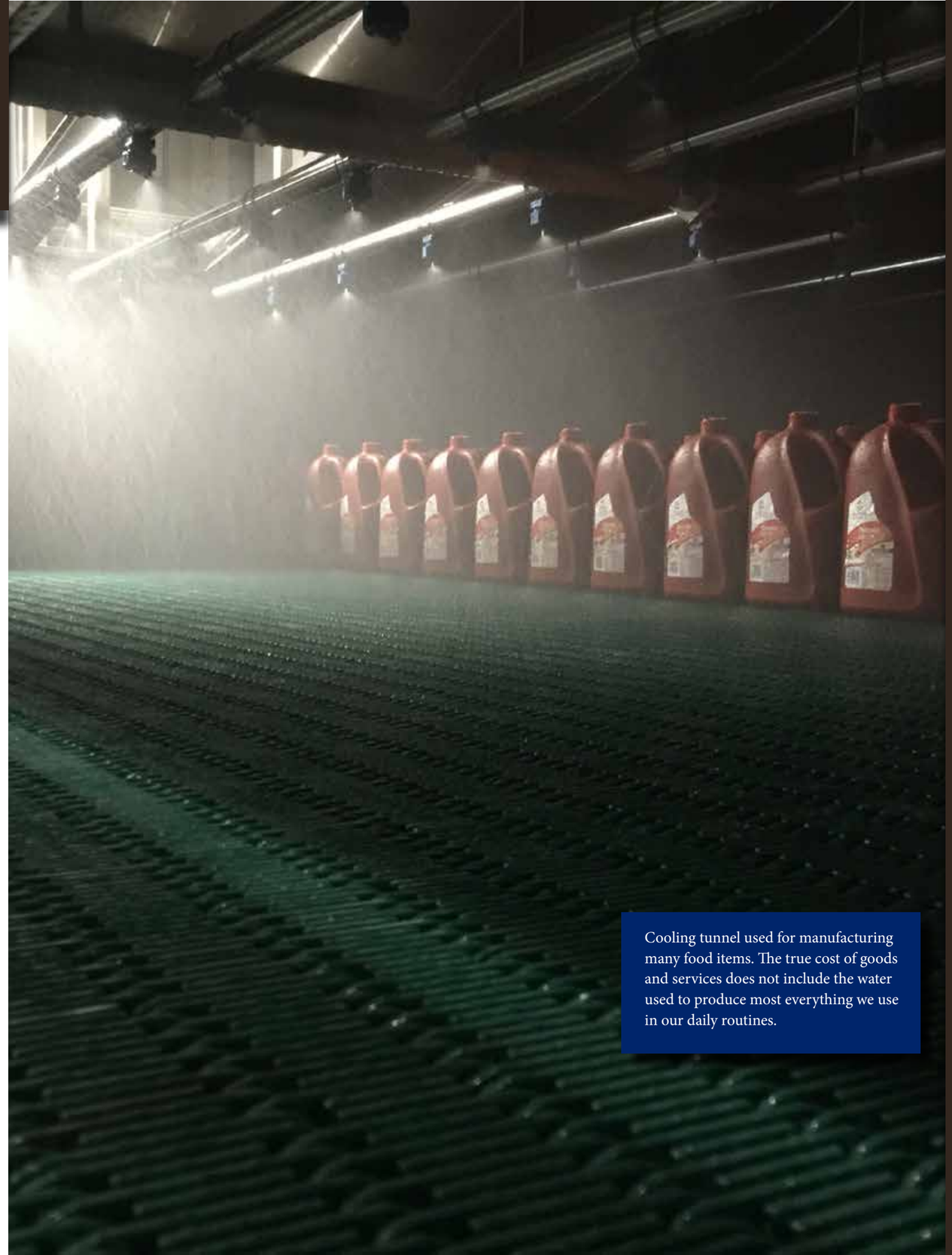
We know our bodies are approximately 65 percent composed of water, evident in our blood, our organs, our muscles, our respiration, our digestion, and even our tears. we know these things, but we don't always know their true value, until we become dehydrated, deprived of sustaining water, and these systems begin to slow down and fail.

What we may not know so well is what is called "virtual water," the water that lies behind things, that is used to produce almost everything we incorporate into our daily routines but is not listed on the label or calculated into the price. The most obvious example is foodstuffs we consume, the amount of water that is used in production cycles to irrigate, wash, clean, and process the products on the supermarket shelves. UNESCO estimates that it takes, for example, 2,500 liters of fresh water to produce a hamburger, 1,000 liters for a liter of milk, 75 liters for a glass of beer, and 70 liters for that apple a day. A kilogram of beef requires some 15,000 liters, "considering an animal of 3 years, for 200 kilogram of resultant meat, 1,300 kilograms for the grain and 7,200 kilograms required for feed, as well as some 24,000 liters for drink. 185 a kilo of pork takes 4,800 liters, of chicken 3,700 liters, of citrus fruits 2,000 liters, of bread 1,500 liters. a kilo of coffee requires 21,000 liters, a single cup of black coffee, 150 liters.

Virtual water calculation can be applied to so many other things we use. For example, a kilo of cotton requires 19,000 liters of water to produce, a fact that translates into 8,200 liters for a pair of jeans. Multiply that by all the cotton in all the clothes we wear, and you have a virtual cascade. and then there's energy required for the processing of foodstuffs and clothes and all the rest. according to The energy collective, all the increase in Us energy production in 2010–11 can be allocated to the 27,000 shale gas wells drilled and hydraulically fracked, each requiring some 5 million gallons of water, amounting to some 135 billion gallons of water consumed and removed as result of contamination from the aquifer, the water- shed, and availability for additional use.186 The number is astronomical, and that's for just one year, in one nation, for one product in the energy mix. Then add the water required for plastic, packaging, chemical production, fertilizer, irrigation, manufacturing, and all the other processes in our consumption-driven economy and lifestyle, and the number grows beyond comprehension.

There are so many examples and statistics, one can drown in them. Here is one last: Think of all the water lost when food is left on the plate, wasted, or processed foods extend beyond the use date and are discarded. We lose not just the water, but also the associated nutrition, the energy consumed to produce, the transportation cost of shipping from here to there, the uncompensated labor, the plastics and related garbage in the landfill, and the deficit subtracted from the global economy forever.

We are a planet crying out for water, and we don't seem to hear the call. That's not virtual; that's real. We are what we drink, and without water, we are nothing.



Cooling tunnel used for manufacturing many food items. The true cost of goods and services does not include the water used to produce most everything we use in our daily routines.

WORLD OCEAN Observatory™

OCEAN SOLUTIONS

WATER FOOTPRINT

To solve the fresh water problem we must first understand how much water is available and how it is being used.

Image Credit:
Canada Water Week
canadawaterweek.com

The new water paradigm should begin not at the top of the user pyramid, but at the bottom, with a better calculation of our own water footprint, a measure of the amount used to produce each of the goods and services we use, directly and indirectly, including "virtual" water and externalities. There is an excellent online tool to help us understand this process—the Water Footprint Network, founded in the Netherlands by Professor Arjen Hoekstra, and intended to assist individuals, companies, municipalities, and governments with water assessments, to design stewardship plans, and to offer training for new methodologies and project implementation under this new aqua-centric approach.

The network assesses three types of water as follows:

Green water footprint is water from precipitation that is stored in the root zone of soil and evaporated, transpired or incorporated by plants. It is particularly relevant for agricultural, horticultural and forestry products.

Blue water footprint is water that has been sourced from surface or groundwater resources and is either evaporated, incorporated into a product or taken from one body of water and returned to another, or returned at a different time.

Irrigated agriculture, industry and domestic water use can each have a blue water footprint.

Grey water footprint is the amount of fresh water required to assimilate pollutants to meet specific water quality standards. The grey water footprint considers point-source pollution discharged to a freshwater resource directly through a pipe or indirectly through runoff or leaching from the soil, impervious surfaces, or other diffuse source.

Each of these requires an evaluation and strategy particular to use, place, and time, for an individual, a business, a product, or a nation using a standard that, according to the network website, "has been applied and tested worldwide across many sectors and includes detailed instruction and guidance on the following:

• How to calculate the green, blue and grey water footprint to understand the geographic and temporal allocation of water resources for industry, agriculture and domestic water supply
• How to conduct a water footprint sustainability assessment which includes criteria for understanding the environmental sustainability, resource efficiency and social equity of water use, for both consumption and pollution
• How to use the results of the water footprint accounting and sustainability assessment to identify and prioritize the most strategic actions to be taken in local, regional, national and global scales, individually and collectively.

The network provides an extensive data site, called WaterStat, a comprehensive collection of research and statistics about inter- national, national, scarcity, pollution, and product water footprints against which to compare baselines and set objectives.227 The website also makes available a free online assessment application that allows the user to complete both a geographic assessment to explore the water footprint of a river basin, its sustainability, and ways to reduce consumption; or a production assessment to quantify and map operational and supply-chain water footprints of a specific facility or product, to maintain sustainability, and to identify ways to reduce use going forward.

I admit it is facile to suggest such a radical change to how a new Hydraulic society
we interact with all elements of the water cycle without under-standing the who, what, where, and how such actions are implemented down to the lowest level of use or production. But there is a vast community of water scholars and hydraulic engineers available for such research, planning, design, and organization, that must be reprogrammed and reassigned to this new way of measuring and assuring the value of water as an organizing principle of a new society.

Why not try it for yourself? Go to waterfootprint.org and use the personal water footprint calculator.

So what is the real cost of all that water that is typically under-valued by the under valuation of water in general and by the resultant negligible price factored into the accounting of what is purchased as raw material, transformed, and sold?
The water Footprint network has conducted studies of specific manufacturing operations in an attempt by some corporations to understand the true environmental impact of production. Volkswagen provides an astonishing case study wherein it began to analyze the freshwater consumption of three specific car models—Polo, Golf, and Passat—along with their product life cycles on both inventory and impact assessment levels.

I could not find the actual number of gallons of fresh water required to produce the Passat you may drive, or the additional water that it takes to maintain your car with parts and service, to operate it over so many thousands of miles, or even to discard or recycle it at the end of a lifetime of use.

But let's think of it this way:

Every vehicle consumes 90% of its water use in its production. Parts manufacture and assembly takes place in over 40 countries, in each case dependent on the water supply available then and there and thereafter wasted or unavailable for alternative use such as hygiene or agriculture. In your mind, if you begin with the idea of a few gallons of water to support the production of one small part, and then incorporate that part, and that water, into the total flow of a single assembly, and then add that assembly to other assemblies similarly water-de- pendent, and

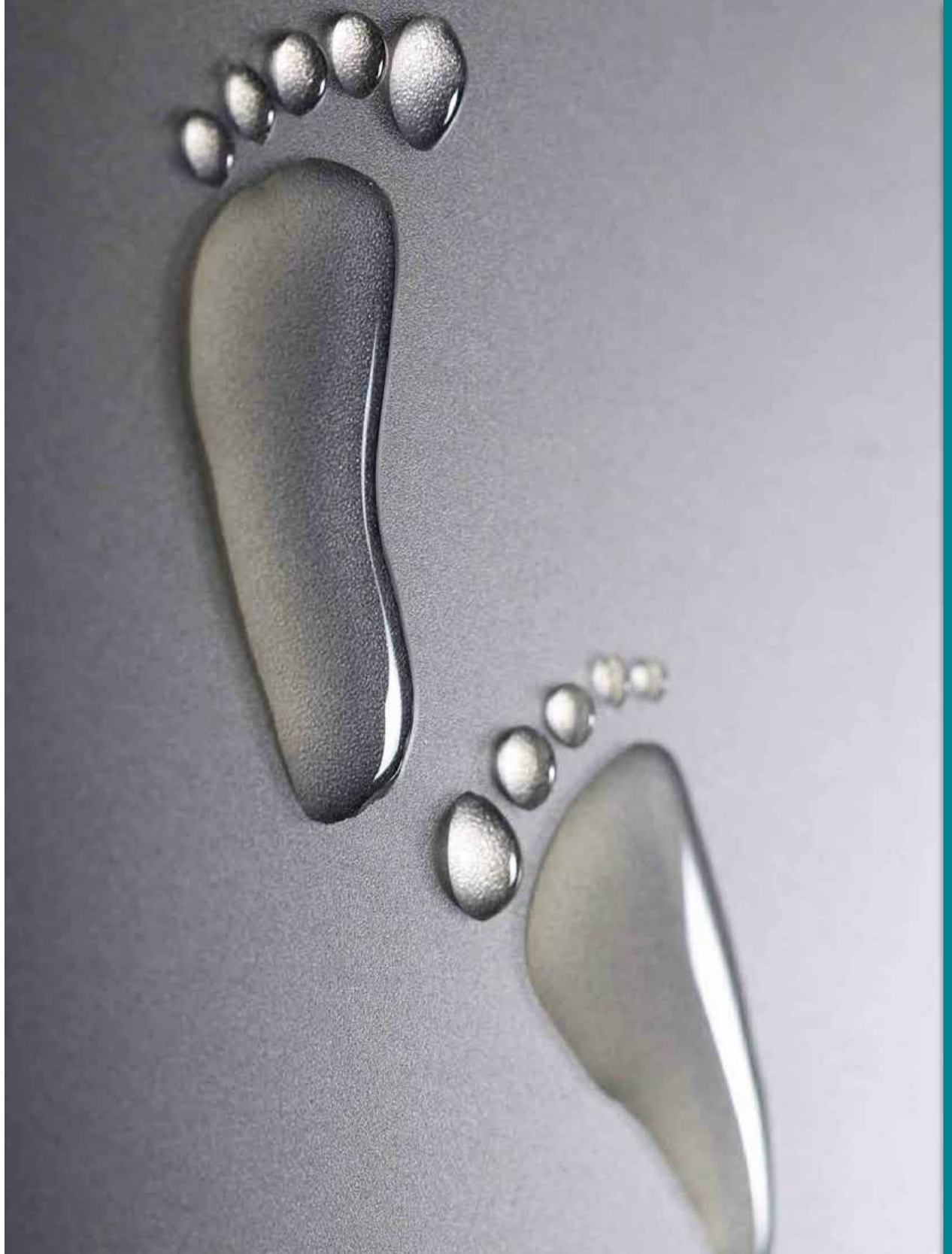
then integrate all those pieces—transportation, chassis, engine, systems, tires, lubricants, and fuels—into a fully aggregated volume of water flow, what began as an insignificant amount has now grown into a tsunami of water required to put just one Passat on the road. now multiply by models and years and brands and numbers of cars owned, and you might drown in the sea of water captured by just one aspect of our global system of manufacture and consumption.

Now consider this: if climate and irresponsible water use and management further delimit the amount available for all uses just in the critical climate and under-supply we know today, what will the inevitable change in water valuation and consequent increase in price mean for the cost of a Volkswagen or anything else on earth? It will be simply unaffordable. Just as for years we have been living the delusion of endless fossil fuel, we are now living in an even more devastating delusion of endless water. what has been seemingly a dream is becoming a nightmare, and we have no alternative but to wake up, face reality, and change assumptions and behavior along the full systemic extent of the water cycle.

To solve the freshwater problem that is now evident around the globe, we must first understand how much water is actually available, how much we use, to what purpose, using what system, in what condition, and with what realistic capacity given rapid climate change and its visible and continuing catastrophic effect. The answer is complicated and can only be found in the understanding of "watermarks," measures of use at every level of supply and demand—for the individual, for separated uses or uses not heretofore integrated or included in the general calculation, for corporate manufacture and processing, and for the externalities of virtual water as hidden in almost every product that affects our lives.

Even if these disparate elements are recognized, measured, and integrated into a larger discussion, the problem still cannot be solved without addressing the larger national policy question and a revolutionary new governance approach that, taken together with complementary international policies, adds up to a global solution.

This is not an easy process, without many difficult questions and no easy answers, but when, as today, cities like São Paulo, San Francisco, and Bangkok are exhausting their drinking water supply, when the reservoirs and rivers run shallow or dry, when the water-dependent crops cannot grow, when we can no longer stay clean or healthy, then this problem will find its urgent, irrefutable logic and we will change the "watermarks" we know today dramatically and forever.



WORLD OCEAN Observatory™

OCEAN CONNECTIONS

UPSTREAM POPULATION AND OCEAN HEALTH

Freshwater and marine ecosystems are threatened by pollutant loads in the upstream environment.

Oceans are downstream of everything: all chemical inputs, unused fertilizers, debris, eroded silt and topsoil, untreated sewage, medicines—from our farms, our suburbs, our cities, and our factories—eventually make their way to the ocean. As a result, coastal seas are now described as the most chemically altered environments on earth; pollutants reach the seas via river inputs, atmospheric deposition, and runoff. Expanding dead zones result, endangering fisheries, biodiversity, and human health.

This is a story not easily told, which is why this may be the biggest sleeper issue of all. How much easier to portray the plight of the great whales, or to document the decline in fisheries, or to show a coastline sullied by unsustainable development. Pollution is difficult to see, even harder to trace, sometimes ephemeral, but with long-lasting impacts. Eutrophication—the over-fertilization of nearshore waters caused by too many nutrients from fertilizers, sewage, animal waste, food processing residues—threatens to disrupt the ecological balance of coastal areas around the world. at the same time, toxins enter the marine system and reside there for long periods—until they are actively removed by mitigation or, worse, until they enter the human food chain, leaving the marine environment to reside in our own tissues.

Non-point source pollution underlies ever-expanding "dead zones", areas of low or no oxygen, an element needed to support most marine life. In the gulf of Mexico dead zone, less than a third of the 31 state watersheds in the United states contribute the vast majority of the nitrogen and phosphorus delivered to the gulf, primarily through non-point source pollution from rural runoff. corn and soybean cultivation is the largest contributor of nitrogen to the gulf; while animal waste combined with crop cultivation contribute most of the phosphorus.

Riparian buffers have long mitigated the effects of runoff, preventing polluted fresh water from reaching coastal systems. But as a 2008 study in "Nature" points out, small stream systems may be even more important in removing pollutants and preventing eutrophication of coastal seas. Patrick Mulholland and co-authors found that nitrates were filtered from stream water by tiny organisms such as algae, fungi, and bacteria. This in and of itself was not news; however, the researchers discovered that entire stream networks are important in removing pollution from stream water, not just individual streams. conversely, the important role that even small streams have in removing and/or transforming nitrates (and therefore preventing eutrophication downstream, and in estuaries and oceans) can quickly be overcome by too many nitrates entering the water. Thus, there are thresholds to the ability of freshwater ecosystems to provide the important ecosystem service of maintaining water quality.

Freshwater ecosystems and marine ecosystems downstream are threatened by both pollutant loading and the loss of stream habitat as development continues to transform the landscape. But the situation is not hopeless. Realization is growing, and market-based mechanisms for better watershed management are being defined and implemented. Perhaps the one bright light in the current worldwide economic downturn is that use of fertilizer is expected to plummet as its cost rises as a result of dramatically increased energy production costs. If the end result is a forced movement to more sustainable agriculture and better opportunities for small-scale growers that practice sustainable methods, this may indeed be both an antidote to an oil-based agricultural economy and to the deteriorating health of the world ocean.

Image Credit:
Martin Norén
Hyggesled, Lidköping S, Sweden

TOWARD A NEW HYDRAULIC SOCIETY

A reinvention of water to inspire us toward a logical and authentic course for the future.

The water delivered to nurture our bodies and minds is but the end result of a massive new reorganization of society around the cycles of water—from ocean to atmosphere, from our summits and glaciers via watersheds to the sea, and from the horizontal and vertical conveyors that circulate and filter that water as an eternal force for life.

Hydraulic means water in motion. That effort, measured by natural, economic, political, and social scales, is the force that drives civic action: movement backward in conflict and forward in changet, in conflict, forward—a change—that determines the success of what we call civilization. We must move away from the failed methods and exhausted results of the past. we cannot drift. We must apply our collective energy and imagination, not just through science and technology but also through shared values and collective action. The purpose here is simply to articulate what might be a functional idea, a re-invention that, if accepted, inspires our best selves toward a logical and authentic course for the future.

Some may doubt the viability of such an idea, deny its practicality and possibility in our world today—a world very much in conflict and transition. It is, however, that very vulnerability that offers the opportunity and imperative for change. Many examples of creative movement toward this new paradigm are evident in the efforts of individuals in their towns, states, and national governments. some individuals and some nations are more advanced in this direction than others. what is most encouraging is that these activities are local and simultaneously international, that they are not just confined to the most developed places, but are in fact being initiated and adopted in the developing world where policy and action can transcend the outmoded practice and technologies and ascend without complications to a future beyond.

african nations, for example, can move to wireless communications beyond the wired infrastructure, to solar energy beyond oil and gas, to agricultural and irrigation methods that maximize available resources and production, and to fresh water supplies that are adequate, affordable, sustainable, and equitable for all.

The associated reallocation of capital, recalculation of value, and re-organization of management structures and political entities around the realization of a new hydraulic society can guarantee an enduring democratic standard for individual and collective commitment as expressed in our response to a global imperative to conserve and maintain water in all its forms for the benefit of all mankind.

OCEAN SOLUTIONS

WORLD WATER MANIFESTO

Arguments for a World Water Contract

The right to life

We come from Africa, Latin America, North America, Asia and Europe. We gathered together in Lisbon, Portugal in l998 with no other legitimacy or representativeness than that of being citizens concerned by the fact that 1.4 billion of the planet's 5.8 billion inhabitants do not have access to drinking water, the fundamental source of life. This fact is intolerable. Now, the risk is great that in the year 2020 when the world population reaches around S billion human beings, the number of people without access to drinking water will increase to more than 3 billion. This is unacceptable. We can and must prevent the unacceptable becoming possible. How?
We think that we can do this by applying the principles and rules outlined below.

Water " the source of life " belongs to all the inhabitants of the Earth in common

As the fundamental and irreplaceable "source of life" for the ecosystem, water is a vital good, which belongs to all the inhabitants of the Earth in common. None of them, individually or as a group, can be allowed the right to make it private property. Water is the patrimony of mankind. Individual and collective health depends upon it. Agriculture, industry and domestic life are intimately linked to it. Its "unsubstituable" character means that the whole human community — and each of its members — must have the right of access to water, and in particular, drinking water, in the necessary quantity and quality indispensable to life and economic activity.
There is no production of wealth without access to water. Water is not like any other resource it is not an exchangeable, marketable commodity.

The right to water is an inalienable individual and collective right

Water belongs more to the economy of common goods and wealth sharing than to the economy of private and individual accumulation and other's wealth expropriation. While the sharing of water has often been a major source of social inequality in the past, today's civilizations recognize that access to water is a fundamental, inalienable individual and collective right. The right to water is a part of the basic ethics of a "good" society and a "good" economy.
It is up to society as a whole and at the different levels of social organization to guarantee the right of access, according to the double principle of co-responsibility and subsidiarity, without discrimination of race, sex, religion, income or social class.

Water has to contribute to the strengthening of solidarity among people, communities, countries, genders, and generations

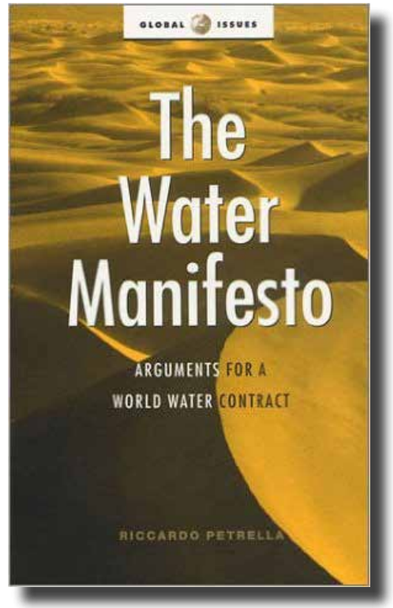
Fresh water resources are unequally distributed on the Earth. Income also. This does not mean that there also must be inequality of access to water between people and communities and regions. Moreover, the inequality in the distribution of water and — financial wealth does not mean that the people rich in water and rich in revenue can make use of it as they please, indeed sell it (or buy it) "abroad" to derive the maximum profit (or pleasure). In many regions of the world water remains a source of inequalities between men and women the latters bearing all the burden of homework dependent on water. These inequalities must be removed. There are still too many water-related wars ongoing on our Planet because most States continue to use water as an instrument in support of their geo-economic strategic interests as regions' c hegemonic power. It is necessary and possible to make water free from the influence of a hegemony-oriented state. Water is a "res publica".

Water is the citizens' business

Creating the conditions necessary to ensure the most effective and sustainable access to water is everybody's concern.. It is also an inter-generational issue so that it is up to present generations to use, valorize, protect and conserve water resources in such a way that future generations can enjoy the same freedom of action and choice that we wish for ourselves today. The citizen must be at the center of decision-making. The integrated and sustainable management of water belongs to the sphere of democracy. It goes beyond the skills and to the know-how of technicians, engineers and bankers. Tile users have a key role to play by their choices and practices to ensure environmental, economic and societal sustainability.

Water policy implies a high degree of democracy at the local, national, continental and world level

By definition, water calls for decentralized management and transparency. The existing institutions of representative democracy must be strengthened. When necessary, new forms of democratic government have to be created. Participatory democracy is unavoidable. This is possible, with or without the new information and communication technologies, at the level of local communities, cities, basins, regions. New coherent regulatory frameworks at international and global level must be designed and implemented, enhancing the visibility of a sustainable water policy at global level by the global community.



ISBN-13: 978-1856499064
160 Pages
Zen Books (October, 2001)
"In an urgent call to action, "The Water Manifesto" asks for a world water contract to enshrine fresh water as an essential good to which all people have a right, controlled by communities in the public interest, and with international rules for equitable management and distribution." Available wherever books are sold.

Parliaments are the natural loci and players in this respect. This is why we also believe that it is urgent and essential to (re)valorize local and traditional water harvesting practices. An important heritage of knowledge, skills and community-based practices, highly efficient and sustainable, has been dilapidated and run down. It runs the risk of being destroyed still further in the years to come.

Access to water necessarily takes place through partnership. It is time to go beyond the logic of "warlords" and economic conflicts for the domination and conquest of markets

Citizenship and democracy are founded on cooperation and mutual respect. They exist by and through partnership. "Partnerships for water" is the inspiring principle behind all the plans (such as "the river agreements") that have permitted the efficient resolution of conflicts, which in certain regions of the world have traditionally

riverside communities who shared the same hydrographic basin. Indeed, we support a real local/ national/world and real public/ private partnership. A sustainable water management in the general interest cannot but be founded on the respect for cultural diversity and socio-economic pluralism. A partnership predominantly subject, as at present, to the logic and interests of private actors in relentless competition against each other for market conquest could only do harm to the objectives of access to water for all and global integrated sustainability.

We believe that the financial responsibility for water must be at once collective and individual according to the principles of responsibility and utility

Ensuring access to water for the vital and fundamental needs of every person and every human community is an obligation for society as a whole. It is society which must collectively assume all of the costs related to the

distribution, use, conservation and recycling of water in view of supplying and guaranteeing access to water in the quantities and qualities considered as being the indispensable minimum. The costs (including the negative externalities which are not taken into account by market prices) are common social costs to be borne by the collective as a whole. This principle is even more relevant and significant at the level of a country, a continent and the world society. The financing must be ensured by collective redistribution. The mechanisms of individual price-fixing, according to progressive pricing must start from a level of water usage that goes beyond the vital and indispensable minimum. Beyond the vital minimum, progressive pricing must be a function of the quantity used. Finally, at a third layer, all abuses and excesses of usage must be considered illegal.

Proposals

In order that the rules become a living reality in the course of the next 20 to 25 years, when two billion human beings will be added to the present population, we propose that the following measures be taken and implemented in a kind of "World Water Contract" alongside two main axes:
1. the creation of a 'Network of Parliaments for Water"
2. the promotion of information campaign, awareness raising and mobilization on "Water for MI".
We also propose the establishment of a World Observatory for Water Rights.

The Creation of a Network of Parliaments for Water

It is in Parliaments, the principal organs of political representation in "westernized" societies, and in comparable institutions, in other civilizational contexts, that the responsibility falls, to modify the existing legislation by applying the principles and rules outlined above. Defining a new legal framework at local and national levels but also at the international and world level is a major task for Parliaments to fill up the void that exists in this domain at the world level.. The priority is to establish a "World Water Treaty" legalizing water as a vital patrimonial good, common to all humanity. This "treat/', for example, should exclude water from all international commercial conventions (such as those existing within the framework of the World Trade Organization), as is already the case for the cultural domain.

Promotion of information campaigns, awareness-raising and mobilization concerning:

1. the development (or modernization) of the systems of water distribution and sanitation for the 600 cities in Russia, African. Asian, Latin American and European countries which will have more than a million inhabitants by the year 2020 and whose water system is even today obsolete, inadequate, indeed, non-existent.
2. The fight against new sources of water pollution in the cities of North America, Western Europe and Japan where contamination of the soil and both surface and deep ground water, is becoming more and more troubling, serious and in certain cases, irreversible.
These actions would respond to the objective of "3 billion taps" by 2020. NGO's, trade unions and scientists have in this respect an essential and determining role to play.

To these purposes, priority should be given to:
1. The structural reform of irrigation systems in highly intensive industrial agriculture
2. The solutions exist already such as, for example, "drip irrigation".
3. Existing "modern" agriculture is the principal consumer of the planet's freshwater resources (accounting for 70% of total world extraction, of which the largest part is for irrigation). Yet, 40% of irrigation water is lost en route from source to sink). Furthermore, industrial agriculture is source of major damages and threats to the environment (soil salinity and hydromorphism in particular)
4. A 10 to 15 year-moratorium in the construction of new large dams which have so far created considerable short- and long-term problems for the environment, local populations and the possibility of integrated, sustainable water management.

The establishment of a World Observatory for Water Rights

The main goal of this observatory will be to collect, produce, distribute and disseminate the most rigorous and reliable information possible on water access from the point of view of individual and collective rights, water production, its use, its conservation/ protection and democratic sustainable development. The Observatory _ must become one of the world reference points for information on water rights, in support of the most effective forms of water partnership and solidarity.

The Global Water Contract
A Citizen Initiative

Provisional addresses:
30 Rue Monrose - B1030
Brussels - Belgium

Mario Soares Foundation
rua S. Bento 176 - P1200
Lisbon - Portugal

European University of Environment
6 rue de Chantilly - F75009
Paris - France

The Ocean, Our Future
Full report of the Independent World Commission on the Oceans available at:
www.amazon.com/Ocean-Independent-World-Commission-Oceans/dp/book-citations/0521644658

WORLD OCEAN Observatory™

OCEAN SOLUTIONS

LAW OF MOTHER EARTH

The rights of the planet. A vision from Bolivia.

Just when you think the world is impossible, the world surprises.

Looking forward into the future one can easily despair over the scale of change required, the intractability of vested interests and governments, and the human energy and imagination required to make any change for the better. We talk of hope, but when specific actions are considered and expressed, all the reasons against often overwhelm the possibility.

Enter Bolivia, where in December 2010, in response to an understanding of the impacts of climate change on the nation's economic and community health, the National Congress voted to support an act to protect the well-being of its citizens by protecting the natural world—its resources, sustainability, and value—as essential to the common good. The act was supported by Bolivian President Evo Morales; revisions of the national legal code were explored; over 2,900 specific conservation programs and anti-pollution projects, conceived as expressions of the practical application of the Law, were implemented in all 327 municipalities; $118 million US was invested; and full legislation enabling this new social and economic model is expected to be ratified soon.

The language is astonishing. Here are the binding principles that govern: 1) Harmony: Human activities, within the framework of plurality and diversity, should achieve a dynamic balance with the cycles and processes inherent in Mother Earth; 2) Collective Good: The interests of society, within the framework of the rights of Mother Earth, prevail in all human activities and any acquired right; 3) Guarantee of Regeneration: The state, at its various levels, and society, in harmony with the common interest, must ensure the necessary conditions in order that the diverse living systems of Mother Earth may absorb damage, adapt to shocks, and regenerate without significantly altering their structural and functional characteristics, recognizing that living systems are limited in their ability to regenerate, and that humans are limited in their ability to undo their actions; 4) Respect and defend the rights of Mother Earth: The state and any individual or collective person must respect, protect and guarantee the rights of Mother Earth for the well-being of current and future generations; 5) No Commercialism: Neither living systems nor processes that sustain them may be commercialized, nor serve anyone's private property: 6) Multi-culturalism: The exercise of the rights of Mother Earth require the recognition, recovery, respect, protection, and dialogue of the diversity of feelings, values, knowledge, skills, practices, transcendence, science, technology and standards of all the culture of the world who seek to live in harmony with Nature.

Image Credit:
People's Agreement
(peoplesagreement.org)
Building the people's world movement for Mother Earth

RESOURCE:

To view the entire text of the *Law of Mother Earth: The Righs of Our Planet. A Vision from Bolivia* visit the World Future Fund.

The Legislation continues: Mother Earth has the following rights: To life, to the diversity of life, to water, to clean air, to equilibrium, to restoration, and to pollution-free living. And it further outlines the obligations of the State and the people to these principles and rights as a binding societal duty.

The Bolivian economy does rely heavily on natural resource export activity, earning a significant part of its foreign exchange thereby. But this moves forward nonetheless, as an endeavor initiated and supported by Bolivian political groups representing some 3 million voters, is on its way to finalization and implementation as national law, supported by the local and national government, with an already existing ministry to implement revisions to the legal system and to continue the applicable programs already underway. Bolivia attempts to move forward, to show us another way, and nearby Ecuador, with similar intent, is right along side.

The Law of Mother Earth: it's not just an idea, it's more than a vision. Something new. Something real. Change must begin somewhere, sometime; perhaps Bolivia is inventing the social model and role of governance that will demonstrate how globally we can transcend the divisions and conflicts, beyond the destruction and despair that we feel, toward an harmonious, effective, efficient, and equitable society connected by the true value of nature as sustainer? If so, should we not pay attention?

WORLD OCEAN Observatory™

OCEAN VIEWS

RECIPROCITY

Changes in behavior and core values to create an obligation to pay back and sustain nature through equitable contribution.

What more can we do to convince us at every level that sustainability is an essential core value for our future? Clearly the struggle is necessary to counter those who will not consider or accept even the idea, much less the concomitant action, required to make sustainability succeed. What else is required to convince the body politic that such destructive indifference, by individuals, corporations, and governments, is no longer acceptable?

As a fresh context, then, consider the concept of reciprocity.

Reciprocity is a state of mutual exchange, the categorization of an action by its motivation and consequence in relationship to another. Indigenous peoples have practiced reciprocity as cultural behavior through direct barter and giving of gifts. The cultural anthropologist, Claude Lévi-Strauss, identified levels of such exchange, through language, kinship, and economics, a process that created bonds of social obligation present and future, an idea familiar through the popular notion of the "favor bank," a value on deposit that must be paid back in kind as a societal norm.

What if we accept the power of reciprocity as an additional standard of behavior at all levels, in all areas of exchange, with nature? What if we acknowledge that the land and the sea provide us value, not for the taking and exhausting as an entitlement, but as the giving of a gift, the making of a loan, with a consequent obligation that we pay back that value through complementary behavior, equitable patterns of consumption, and forms of exchange that sustain the capacity of nature through accepted future obligation? What if we accept such a reciprocal relationship and system of connection with nature as our active contribution— our obligation— to ourselves, our children, and the public good?

Mike Baird, Flikr

Let me offer three illustrative statements, with examples of what I mean.

First: By not taking, we are giving back. If we choose to forgo or reduce our consumption of fossil fuels or plastic bags or tuna, we are leaving that value for others, a collective choice that taken to scale will extend or conserve that resource at a sustainable level.

Second: By paying a fair price for what we need and use, we are giving back. If we pay for our consumption at a level of true cost, we establish a new valuation system commensurate with changing realities. Some examples: withdrawal of subsidies for fossil fuels, reinvestment of such underwriting in clean technology; pricing water as the most valuable commodity on earth; inclusion of insurance payment for disaster response and reparation from environmental destruction as part of regulatory requirement and permit fees; approval of government investment projects based on a neutral or positive comparison of public benefit versus private profit; increase in taxes and royalties to establish financial disincentives for polluting industries; allocation of penalties to support of non-polluting alternatives; and the definition of many other financial calculations and market applications based on the value added by environmental protection and sustainability outcomes.

Third: By acting and applying these values, we are giving back. We can also contribute by modifying personal, family, and community behaviors in every way possible to affirm these values through action.

We can become "sustainability" citizens. We can set our own example. Sign petitions. Vote. Demonstrate when necessary. Communicate our commitment at every level, and hold others accountable in our daily purchases, our employment, our investments, civic organizations of which we are members, schools that we attend or have attended, churches that we belong to, recreational activities that we enjoy, and politicians that we support.

We can communicate, advocate by example, and amplify our voices by joining other exemplars into a movement of giving back. By so doing, we counter the simplistic political recalcitrance that sustains the status quo, the impracticality of sustaining our way of life at present levels of consumption, the radical inflexibility and fearfulness that have brought governance to a standstill.

What I am describing here is an affirmation of the democratic process and expression of popular will based not on narrow ideology but on our mutual understanding of the consequences for us all if we fail to act.

Reciprocity makes everyone a winner, everyone a builder, everyone a giver. It is a simple framework that allows us to understand another way of being, how to support, individually and collectively, a shift from our present way that is making us all losers, all destroyers, and all takers until we have nothing left. Is that really what we want for the land, for the ocean, for our children and their future?

Reciprocity. It seems so clear. Think what the land gives us. Think what the ocean gives us. Are we not obligated to respond?

Let's start giving back.

Let's adopt an ocean ethos as the transformative stimulus for changing the way we see the world.

OCEAN COMMONPLACE

LAUDATO SI'

On Care for Our Common Home is an appeal from Pope Francis for an inclusive dialogue about how we are shaping the future of the planet.

In March 2015, Pope Francis, world leader of the catholic church, issued a papal encyclical, *Laudato Si—On Care of our Common Home,* in which he addressed the moral imperative to steward our natural world for the benefit of succeeding generations, and issued a call that speaks beyond Catholicism to every person on earth:

I urgently appeal, then, for a new dialogue about how we are shaping the future of our planet. We need a conversation which includes everyone, since the environmental challenge we are undergoing, and its human roots, concern and affect us all. The worldwide ecological movement has already made considerable progress and led to the establishment of numerous organizations committed to raising awareness of these challenges. Regrettably, many efforts to seek concrete solutions to the environmental crisis have proved ineffective, not only because of powerful opposition but also because of a more general lack of interest. Obstructionist attitudes, even on the part of believers, can range from denial of the problem to indifference, nonchalant resignation or blind confidence in technical solutions. We require a new and universal solidarity. As the bishops of Southern Africa have stated: "Everyone's talents and involvement are needed to redress the damage caused by human abuse of God's creation". All of us can cooperate as instruments of God for the care of creation, each according to his or her own culture, experience, involvements and talents.

On water and the ocean the Pope writes:

Other indicators of the present situation have to do with the depletion of natural resources. We all know that it is not possible to sustain the present level of consumption in developed countries and wealthier sectors of society, where the habit of wasting and discarding has reached unprecedented levels. The exploitation of the planet has already exceeded acceptable limits and we still have not solved the problem of poverty.

Fresh drinking water is an issue of primary importance, since it is indispensable for human life and for supporting terrestrial and aquatic ecosystems. Sources of fresh water are necessary for health care, agriculture and industry. Water supplies used to be relatively constant, but now in many places demand exceeds the sustainable supply, with dramatic consequences in the short and long term. Large cities dependent on significant supplies of water have experienced periods of shortage, and at critical moments these have not always been administered with sufficient oversight and impartiality. Water poverty especially affects Africa where large sectors of the population have no access to safe drinking water or experience droughts, which impede agricultural production. Some countries have areas rich in water while others endure drastic scarcity.

One particularly serious problem is the quality of water avail- able to the poor. Every day, unsafe water results in many deaths and the spread of water-related diseases, including those caused by microorganisms and chemical substances. Dysentery and cholera, linked to inadequate hygiene and water supplies, are a significant cause of suffering and of infant mortality. Underground water sources in many places are threatened by the pollution produced in certain mining, farming and industrial activities, especially in countries lacking adequate regulation or controls. It is not only a question of industrial waste. Detergents and chemical products, commonly used in many places of the world, continue to pour into our rivers, lakes and seas.

Even as the quality of available water is constantly diminishing, in some places there is a growing tendency, despite its scarcity, to privatize this resource, turning it into a commodity subject to the laws of the market. Yet access to safe drinkable water is a basic and universal human right, since it is essential to human survival and, as such, is a condition for the exercise of other human rights. Our world has a grave social debt towards the poor who lack access to drinking water, because they are denied the right to a life consistent with their inalienable dignity. This debt can be paid partly by an increase in funding to provide clean water and sanitary services among the poor. But water continues to be wasted, in the developed world and in developing countries that possess it in abundance. This shows that the problem of water is partly an educational and cultural issue, since there is little awareness of the seriousness of such behaviour within a context of great inequality.

Greater scarcity of water will lead to an increase in the cost of food and the various products which depend on its use. Some studies warn that an acute water shortage may occur within a few decades unless urgent action is taken. The environmental repercussions could affect billions of people; it is also conceivable that the control of water by large multinational businesses may become a major source of conflict in this century.

*Oceans not only contain the bulk of our planet's water supply, but also most of the immense variety of living creatures, many of them still unknown to us and threatened for various reasons. What is more, marine life in rivers, lakes, seas and oceans, which feeds a great part of the world's population, is affected by uncontrolled fishing, leading to a drastic depletion of certain species. Selective forms of fishing which discard much of what they collect continue unabated. Particularly threatened are marine organisms which we tend to overlook, like some forms of plankton; they represent a significant element in the ocean food chain, and species used for our food ultimately depend on them.*239

On the world we want to live in:

When we speak of the "environment", what we really mean is a relationship existing between nature and the society which lives in it. Nature cannot be regarded as something separate from ourselves or as a mere setting in which we live. We are part of nature, included in it and thus in constant interaction with it. Recognizing the reasons why a given area is polluted requires a study of the workings of society, its economy, its behaviour patterns, and the ways it grasps reality. Given the scale of change, it is no longer possible to find a specific,

Image Credit:
William Bossen, Greenland

discrete answer for each part of the problem. It is essential to seek comprehensive solutions which consider the interactions within natural systems themselves and with social systems. We are faced not with two separate crises, one environmental and the other social, but rather with one complex crisis which is both social and environ- mental. Strategies for a solution demand an integrated approach to combating poverty, restoring dignity to the excluded, and at the same time protecting nature.

What kind of world do we want to leave to those who come after us, to children who are now growing up? This question not only concerns the environment in isolation; the issue cannot be approached piecemeal. When we ask ourselves what kind of world we want to leave behind, we think in the first place of its general direction, its meaning and its values. Unless we struggle with these deeper issues, I do not believe that our concern for ecology will produce significant results. But if these issues are courageously faced, we are led inexorably to ask other pointed questions: What is the purpose of our life in this world? Why are we here? What is the goal of our work and all our efforts? What need does the earth have of us? It is no longer enough, then, simply to state that we should be concerned for future generations. We need to see that what is at stake is our own dignity. Leaving an inhabit- able planet to future generations is, first and foremost, up to us. The issue is one which dramatically affects us, for it has to do with the ultimate meaning of our earthly sojourn.

Let us also mention the system of governance of the oceans. International and regional conventions do exist, but fragmentation and the lack of strict mechanisms of regulation, control and penalization end up undermining these efforts. The growing problem of marine waste and the protection of the open seas represent particular challenges. What is needed, in effect, is an agreement on systems of governance for the whole range of so-called "global commons".

On ecological conversion:

The rich heritage of Christian spirituality, the fruit of twenty centuries of personal and communal experience, has a precious contribution to make to the renewal of humanity. Here, I would like to offer Christians a few suggestions for an ecological spirituality grounded in the convictions of our faith, since the teachings of the Gospel have direct consequences for our way of thinking, feeling and living. More than in ideas or concepts as such, I am interested in how such a spirituality can motivate us to a more passionate concern for the protection of our world. A commitment this lofty cannot be sustained by doctrine alone, without spirituality capable of inspiring us, without an "interior impulse" which encourages, motivates, nourishes and gives meaning to our individual and communal activity.

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Laudato Si' is the second encyclical of Pope Francis, Bishop of Rome, Sovereign of Vatican City
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WORLD OCEAN Observatory™

ABOUT THE WORLD OCEAN OBSERVATORY

The WORLD OCEAN OBSERVATORY offers a new model for ocean communications, aggregating comprehensive ocean information, consolidating educational resources, promoting other organizations' programs and successes, amplifying the ocean message, and multiplying ocean engagement with an audience above and beyond that of any individual endeavor. We are a collective voice for many ocean voices, a central place of exchange of content and accomplishment, and the promoter of best practices, innovation, and effective connection to the global ocean community.

Today we perform this task with energy, imagination, economy, and efficiency, reaching a significant audience worldwide through the free distribution of a full catalogue of ocean information. We do so at modest cost, with a conservative annual budget, all program expended, provided by a small number of prescient donors who understand our concept, see our results, and are committed to our future.

Our challenge is to reach an exponentially larger number of ocean advocates, to engage and link to ocean organizations and individuals at a scale that truly matters, through an informed, exciting, relentless, and enduring program of communications based on the understanding that the sea connects all things.

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