



# Emerging Trends Report

*Bridging the Business Intelligence Gap*

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## *Agua Caliente*<sup>1</sup>

by

Richard Karn/the Emerging Trends Report/2006-03-15

### **EXECUTIVE SUMMARY:**

Consider the implications of the following anomaly. For more than a decade, increasingly dire warnings have been issued by media sources worldwide and confirmed by both recognized experts and such august bodies as the United Nations and the World Health Organization. Atypically, politicians are mute on the subject and the general public is steadfastly blasé despite ever more strident warnings from the scientific community.

The Emerging Trends Report (ETR) recognizes distinct parallels in this behavior to the prevalent attitude toward the probable end of inexpensive petroleum—right up to the point prices exploded. Similarly, the ETR submits that *investors who grasp the enormity of this problem and position themselves accordingly stand to reap tremendous profits for years to come.*

What scientists are universally warning about and the public is studiously ignoring is **CLEAN WATER**... and so-called First World countries are about to discover they are not immune to this most fundamental of all problems. Quite simply, the world's burgeoning population is both overusing and misusing the planet's finite supply of fresh water. Between aging infrastructure or lack thereof, aquifer drawdown and bad water policy, agricultural, industrial and human pollution as well as salination, and accelerating climate change, the world faces a developing crisis of truly Biblical proportions—one requiring time, concerted effort, and inconceivable amounts of money to avert.

Recently, investing in water has gained a certain mainstream popularity in the United States and Europe, but the comparatively small number of 'headline' pure-play stocks in the water industry has driven many favorites to P/E multiples more closely resembling dot.com stocks than stodgy old water stocks. The ETR does not take this to mean the bloom is off the rose; far from it in fact: *if ever there were a trend that is destined to run for decades, water is it.* The ETR sees numerous opportunities, both domestically and internationally, mainstream as well as obscure, conservative and wildly speculative, that have yet to begin their march toward multiple parity with the more obvious choices—but they will.

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<sup>1</sup> *Hot Water* in Spanish

**DETAIL 1: “One of the crueler ironies... is that those with the lowest incomes generally pay the most for their water.”<sup>2</sup>**

The Emerging Trends Report subscribes to the notion that in order for investors to capitalize on the solutions to fresh water problems in years ahead they must avail themselves of at least a rudimentary grasp of the scope of the issues involved. Considering that to a certain extent this even involves Chaos Theory of all things, we’ve decided there are only two approaches in presenting our micro to macro assessment of the systems involved: stream of consciousness verbosity or ‘the-knee-bone’s-connected-to-the-shin-bone’ simplicity. We’ve opted for the latter.

Water is unique amongst resources in that its availability and manipulation is pivotal in the rise and fall of civilizations. Today, Water is one of the three largest industries in the world, the other two being Oil & Gas and Electricity; moving water accounts for approximately 7% of worldwide commercial energy use<sup>3</sup> while falling water driving turbines produces nearly 20% of the world’s electricity.<sup>4</sup> By and large, the water supply business is heavily regulated but suffers few of the downsides of traditional industry: new products will not come on the market to compete with or replace it; business cycles do not have an effect on its price; and demand consistently outpaces customer growth.

Whereas in industrialized countries water is the blandest of commodities, an amenity only missed when its supply is disrupted, approximately half of the world still endures water and sewerage services inferior to those available to ancient Greeks and Romans.<sup>5</sup> In developing countries, securing drinking water consumes a significant portion of each day; to their emerging middle classes, water and sanitation are luxuries that command a premium because of the head start such basic health services provide the young. And it is this infrastructure or want thereof that will be the primary driver of the coming boom, and which a UN panel estimated would need to be in excess of \$180 billion per year just to meet the needs of developing countries.<sup>6</sup>

Many industrialized countries’ infrastructure appears to be living on borrowed time. The majority of infrastructure problems revolve around neglected or decaying systems unable to cope with increasing wastage, which in turn is being exacerbated by increasing demand. Many European cities lose as much as 30% of the water in their antiquated systems to leakage. In the US, which has the fastest growing population of any industrialized country, infrastructure is simply not keeping pace with growth. There are more than 700,000 miles of water pipes nationwide, and water mains break roughly 237,000 times each year.<sup>7</sup> A surprising amount of that pipe is more than one hundred years old, and some systems are amalgamations of various pipes of various ages from various systems cobbled together ‘to make do’ years ago. Exurban sprawl is over-taxing

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<sup>2</sup> Kofi Annan, as quoted by Radford, Tim: “Poor suffer as world’s water seeps away”; Sydney Morning Herald: 2003-06-07.

<sup>3</sup> Hoffman, Dr. Allan J.: “The Connection: Water and Energy Supply”; Department of Energy: 2004-08-13.

<sup>4</sup> Gleick, Peter: “Making Every Drop Count”; NewScientist.com: 2001-02-18.

<sup>5</sup> Ibid.

<sup>6</sup> UN Security Council/Global Policy Forum: “Water, the Looming Source of World Conflict”; Agence France Presse: 2001-03-21. <http://www.globalpolicy.org/security/natres/water/2001/0320cflt.htm>

<sup>7</sup> Lavelle, M. & Kurlantzick, J: “The Coming Water Crisis”: US News and World Report: 2002-08-12, pg 24.

once rural systems not designed to handle the increased demands and loads. Terrified to even mention raising taxes to pay for the needed repairs and upgrades, which the American Water Works Association (AWWA) in 2002 estimated to be as high as \$6900 per household in some rural areas,<sup>8</sup> weak-willed politicians with a long term planning horizon that extends only as far as the next election have been deferring the issue to their successors now for decades.

This political climate reflects the slow motion collapse of water infrastructure itself. Just as in the case of petroleum and energy consumption, Americans are the most profligate in the world in terms of water usage. Politicians of all stripes avoid this issue like the plague because Jimmy Carter demonstrated that advocating conservation and responsible lifestyle changes is the second fastest way out of office. These same politicians who have refused to address the problem have all too often demonstrated their propensity for letting crises develop before over-reacting to them, and the ETR expects this behavior to continue. Having misallocated resources elsewhere, the best response municipal governments can muster is to abrogate responsibility and pave the way for big business to respond to the problem via increased privatization. Water rates are already rising faster than inflation,<sup>9</sup> and just as higher petroleum and energy prices are beginning to take a toll on consumer spending habits, the ETR expects further increases in water rates to fund long-ignored infrastructure repairs will further exacerbate household savings shortfalls.

If the situation domestically is problematic, internationally it's worse.

Amazingly, as much as 30-40% of water being transported worldwide is lost to pipe or canal leakage and illegal tapping.<sup>10</sup> Further, the incidence of both chronic water shortages and water-borne illness is increasing--rapidly. Spawned in part by governments reallocating water resources away from agriculture to industry, which promises a higher return on water investment, rural poor in developing countries are migrating to urban slums at such a rate that by 2007, for the first time in history, half of the world's population will live in towns and cities.<sup>11</sup> In China, for example, where this migration from rural to urban living has been pronounced for the last 15 years, 400 of the largest 670 cities are operating in serious water deficit and over-taxing sewage treatment facilities if available at all.<sup>12</sup> According to a 2003 UN report, between 1970 and 1990 per capita water use in developing countries decreased by one third, putting their overall water usage at between 30 and 50% less than developed countries.<sup>13</sup>

Globalization is also contributing to this mass migration. The jobs are in the cities. Agricultural subsidies in industrialized countries have resulted in trade spats in which rural farmers in developing countries have been for all intents and purposes the victims of dumping.<sup>14</sup> This puts more rural people out of work and drives them to rapidly expanding mega-cities (populations in excess of 10 million) in India, China and elsewhere in search of work, thereby providing an endless stream of labor for industry.

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<sup>8</sup> Ibid.

<sup>9</sup> Water Investment Newsletter quoting *Kiplinger's* Jeffrey Kosnett: WIN: 2005-10-15, vol.19, no. 10, pg 7.

<sup>10</sup> United Nations Educational, Scientific and Cultural Organization (UNESCO): "Fact and Figures from the United Nations World Water Development Report 2"; UNESCO Press Release: 2006-03-09, pg 2.

<sup>11</sup>:UNESCO: "Water: a crisis of governance"; UN World Water Development Report 2: 2006-03-09, pg 2.

<sup>12</sup> Vidal, John: "Beyond the city limits"; Guardian Weekly: 2004-09-17, pg 18.

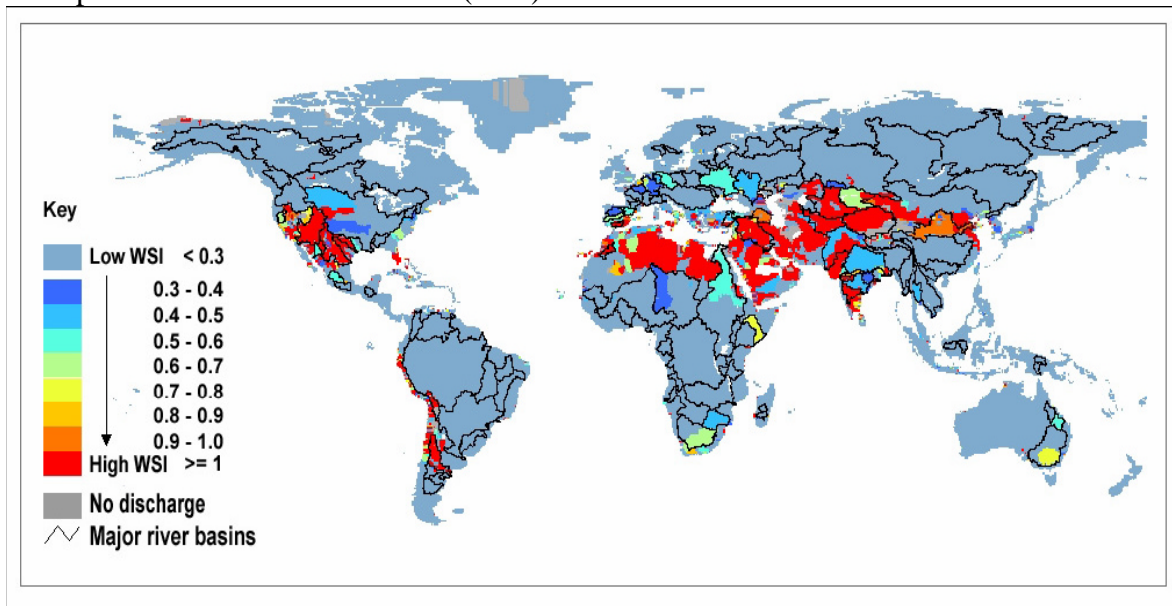
<sup>13</sup> Dayton, Leigh: "7 billion to face water crisis within 50 years"; the Australian: 2003-03-05, pg 5.

<sup>14</sup> Hines, C., & Lucas, C.: "Rural slavery that passes for free trade"; Weekly Guardian: 2003-06-12: pg 29.

However, industry cannot function without clean water, and before committing to new projects in developing countries feasibility studies now place increased emphasis on reliable water sources and waste water treatment facilities.

Of the top ten of these mega-cities, seven are in developing countries, and all are outpacing their industrial counterparts in terms of the rate of expansion.<sup>15</sup> With the possible exception of Sao Paulo, every one is experiencing a high level water stress (see map below).

A map of the water stress indicator (WSI)



Source: International Water Management Institute (IWMI)<sup>16</sup>

**DETAIL 2: “...groundwater depletion is a phenomenon of the twentieth century, made possible by the availability of electricity and cheap pumps.”<sup>17</sup>**

Two time-honored responses to fresh water shortages have been pumping water from underground aquifers and building dams and reservoirs. Combined, these two methods of securing fresh water have contributed significantly to both the development of the American southwest and the Green Revolution of the last fifty years which has managed to keep the specter of famine at bay in the face of an exploding world population. It is widely perceived that pumping more water and building more dams will also be the responses in the future. The ETR does not believe these responses will be the panacea of yesteryear: the former is falling victim to technology and the latter to the law of unintended consequences<sup>18</sup>.

<sup>15</sup> Ang, M. & Gluckman, A.: “Megacities in the Global South”; Dollars & Sense: 2003-08, pg 47.

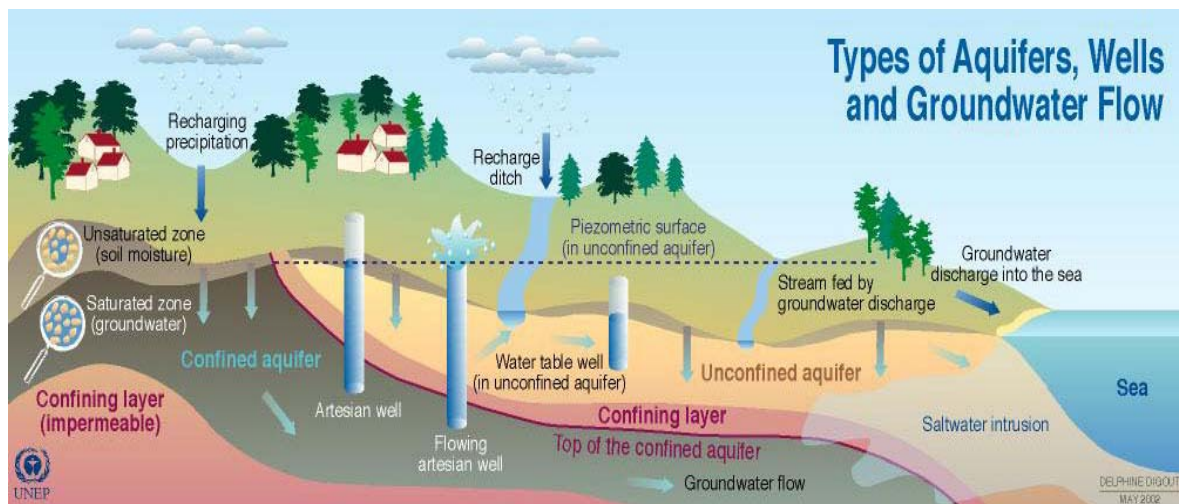
<sup>16</sup> Smakhtin, V. et al: “Environmental Water Requirements & Global Water Availability”; IWMI: 2002: pg 15.

<sup>17</sup> Leslie, Jacques: “Running Dry”; Harper’s Magazine: July 2000.

<sup>18</sup> Norton, Rob: definition as per *The Concise Encyclopedia of Economics*: the “actions of people—and especially government—always have effects that are unanticipated.” [www.econlib.org](http://www.econlib.org).

Only about three-tenths of one percent (.3%) of all the water on the planet is available for human and animal consumption.<sup>19</sup> The largest source of *ready* fresh water is found in underground aquifers, which contain approximately 30 times more water than is found in the world's lakes; such groundwater is usually cleaner than surface water. As it stands now, more than 50% of the US and 25% of the world depend on aquifers for drinking water; Europe and Russia rely on groundwater for up to 80% of their needs.<sup>20</sup> Around the world, twelve mega-cities, including London, Bangkok and Shanghai, similarly rely on ground water reserves for primary supplies of drinking water.<sup>21</sup>

Provided adequate recharging and protection from pollution, which suggests prudent management, aquifers *could* allow for indefinite extraction. Water equates to food, however, and those provisos have been subordinated by the availability of inexpensive pumps and the need to feed burgeoning populations. A tidbit of trivia that puts pump usage into perspective somewhat is that so much water has been drawn from aquifers over the last century that it has measurably raised global sea levels.<sup>22</sup> As can be imagined, groundwater depletion now exceeds replenishment by an estimated 4% annually and presents severe problems around the globe, notably in China, India, Pakistan, the Middle East, North Africa, and Mexico.



Source: Environment Canada, 2001 (Adapted from: <http://www.ec.ca/water/index.htm>).

In many cases aquifer depletion has lowered water tables such that the resulting subsidence has left buildings standing cock-eyed. In others, depletion has compacted aquifers' sediments, irreparably damaging their ability to hold water in the future. Many deep aquifers, such as the massive Ogallala in the US or the Nubian in Saharan Africa, have a recharge rate that runs to centuries, if not millennia, making such water sources for all intents and purposes nonrenewable; this can generally be said to be true for aquifers in most low rainfall regions of the world. Like river deltas, coastal aquifers, if drawn down too severely, can be inundated with salt water and ruined (see diagram on

<sup>19</sup> Hoffman, Dr. Allan J.: "The Connection: Water and Energy Supply"; Department of Energy: 2004-08-13.

<sup>20</sup> Struckmeier, W., Rubin, Y., & Jones, J.A.A.: "Groundwater-reservoir for a thirsty world?"; International Union of Geological Sciences: 2005-12, pg 3.

<sup>21</sup> Radford, Tim: "Poor suffer as world's water seeps away"; Sydney Morning Herald: 2003-06-07, pg. 19.

<sup>22</sup> Perkins, Sid: "Crisis on tap?"; Science News: 2002-07-22.

preceding page), as is the case in parts of the Gaza Strip, Florida and the Indian state of Gujarat.

With good water management, aquifer recharge rates can be significantly augmented. Two interesting examples are the region surrounding Los Angeles and certain areas of the Middle East. In the case of the Los Angeles basin, during the winter months when demand is low water authorities continuously pump excess precipitation, recycled wastewater, and water diverted from the Colorado River into the local aquifers to store it for the summer months of increased demand; the ground in the Santa Anna basin is so sponge-like that it regularly rises and falls as much as 5 inches/11 centimeters over the course of a year.<sup>23</sup> In the Middle East, various countries are pioneering the concept of combining desalination with aquifer storage and recovery, which essentially allows for large volumes of water to be stored with minimal throughput, thereby reducing both the evaporative loss and the operating costs of the desalination facility.<sup>24</sup>

Increased water scarcity is leading to increased competition. The UN cautions that aquifer and riverine sources of fresh water may well become flashpoints of regional conflict in the next 50 years as the world attempts to deal with the projected tripling of water demand. Major aquifers, such as the Nubian beneath the Sahara Desert and the Guarani in South America, are sources of animosity between the countries drawing on them now. Major rivers, including the Rhine, Danube, Niger, Nile and Zambezi flow through nine or more countries—the majority of which have no water treaties or agreements on how to share the water.

Collapse of the world's groundwater supply is not imminent. However, ever-increasing reliance on groundwater to irrigate marginal farmland or for use in areas already experiencing acute water stress is clearly short-sighted and unsustainable; yet that is exactly what is transpiring throughout the world, including the United States and Europe. Better water management is widely considered to be critical going forward. Similarly, building more dams and reservoirs, although certainly part of the equation, is not the answer.

It is startling to contemplate the notion that billions of years ago the oceans were full of fresh water.<sup>25</sup> The ocean's 35,000 parts per million (ppm) salinity level of today is the accumulation of eons of river borne salts and minerals being washed downstream in a natural rinse cycle that over vast amounts of time led to the world's soils becoming arable—*and staying that way*. Damming rivers and streams to collect and store run-off for later use in irrigation is one of the most important developments in man's history. Paradoxically, this same vehicle that gave rise to civilization in numerous cases sowed the seeds of its destruction as the irrigation and land-clearing practices associated with dam-building eventually led to the twin environmental degradations of soil destruction and desertification.<sup>26</sup>

Of course, past civilizations did not know then what we know now. And to modern man's credit, some dams and reservoirs are actually being dismantled in an effort to return riverine systems to their original condition. But what we have recently learned will have little bearing on our continued overwhelming reliance on dams and reservoirs.

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<sup>23</sup> Perkins, Sid: "Crisis on tap?"; Science News: 2002-07-22.

<sup>24</sup> United Nations World Water Development Report 2: *Water: A Shared Responsibility*; UN: 2006-03-09, pg 150.

<sup>25</sup> Leslie, Jacques: "Running Dry"; Harper's Magazine: July 2000.

<sup>26</sup> Diamond, Jared: *Collapse: How Societies Choose to Fail or Survive*; Penguin Group, New York: 2005.

Without the 70,000 dams that collect and store approximately half of the rainfall received each year, the US would be a decidedly different place: the desert of the American southwest certainly would not be able to support its 23 million inhabitants were it not for the Hoover Dam. However, between a general lack of suitable rivers to dam and strong environmental opposition, the US may well be approaching the limits of dam-building. But that is not the case worldwide where such responses remain viable if not environmentally sound in practice (see below). For example, where Europe makes use of 75% of its hydropower potential, Africa barely utilizes 7%, leaving a great many opportunities to better both water storage and economic development.<sup>27</sup>

Worldwide, reservoirs hold as much water as is contained in Lakes Superior and Ontario combined. Water storage has shifted so much weight that geophysicists believe it has slightly altered the Earth's rotational speed, tilt of its axis, and shape of its gravitational field.<sup>28</sup> But for all of the stunning accomplishments represented by these figures, and acknowledging that dams have made tremendous contributions to our way of life, the collateral damage has been equally staggering.

In the last two hundred years the amount of irrigated land worldwide has increased thirty-fold. Because it is not uncommon for farmers to get water for as little as one-fifth the cost of urban users, they have absolutely no incentive to invest in technological innovations or methods to help conserve water. The resulting excessive irrigation practices have contributed to fertilizers and pesticides seeping into ground water on one hand while also floating minerals and salts to the surface of the soils being watered on the other, damaging both. The cycle of water being stored in reservoirs, distributed via canals etc., irrigating crops, and the excess run-off being returned to reservoir storage to repeat the process over again is so wasteful that as much as half of the water intended for agricultural use is lost and never contributes to food production.<sup>29</sup> This continual concentrating of salts in the water during this cycle, which is called salination, is such it corrodes pipes in Los Angeles, San Diego and Phoenix; and the resultant slow poisoning of the soil has led to the loss of approximately 20% of the world's agricultural land: an estimated 1,000,000 hectares/ 2,471,000 acres of farmland *are lost each year*, with twice as much again being adversely affected and set on the path to degradation.<sup>30</sup>

Another consideration is that major dam projects are so horrendously expensive that only governments have the resources to fund them. However, this also means that governments determine how the water is allocated, and especially in the US water policy is all too often swayed by powerful lobbies, which has led to stupendously wasteful practices. For example, agriculture contributed \$22 billion dollars to California's \$1.3 trillion dollar economy in 2002 and was allotted 80% of the state's water; yet dollar for dollar virtually any other industry represented a better return on water investment than agriculture.<sup>31</sup>

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<sup>27</sup> United Nations Educational, Scientific and Cultural Organization (UNESCO): "Fact and Figures from the United Nations World Water Development Report 2"; UNESCO Press Release: 2006-03-09, pg 1.

<sup>28</sup> Leslie, Jacques: "Running Dry"; Harper's Magazine: July 2000.

<sup>29</sup> Gleick, Peter: "Making Every Drop Count"; NewScientist.com: 2001-02-18.

<sup>30</sup> Ibid.

<sup>31</sup> Huck, Peter: "Midnight at the Oasis"; The Weekend Australian Financial Review: 2003-02-01, pgs. 45-6.

**DETAIL 3: “Eighty percent of all diseases and one third of all deaths in developing nations are caused by contaminated water.”<sup>32</sup>**

Scientists don’t claim we are running out of water per se—just clean water. In addition to salination and salt water intrusion into damaged aquifers and river basins, pollution makes much of the water that is available dangerous or unusable. Clean water is not only one of the most indispensable requirements for industry but also, according to the UN, the single intervention most likely to alleviate global poverty. Altruism aside, safe water and basic sanitation are emerging as critical elements of worker productivity as water-related sickness has driven absenteeism up dramatically in developing countries.

An estimated two million tons of waste is dumped *daily* into the world’s waters, much of it untreated.<sup>33</sup> A river flowing through a developing country serves the needs of the agriculture, industry and populace of each city it passes through, growing increasingly polluted on its way to the sea. In China, roughly 70% of the rivers and lakes are polluted for exactly this reason, which poses an enormous health risk.

In the US, and to a lesser extent in Europe, waste treatment plants have been so low on the priorities list for so long that it doesn’t take much of a storm to overwhelm systems operating at maximum capacity, resulting in millions upon millions of gallons of raw sewage all too often being dumped into bays and lakes and waterways. Further, the concentration of agricultural and industrial waste in major rivers, especially those with heavily subsidized agriculture such as the Mississippi and Yangtze, is so high that massive “dead zones” are appearing around the mouths of such rivers, and fish simply die, asphyxiated by the severely depleted oxygen levels.<sup>34</sup>

In many of the world’s mega-cities whatever water and sewage facilities that existed were long ago overwhelmed. Admittedly an extreme example, Dhaka’s population has grown from 250,000 just over thirty years ago to more than 13 million today, resulting in an environment where more than 9 million people have no sewerage at all, resulting in human waste collecting and overflowing into rivers and lagoons—sources of fresh water for the poor.<sup>35</sup>

Scientists have been warning for decades that natural events rarely occur in isolation. The results of mismanaging one area of human endeavor usually show up in another, often with catastrophic results.

In the following five sections for subscribers, the Emerging Trends Report continues its assessment of the water situation worldwide, discussing global warming, climate change at the margins, and predictions regarding their effects on global water availability; this is followed by a lengthy section exploring what we consider to be the best investment opportunities both domestically and internationally, mainstream and obscure, conservative as well as wildly speculative. And the last section is our extensive Sources/Further Reading section.

To purchase either this 30-page individual report or an annual subscription, please visit our website at [www.emergingtrendsreport.com](http://www.emergingtrendsreport.com).

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<sup>32</sup> Ball, Philip: “Water, water everywhere”; Nature: 2000-01-27.

<sup>33</sup> Dayton, Leigh: “7 billion to face water crisis within 50 years”; the Australian: 2003-03-05, pg 5.

<sup>34</sup> Vidal, John: “Sewage and fertilizers ‘are killing the sea’”; Guardian Weekly: 2004-05-06, pg 21.

<sup>35</sup> Vidal, John: “Waters of strife”; Guardian Weekly: 2002-02-11, pg 20.