

## ARTICLES

### NOT A DROP TO SPARE: THE GLOBAL WATER CRISIS OF THE TWENTY-FIRST CENTURY

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I dedicate this Article to my parents, my loving mother, Lata K. Panjabi, author, poet, diplomat, artist, musician, and to my brilliant father, Khooshie Lal Panjabi, journalist, editor, author, diplomat. Once again, my wonderful mother inspired the idea for this Article. My father, a unique idealist and realist, believed that one person with a principle could change the world. I thank them for the gift of life and the gift of education. I also thank Lenny for all his generous advice and Davey and Jeffy for making so many helpful suggestions.

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## I. INTRODUCTION

We all understand that water is the wellspring of life on our planet Earth. It is also indispensable for human survival and has aptly been called the “genesis ingredient for life at all levels.”<sup>1</sup> So, when the United Nations decided that 2013 would be the International Year of Water Cooperation,<sup>2</sup> the world body was in effect reminding the international community about its responsibilities to those who are still deprived of this most essential commodity in life. It was also nudging the governments of every country in the world to be aware of their failure to ensure a clean and constant water supply to sustain the lives of all their citizens. In this era of Water Cooperation, it might be timely to draw attention to the need for all of us to work together harmoniously to achieve the laudable and vital aim of providing clean water as a universal reality. Across the planet, in many countries, there are thousands of poor people with no access to clean water and no adequate sanitation facilities. Their continuing plight and the terrible suffering they endure in disease and early death has to reflect on all of us as a failure of collective will to resolve the global water crisis.

Water plays a pervasive role in all life on this planet whether as a solid, liquid, or gas,<sup>3</sup> changing form as it circulates endlessly through the hydrological cycle. Impelled by the sun’s rays, water transforms from solid to liquid as it travels across the globe. Karl Weber eloquently described water as being “in all its forms, from rain-drops to rivers to waterfalls to fountains to clouds, ice and snow, perhaps the most varied and beautiful substance on our planet.”<sup>4</sup>

No wonder that ancient civilizations were largely riverine in nature, drawn to live near water for its endless uses, including navigation, food, irrigation and liquid sustenance. The ancient Indians worshipped the Ganges River, grateful for its many gifts. The ancient Egyptians saw their country as the gift of the Nile. History is replete with examples of the devotion of people to water. Water is inextricably linked to each and every one of us, and to all living things. It has aptly been called “a purifying, regenerative

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<sup>1</sup> CHARLES FISHMAN, *THE BIG THIRST* 44 (2011).

<sup>2</sup> See United Nations Educational, Scientific and Cultural Organization, Major Events, World Water Day (2013), <http://www.unesco.org/new/en/unesco/events/prizes-and-celebrations/celebrations/international-days/world-water-day-2013/>.

<sup>3</sup> See WATER: GLOBAL COMMON AND GLOBAL PROBLEMS 3 (Velma I. Grover ed., 2006) [hereinafter Grover].

<sup>4</sup> Karl Weber, *Water Realities*, in *LAST CALL AT THE OASIS* 3 (Karl Weber ed., 2012).

and hallowed element.”<sup>5</sup> The cultural and religious significance of water<sup>6</sup> forms an integral part of humanity’s spiritual and psychological value system. And yet, this treasured, revered gift from our planet is daily despoiled, polluted, and destroyed with impunity. While around the world human beings pray to rivers and revel in their beauty and view them as symbols of divine benevolence, they are still complacent about dumping raw sewage into these “godly gifts.” Industrialists routinely dispose of their most dangerous toxic by-products into flowing rivers, disregarding the consequences. Farmers dump animal manure and agricultural debris including chemical fertilizers into lakes and rivers, while municipalities in many parts of the world use water as the most expedient sewage system.

The saga of water in our time is riddled with many contradictions. Humanity’s behavioral patterns especially during the twentieth century are now endangering life on this planet. The root of this crisis and the key to its resolution lie in the need to amend human behavior, to acknowledge the fault, and to act decisively to remedy it.

Speaking in 2000 as President of the World Bank, James Wolfenson told the Hague World Water Forum that a holistic approach was needed and commented that “[p]artnership and behavioural change are going to be central to what we do.”<sup>7</sup> Former Soviet President Mikhail Gorbachev, who is now a leading environmental advocate, has argued that “[h]uman solidarity is the only force capable of facing a task of this magnitude.” Continuing on this theme of resolution, Gorbachev called for “solidarity in international and regional governance; there must be solidarity between sectors and stakeholders; and there must be political will amongst governments to work in good faith both with their neighbors and with their own people.”<sup>8</sup> In an interesting book *The Big Thirst*, author Charles Fishman called for a “fresh way of thinking about water,” and concluded that we would “need a framework for thinking about the fate of water, because the fate of water is our fate.”<sup>9</sup> This crisis is no longer one that we can afford as a species to ignore. The wanton destruction of water sources takes a toll in human and

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<sup>5</sup> ALAN SNITOW ET AL., *THIRST: FIGHTING THE CORPORATE THEFT OF OUR WATER* 3 (2007).

<sup>6</sup> Grover, *supra* note 3, at 3.

<sup>7</sup> Caroline A. Sullivan & Jay O’Keefe, *Water, Biodiversity and Ecosystems: Reducing Our Impact*, in *WATER RESOURCES PLANNING AND MANAGEMENT* 121 (R.Q. Grafton & K. Hussey eds., 2011).

<sup>8</sup> Mikhail Gorbachev, *The Global Water Crisis* (2000), <http://www.runningdry.org/essay.html>.

<sup>9</sup> FISHMAN, *supra* note 1, at 308.

animal life and on the environment. Humanity can no longer afford to abuse this essential ingredient of life while simultaneously extolling it as a spiritual gift.

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The extensive research for this Article has demonstrated clearly that the issue of water protection has become both a rallying cry and a call to battle for groups small and large across the globe. The issue is rife with division and strife because water is so fundamental a human need that there can be no life without it. Articulating the significance of water, Richard Lawford commented that “the survival of every human, every region, and every society depends on having access to a share of the world’s water through the global water cycle.”<sup>10</sup>

That reality has polarized communities from the size of small villages to entire countries as this precious resource is sought for its multiple uses, for drinking, for personal hygiene, for growing food, for laundry and cleaning, for agriculture and industry and most unfortunately, for disposal of waste and sewage. William Wheeler, writing in the *Christian Science Monitor*, aptly commented that “[w]ater is a part of everything we do: it feeds crops, powers cities, cools computer servers, and is key to the manufacturing of everything from clothes to cars.”<sup>11</sup> The energy sector uses water to extract fuel from deep underground and in many places derives energy from the water itself via hydroelectric power.<sup>12</sup>

Water serves so many functions in human life across this blue planet that when there is scarcity, people inevitably become nervous, defensive and angry, a rage amply reflected in the vast literature on this subject. There is a visceral reaction when availability of water is threatened.<sup>13</sup> Positions become polarized. Allegations of greed, injustice, incompetence, inefficiency and the like are tossed back and forth as parties jockey to convince anyone who will listen. These diverse controversies do bring to

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<sup>10</sup> Richard Lawford, *Climate Change and the Global Water Cycle*, in WATER RESOURCES PLANNING AND MANAGEMENT, *supra* note 7, at 3.

<sup>11</sup> William Wheeler, *Global Water Crisis: Too Little, Too Much, or Lack of a Plan?*, CHRISTIAN SCI. MONITOR (Dec. 2, 2012), <http://www.csmonitor.com/World/Global-Issues/2012/1202/Global-water-crisis-too-little-too-much-or-lack-of-a-plan>.

<sup>12</sup> Robyn Beavers, *From Crisis to Competitive Advantage*, in LAST CALL AT THE OASIS, *supra* note 4, at 145.

<sup>13</sup> SNITOW ET AL., *supra* note 5, at 2.

light injustice, greed and waste, all of which persist in the use of water. However, the purpose of this Article is to assess the possibility of moving forward toward a consensus approach so that the volatile rhetoric can now be replaced by consistent and constructive global action to bring clean water to the vast numbers of those who are deprived of it. While this process of enlarging the community of those who have water has already begun, efforts are bedeviled by continued suspicion, mistrust, and defensiveness on all sides of the debate. It has aptly been said that "many worlds collide around the resource of water."<sup>14</sup> If the twenty-first century is to become known as the era when human beings are gravitating toward the idea of a global perspective, a cosmopolitan outlook and an internationalist sense of mutual responsibility, then where better to concentrate than on the issue of water, which has for centuries and in many civilizations been aptly deemed the elixir of life.

It is important at the outset to explain that the parameters of this Article will deal only with fresh water, not oceanic sources. There are always length constraints in any article. Further, the focus will be on a few selected issues surrounding water with less emphasis on the equally significant issue of sewage and its disposal.

From an academic perspective, water is the ultimate multi-disciplinary subject for study and research. It commands the attention of scientists, engineers, hydrologists, historians, political scientists, economists and many more professionals. Because water pervades every part of life on this planet and is so indispensable, it requires all of us to study it from a multiplicity of perspectives and seek to add to the discourse that will hopefully someday very soon bring an end to the crisis that afflicts this very precious resource. Like others who have studied this subject, I have selected particular facets and topics that reflect and relate to my own legal and historical academic background. Hopefully, the perceptions from many diverse points of view will contribute to both the debate and the resolution.

In this Article, the attempt will be to give a brief global view of the situation in numerous countries rather than providing intense focus on one geographic location. There are numerous detailed studies specific to one area and readers are encouraged to seek out those sources. The literature on this subject is so vast that anyone venturing into this field would find it easier to write a book than an article which is inevitably subject to word limitations.

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<sup>14</sup> Beavers, *supra* note 12.

The water issue is so large a subject that encyclopedias have been written to elucidate its many features and facets.

It is also important to note that any researcher into this subject is bound to discover that statistics are sometimes not precise and that they can vary. Wherever possible, United Nations sources have been used for statistics. The ultimate point is clear: there is a serious crisis concerning access to clean water. The statistics should be viewed as the Greek chorus in that terrible human tragedy.

This Article is an attempt to provide the reader with enough information on selected aspects to encourage and elicit further research. There is no pretension to provide a full treatment of the subject of water in a short article. Accordingly, a few topics have been selected for exploration and analysis, with a reminder that so multi-faceted a subject cannot be comprehensively assessed in a short article. The examples that illustrate the various subjects are quite deliberately drawn primarily from the developing world. Although water shortages and pollution are global problems, most of those who suffer from deprivation and are daily dying because of these crises live in the developing world. It seems only appropriate to highlight their plight. This is not to underestimate the amount of suffering in the developed world—far from it. Fortunately, in this part of the world we do have the resources to cope and facilities, science, engineering, indeed all the required elements to deal with these crises. While the Article has been divided into various sections and a table of contents provided, it is hoped that the reader will appreciate that this is only a convenience and that aspects of one sub-topic may well have to be explored under another heading. Ultimately this entire subject is subsumed under one large issue—the water crisis—and like a kaleidoscope the many perceptions and topics converge and disperse to add to the overall picture.

There is growing awareness about the plight of the millions of people who live their daily lives without access to clean water and adequate sanitation. This reflects poorly on all of humanity. It has correctly been said that this “may be remembered as the 20th Century’s greatest failure.”<sup>15</sup>

The ultimate aim of this Article is hopefully to encourage a more harmonious, less acrimonious perception of this crisis so that its resolution can proceed with speed and even urgency. The Western world is known for its tremendous sense of community when sudden disasters strike. The

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<sup>15</sup> Peter H. Gleick, *The Human Right to Water*, PACIFIC INSTITUTE (May 2007), [http://www.pacinst.org/reports/human\\_right\\_may\\_07.pdf](http://www.pacinst.org/reports/human_right_may_07.pdf).

Boston Marathon bombing demonstrated the generosity, resilience, and communal spirit of the American people. If these wonderful qualities could be harnessed similarly to deal with a continuing crisis that daily takes a huge toll in human suffering, the global water crisis could become a horror of the past.

The emphasis in this Article is on finding points of convergence rather than intensifying divergence. The water crisis has created significant rifts and confrontations within societies between small and large landowners; between corporations and non-governmental organizations; between those dedicated to public ownership and governance and those advocating private management for efficiency. There are conflicts across regions and controversies between countries. Ownership and use of this vital resource have become more conflicted because water scarcity is now a terrifying reality in many parts of the world. This Article attempts to bridge this vast chasm of self-interest and acrimony and promotes instead a more holistic approach that places the victims of water deprivation at the center of attention. The research has demonstrated that there is enough good science available and enough technology in existence to resolve this problem fairly soon. There is more than a sufficiency of articulated international documents of principle to underpin any action. What is now needed is the collective will to act with speed because this crisis is daily killing men, women, and children. The prevalence of this tragedy over so many years reflects terribly on all of us who are fortunate through accident of birth to live with easy access to clean water and sanitation. We have a collective responsibility to ensure that such access is guaranteed and provided universally. Prompt and urgent action is called for to fulfill the rights of the deprived millions.

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Given the veritable tsunami (pun, with regrets, intended) of rhetoric that has flowed at the United Nations and at numerous international conferences dealing with the water crisis, it may be opportune now to suggest that the world does not really need any more international agreements on this subject, however well-intentioned. There is a prevailing fear affecting anyone who has researched and written about the United Nations that the intense drama surrounding the acceptance or rejection of any global instrument becomes the ultimate aim for the members of the World Organization. It is as if the passage of words in a resolution or convention is sufficient as an end in itself. That is far from realistic. Implementation, the actual work in the real

world outside the glamorous halls in the U.N. headquarters in New York, takes a distant second place. It is this fear—an apprehension that I share—that prompts a suggestion that real attention now needs to be paid toward the creation of a consensus that steers the world to action. We cannot go on passing wordy legal instruments laden with good intentions unless we are willing to act decisively to implement them. Khooshie Lal Panjabi, a diplomat—and my father—told me about the jockeying and haggling and horse-trading that led to miniscule wording changes in drafts and the celebratory sense of achievement when agreement on words was finally attained. He wryly commented: “There was lots of activity. There will be very little action.”

The United Nations cannot be faulted for its concentration on these “rhetoric fests.” It is not a world government. It has no sovereign independent powers, only the authority that its numerous members will allow it to exercise. In terms of highlighting injustice and emphasizing glaring deprivation, the United Nations has been eminently successful. In a very real sense, the United Nations has on occasion served as the conscience of the world and as the consciousness-raising center of global politics. Those two tasks may not loom large in terms of actual achievement but nevertheless, they are very significant. Their importance in preparing the ideas and ideal standards for the world to aim for and hopefully achieve some day should not be underestimated.

The countries that won the Second World War and founded the United Nations were not inclined to part with their national sovereignty in favor of this World Organization. Implementation still lies with governments and the vigilance of the citizens of the various sovereign member-states of the United Nations. Five countries, the United States of America, the Soviet Union (now Russia), the United Kingdom, France and China (then Taiwan, now the People’s Republic of China) allotted themselves permanent status on the Security Council of this new organization in order to gain a veto on any substantive political action. Therein lies the problem that afflicts every global crisis of this century. We have the intentions and the international instruments. What is needed now is more focus on implementation and on action. Words alone will not improve the world although they may hopefully, inspire action. Absent the will to fulfill the needs of the deprived millions on this planet, the words, for many critics, become nothing more than hollow, meaningless promises.

While it can easily be viewed as a flawed Organization in terms of implementation, the United Nations justly deserves praise for drawing world

attention to international problems and for emphasizing the need for the world community to consider the plight of those deprived of a decent standard of living. Indeed, in terms of this publicizing task, the U.N. almost over-compensates for its failures in the realm of actual implementation. At the present time there are an estimated thirty United Nations bodies working on various aspects of the water crisis,<sup>16</sup> to highlight the problem and to ensure that the plight of those suffering and dying from lack of clean water is not overlooked or forgotten. These agencies work to provide a wealth of statistical material and compilations of situations across the globe and they gather reams of data while simultaneously working, often with very strained budgets, to ameliorate the lives of the most helpless of people. If they manage occasionally to stir the conscience of governments in the richer countries, that is a significant achievement. In tandem with these efforts by the United Nations, we all need to do whatever we can to bring about alleviation of the terrible plight that daily takes a toll in illness and death.

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We need as well now to subsume the many hostilities that prevail between water activists and industrialists, between agribusiness and family farmers, between cities and villages and between countries that share the same rivers. "Over 260 river basins are shared by" at least two countries.<sup>17</sup> The feisty debate between community groups and industries and business could be converted into a more productive and constructive working relationship. Instead of a volatile discourse, the contenders might together realize a future in which water remains a community resource but business and industry provide the necessary technology that is vital for clean-up of pollution and construction or reconstruction of infrastructure. There is, in a consensus-driven century, a possibility for both public and private participation in utilizing and protecting this resource and for the joint discovery of methods and inventions that will bring clean water to those who are currently deprived. If an inclusive approach may seem naïve to those who have a deeply-ingrained suspicion of those on the "other side," it might be worth pointing out that the polarization has only resulted in mutual recrimination, lengthy legal and media battles, and waste of resources that

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<sup>16</sup> J.A.A. JONES, WATER SUSTAINABILITY 8 (2010).

<sup>17</sup> Heather Cooley et al., *Climate Change and Transboundary Waters*, in 7 THE WORLD'S WATER 1 (Peter H. Gleick et al. eds., 2012).

might have been better utilized in implementation of those wordy international instruments full of many promises that have yet to be fulfilled. As author Charles Fishman commented: “nothing stands in our way except our own attitude.”<sup>18</sup>

In forging a consensus that will accommodate the variety of views toward a productive and constructive end, we can begin by mutually appreciating that the human body itself is approximately 60% water.<sup>19</sup> That reality is only part of the essential significance of water for life on Earth. Because this is a vital human concern, it has drawn the attention and expertise of a range of professionals and with their combined energy, hopefully this world can now move toward pollution control and clean-up, clean water distribution and safe and sanitary sewage disposal. Pragmatically, given the will to make this joint effort work successfully on a global basis, water could become a vast producer of jobs for all types of expertise. Professors Quentin Grafton and Karen Hussey articulated this prospect, stating that “solutions which will deliver positive outcomes to society, the environment and the economy, must also engage a spectrum of hydrologists, engineers, and economists.”<sup>20</sup> They added, “they must also engage sociologists, ecologists, lawyers, political scientists, environmental historians, anthropologists, geographers and others.”<sup>21</sup>

If in this new century we fail to deal decisively and quickly with this crisis, the well-being of all humanity will be imperiled. Robert Dañino, Senior Vice President of the World Bank, pointed to the nexus between water shortage and poverty, commenting that “poverty is prevalent mostly in water-short areas.”<sup>22</sup> Klaus Toepfer, Executive Director of the United Nations Environment Programme warned that the “freshwater crisis must be solved if we are to achieve long-term sustainable development.”<sup>23</sup> Calling this “the world’s greatest social and developmental challenge,” Toepfer continued: “The failure to manage water effectively seriously hampers

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<sup>18</sup> FISHMAN, *supra* note 1, at 309.

<sup>19</sup> *Freshwater Crisis*, NAT’L GEOGRAPHIC, <http://environment.nationalgeographic.com/environment/freshwater/freshwater-crisis/>.

<sup>20</sup> R. Quentin Grafton & Karen Hussey, *Preface*, in WATER RESOURCES PLANNING AND MANAGEMENT, *supra* note 7, at xvii.

<sup>21</sup> *Id.*

<sup>22</sup> Robert Dañino, *Foreword*, in THE HUMAN RIGHT TO WATER: LEGAL AND POLICY DIMENSIONS, at vii (Salman M.A. Salman & Siobhan McInerney-Lankford eds., 2012), available at [https://openknowledge.worldbank.org/bitstream/handle/10986/14893/302290PAPER0Human\(right\)toH2O.txt?sequence=2](https://openknowledge.worldbank.org/bitstream/handle/10986/14893/302290PAPER0Human%20right%20to%20H2O.txt?sequence=2).

<sup>23</sup> Klaus Toepfer, *Foreword*, in Grover, *supra* note 3, at iii.

effort[s] to alleviate poverty worldwide and threatens progress towards sustainable development.”<sup>24</sup>

## II. WATER POLLUTION

Water pollution is a major cause of this global water crisis. It is a “scourge of both developed and developing countries.”<sup>25</sup> Pollution, largely man-made, affects every part of this planet. Ponds, lakes, rivers, aquifers, and any and almost every source of freshwater suffer from some form of contamination. Water pollution has topped the list of concerns articulated by the public for pollsters surveying a range of environmental issues.<sup>26</sup> UNESCO estimated that every year approximately 500 million tons of heavy metals, solvents, and toxic sludge wind up in the global water supply.<sup>27</sup>

The subject of water pollution is vast and this Article can only briefly touch on some of the more egregious ways in which humans have destroyed the most essential element that sustains life. The basic problem stems from the fact that while we claim that we revere water as the source of life, we still befoul it with domestic, agricultural, and industrial garbage. For some centuries and in many countries, rivers and lakes have been used as dumping grounds for all types of metal and pollutants, many of them toxic and extremely dangerous for humans and wildlife. We have literally changed the composition of our water sources across the globe, using them as depositories for metals, chemical waste, industrial by-products, organic waste, pharmaceuticals and some particularly deadly elements like asbestos, mercury and lead.<sup>28</sup> That is just a short list of what exists in water today. This toxic brew can affect plant and fish life and indeed all life in lakes and rivers. Algae blooms that result from this can produce dangerous toxins, a process that occurs because of eutrophication, the enrichment of an

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<sup>24</sup> *Id.*

<sup>25</sup> *2008 Annual Report: Water for All, All for Water*, ONE DROP FOUNDATION 1, 7 (2008), available at [http://www.onedrop.org/en/DiscoverOneDrop\\_Canada/~media/Files/Annual\\_reports/2008/2008\\_Annual\\_Report\\_FINAL\\_EN.ashx](http://www.onedrop.org/en/DiscoverOneDrop_Canada/~media/Files/Annual_reports/2008/2008_Annual_Report_FINAL_EN.ashx).

<sup>26</sup> 7 PETER H. GLEICK, *THE WORLD'S WATER*, *supra* note 17, at 282–84.

<sup>27</sup> Rachel Oliver, *All About Water and Health*, CNN.COM/ASIA (Dec. 18, 2007), <http://edition.cnn.com/2007/WORLD/asiapcf/12/17/eco.about.water/>.

<sup>28</sup> For a list of some of these pollutants and their impact, see *Health*, THE GUIDES NETWORK, <http://www.water-pollution.org.uk/health.html>; *Industrial Water and Water Pollution*, <http://www.water-pollution.org.uk/industrialwaste.html>.

environment with nutrients.<sup>29</sup> The normal processes of life in water sources are disrupted by the invasion of these deadly ingredients. Water can also be polluted by microorganisms like bacteria, viruses, and protozoa, which are a leading cause of diseases like cholera.<sup>30</sup>

The proliferation of pollution is quite terrifying to contemplate. Developing nations discharge 90% of their wastewater untreated.<sup>31</sup> Greenpeace estimated in 2013 that approximately 40% of China's surface water is now considered polluted.<sup>32</sup> Eighty percent of China's surface waters cannot be used for drinking, fishing, or bathing, and the similar figure for India was 75%.<sup>33</sup> Africa and Latin America were also deemed to have this problem.<sup>34</sup>

The examples of water pollution are so numerous that even a short survey can be intensely disheartening. The gold-mining operations in the Democratic Republic of Congo employ about 2 million people, but utilize about fifteen tons of mercury every year.<sup>35</sup> Pollution problems plague that country; years-long gold mining operations in South Africa have contaminated the water underlying the populous city of Johannesburg.<sup>36</sup> Similarly, operations in the arid Atacama desert in Chile are consuming huge amounts of water in order to extract copper.<sup>37</sup> In Bolivia, silver extraction utilizes water desperately needed by farmers and alpaca herders.<sup>38</sup>

Water expert Robert Moran travelled to Kyrgyzstan in 2011 to visit one of the richest gold mines on earth, the Kumtor Mine.<sup>39</sup> Although he was excluded from the mine itself, he managed to study the environmental impact

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<sup>29</sup> *Eutrophication*, THE GUIDES NETWORK, <http://www.water-pollution.org.uk/eutrophication.html>.

<sup>30</sup> *Health*, *supra* note 28.

<sup>31</sup> *Water Shortage Looming Crisis for Earth*, EDMONTON J. (Mar. 26, 2007), Canada.com, <http://rferl.org/content/world-water-week-stockholm-crisis/24688200.html>.

<sup>32</sup> *World Water Day 2013: 10 Facts About Water Pollution*, WATER WORLD (Mar. 22, 2013), <http://www.waterworld.com/articles/2013/03/world-water-day-2013-10-facts-about-water-pollution.html>.

<sup>33</sup> *Id.*

<sup>34</sup> *Water Shortage Looming Crisis for Earth*, *supra* note 31.

<sup>35</sup> United Nations News Centre, *DR Congo: UN Advises Prudent Use of Abundant Resources to Spur Development* (Oct. 10, 2011), <http://www.rferl.org/content/world-water-week-stockholm-crisis/24688200.html>.

<sup>36</sup> *Id.*

<sup>37</sup> Robert Moran, *Clean Water—The Price of Gold? Resource Development and Global Competition for Water*, in *LAST CALL AT THE OASIS*, *supra* note 4, at 65.

<sup>38</sup> *Id.* at 64.

<sup>39</sup> *Id.* at 49.

of this massive operation.<sup>40</sup> Moran's findings are indicative of the type of terrible havoc that is being wrought in so many communities across this planet, deliberate, negligent degradation of water resources with no concern or consideration about the population of the area. At Kumtor, after the processing to extract gold, the water is contaminated with arsenic, copper, zinc, nickel, uranium, explosives, fuels, oils, grease, antifreeze, sewage, and a very significant amount of cyanide, about eight to ten tons per day.<sup>41</sup>

The World Health Organization reported that high levels of arsenic are present in the groundwater sources of a number of countries.<sup>42</sup> Bangladesh represents one of the most tragic examples of the terrible impact of water pollution. A number of scholars blame the United Nations for persuading the citizens of that country to avoid drinking polluted surface water and instead to dig wells. This advisory apparently ignored the geology of the area and did not test the well water. The water from the new deep wells was laden with vast quantities of arsenic and thousands of people suffered the horror of slow poisoning and a terrible death.<sup>43</sup> The United Nations claimed that it was attempting to protect the people from cholera epidemics caused by surface water that was polluted with raw sewage.<sup>44</sup> The World Health Organization called this tragedy that ultimately affected over 50 million residents of Bangladesh and the neighboring Indian province of West Bengal<sup>45</sup> "the worst mass poisoning of a population in history."<sup>46</sup> There is an ironic and tragic twist to this calamity. Women in Bangladesh traditionally fetch the water. It is not deemed a fit job for a man to perform. Women are also culturally and by tradition restricted in their movements and some of them cannot venture too far from their homes. The combination of these factors resulted in preventing women—the only water collectors—from going farther to cleaner sources of water and the families continued to drink water laden with arsenic.<sup>47</sup>

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<sup>40</sup> *Id.* at 51.

<sup>41</sup> *Id.* at 54.

<sup>42</sup> *International Programme on Chemical Safety*, WORLD HEALTH ORGANIZATION, [http://who.int/ipcs/assessment/public\\_health/arsenic/en/](http://who.int/ipcs/assessment/public_health/arsenic/en/).

<sup>43</sup> Bill McKibben, *Poisoning the Well*, in *WATER MATTERS* 22 (Tara Lohan ed., 2010).

<sup>44</sup> *Id.*

<sup>45</sup> Ashok Gadgil, *Two Noble Truths*, in *WRITTEN IN WATER* 266 (Irene Salina ed., 2010).

<sup>46</sup> Fred Pearce, *Respect for Water*, in *WRITTEN IN WATER*, *supra* note 45, at 73.

<sup>47</sup> CLIVE AGNEW & PHILIP WOODHOUSE, *WATER RESOURCES AND DEVELOPMENT* 241 (2011).

Inorganic and toxic arsenic can be found in the groundwater in the United States of America, Chile, Mexico, China, and India.<sup>48</sup> Exposure to arsenic from drinking water can result in cancer, skin lesions, cardiovascular disease, neurotoxicity and diabetes.<sup>49</sup> In Mexico City, canals built centuries ago by the Aztecs are now being polluted and contaminated.<sup>50</sup>

Environmental author, Meena Palaniappan of the Pacific Institute explained another problem that afflicts numerous water sources in the world. In Indonesia, the Amprong River in the city of Malang “is used for bathing, for washing clothes, as a toilet for open defecation, and is also canalized to provide water for agricultural fields and used for fish farming.”<sup>51</sup> According to Palaniappan, women washed and bathed within twenty feet of a toilet of branches extending into the river.<sup>52</sup>

The developed world suffers almost as much from the effects of water pollution. The U.S. Environment Protection Agency (E.P.A.) expressed serious concern about its findings that 55% of the nation’s rivers are in “poor condition for aquatic life.”<sup>53</sup> The E.P.A. found elevated levels of nitrogen, phosphorus, bacteria, and mercury.<sup>54</sup> Nitrogen and phosphorus—two of the most common nutrients in U.S. lakes, ponds, and reservoirs—originate from fertilizer runoff and animal waste from farms as well as sewage treatment plants.<sup>55</sup>

The situation is particularly desperate in areas of the Middle East when there is only one main source of water. The Gaza Strip, home to the Palestinians and subject to periodic blockade by Israel, has only one coastal aquifer.<sup>56</sup> Amnesty International reported in 2009 that this source had

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<sup>48</sup> *Media Centre Arsenic Fact Sheet No. 372*, WORLD HEALTH ORGANIZATION (Dec. 2012), <http://www.who.int/mediacentre/factsheets/fs372/en/index.html>.

<sup>49</sup> *Id.*

<sup>50</sup> *Pollution Threatens Mexico City Water*, ALJAZEERA (June 25, 2011), <http://www.aljazeera.com/video/americas/2011/06/2011625103512893576.html>.

<sup>51</sup> Meena Palaniappan, *Multiple Uses of Water*, International Water and Communities Initiative: Notes From the Field, PACIFIC INSTITUTE (Nov. 26, 2011), [http://pacinst.org/topics/international\\_water\\_communities/notes\\_from\\_the\\_field/multiple-uses-of-water/](http://pacinst.org/topics/international_water_communities/notes_from_the_field/multiple-uses-of-water/).

<sup>52</sup> *Israel ‘Cutting Palestinian Water,’* ALJAZEERA (Oct. 27, 2009), <http://www.aljazeera.com/news/middleeast/2009/10/20091026132714361238.html>.

<sup>53</sup> *EPA Survey Finds More Than Half of the Nation’s River and Stream Miles in Poor Condition*, EPA (Mar. 26, 2013), <http://yosemite.epa.gov/opa/admpress.nsf/0/C967210C37CFFB6885257B3A004CFAF6>.

<sup>54</sup> *Israel ‘Cutting Palestinian Water,’* *supra* note 52.

<sup>55</sup> *Three Big Pollutants*, EPA (Mar. 6, 2012), <http://water.epa.gov/learn/resources.bigpollutants.cfm>.

<sup>56</sup> *Israel ‘Cutting Palestinian Water,’* *supra* note 52.

become polluted by seawater infiltration and raw sewage and been “degraded by over-extraction.”<sup>57</sup> Polluted by nitrates and fertilizers, 90% of this water is already unfit for Gaza’s population of over 1.5 million, half of them children.<sup>58</sup> By 2016, the aquifer could become unusable.<sup>59</sup> Almost 25% of all illnesses in this conflict-ridden area are water-related.<sup>60</sup>

Water pollution and its consequences are now a global problem of increasing severity and millions are daily affected. In Nigeria, the most populous African country, water vendors ply a living selling water, sometimes from rivulets “often fed by the sewer-streams that run through the middle of the streets.”<sup>61</sup>

Sometimes, the issue is not water scarcity but the terrible impact of war, revolution, terrorism, and political instability. This leads to environmental destruction and diversion of monetary resources to military requirements rather than the real needs of the people. As case in point, the Democratic Republic of the Congo contains over half of the water reserves of Africa but 51 million of its citizens—about three quarters of the population—do not have access to clean drinking water.<sup>62</sup> This tragedy is replicated in various parts of that continent. Sub-Saharan Africa utilizes only about 5% of its renewable freshwater.<sup>63</sup> The problem is not so much the scarcity of the resource, but having the lowest access rate in the world.<sup>64</sup> It is a problem created by inadequate infrastructure, economic constraints, and an absence of effective water management.<sup>65</sup> According to the United Nations, thirty-five of the forty-five most water-stressed countries in the world are in Africa, with Ethiopia and Niger leading this tragic list of nations with the least amount of available water.<sup>66</sup>

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<sup>57</sup> *Id.*

<sup>58</sup> John Vidal, *Water Crisis Will Make Gaza Strip ‘Unliveable,’* GUARDIAN, Aug. 30, 2012, <http://www.guardian.co.uk/environment/2012/aug/30/water-crisis-gaza>.

<sup>59</sup> *Id.*

<sup>60</sup> *Id.*

<sup>61</sup> Andrew Walker, *The Water Vendors of Nigeria*, BBC NEWS (Feb. 5, 2009), <http://news.bbc.co.uk/1/hi/science/nature/7867202.stm>.

<sup>62</sup> United Nations News Centre, *In Water-Rich DR Congo, 50 Million People Lack Clean Water to Drink – UN* (Mar. 22, 2011), <http://www.un.org/apps/news/printnewsAr.asp?nid=37850>.

<sup>63</sup> *World Water Development Report*, UNITED NATIONS WORLD WATER ASSESSMENT PROGRAMME (Jan. 1, 2013), [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/00\\_WWAP\\_A4\\_FLYER\\_PICA\\_WEB\\_290212.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/00_WWAP_A4_FLYER_PICA_WEB_290212.pdf).

<sup>64</sup> *Id.*

<sup>65</sup> *Id.*

<sup>66</sup> *Summary of the Report (2012)*, THE WORLD BANK, <http://web.worldbank.org/WBSITE/>

Public rage against inept government has sometimes resulted in mass protests, notably in Egypt in 2007. Egyptians have depended on the Nile River since ancient times as a source of all their water needs. However, in the present century, pollution has made the water in some parts of the Nile Delta putrid.<sup>67</sup> Dead animal carcasses float in their source of water, but people have no choice but to drink it.<sup>68</sup> Because of governmental indifference, such egregious negligence has caused tens of thousands of deaths in Egypt, leading one opposition parliamentarian to complain: “How can a country that has the Nile suffer like this? A glass of clean water is a basic right of all citizens.”<sup>69</sup> The Arab Spring revolution of 2011 deposed the dictatorial government of President Hosni Mubarak, but the water woes of that nation continue. In 2012, hundreds of people in Menoufia, an Egyptian town, fell ill with severe vomiting and diarrhea after drinking contaminated water.<sup>70</sup>

There is no doubt that awareness about the threat to water, particularly its pollution, has served to politicize a disparate group of people from farmers, to environmentalists, to indigenous peoples. In Ecuador in 2010, there was furious reaction against the Government’s plans to develop gold mining which had the potential to pollute critical water supplies.<sup>71</sup> Coal mining has generated severe problems in Northern Colombia, as explained by activist Tatiana Roa Avendano.<sup>72</sup> She revealed in April 2013 that three multinational mining companies own and operate a large open-pit coal mine in La Guajira, Colombia.<sup>73</sup> Avendano alleged that this mining operation displaced local communities with inadequately-compensated expropriations and proceeded to pollute land, air, and water supplies in the region, damaging crops and fishing.<sup>74</sup>

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EXTERNAL/EXTOED/EXTWATER/0,,contentMDK:22510243~pagePK:64829573~piPK:64829550~theSitePK:6817404,00.html.

<sup>67</sup> Farid Barsoum, *Egypt Faces Water Crisis*, ALJAZEERA (July 17, 2007), <http://www.aljazeera.com/news/middleeast/2007/07/2008525184645341324.html>.

<sup>68</sup> *Id.*

<sup>69</sup> *Id.*

<sup>70</sup> *Egypt Town Blames State for Blighted Water*, ALJAZEERA (Aug. 24, 2012), <http://www.aljazeera.com/news/middleeast/2012/08/201282491436189354.html>.

<sup>71</sup> *Ecuador: Water or Gold*, ALJAZEERA (Sept. 23, 2010), <http://www.aljazeera.com/programmes/peopleandpower/2010/08/201082585310769297.html>.

<sup>72</sup> Nikki Ray, *Activist Calls on Us to Protest Anglo American’s Colombian Mine*, WORLD DEVELOPMENT MOVEMENT (Apr. 5, 2013), <http://www.wdm.org.uk/climate-change/anglo-american%E2%80%99s-dirty-investments-protest-19-april-2013>.

<sup>73</sup> *Id.*

<sup>74</sup> *Id.*

Similar circumstances have led to competition in Chile and Peru where copper and gold mining interests vie with indigenous populations for control and use of the already scarce water supply.<sup>75</sup> The United Nations reported on the situation in the Andean highlands of Peru where in the vicinity of river headwaters, gold and silver are being mined using the open pit method on lands belonging to an indigenous community.<sup>76</sup> There have been consequent allegations, protests and some deaths.<sup>77</sup> With the increased global demand for minerals, the long-term future water-related prospects for the local populations appear bleak.

Indeed, sometimes in such complex situations, even large inflows of foreign monetary aid do little to alleviate the problem. A case in point is Afghanistan which has become a veritable money pit for foreign development aid but where, in 2011, three quarters of the population still had no access to clean water.<sup>78</sup> Tragically, the many wells built by aid agencies are no longer considered a safe source of water.<sup>79</sup> The years-long wars in Afghanistan have had a drastic impact on the environment.

The world's most populous country and an economic powerhouse also suffers from very serious water degradation.<sup>80</sup> The economic miracle of modern China has come at a terrible cost in terms of the environment. China has, by one estimate, suffered 3,600 spillage accidents from chemical industries between 1970 and 2010.<sup>81</sup> The result has been serious conflict between pollution-causing industrial plants and the public which is justifiably very concerned about the destruction of its drinking water.<sup>82</sup> Economic development seems to rule the roost in China. An estimated

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<sup>75</sup> Press Release, United Nations World Water Assessment Programme, Urbanization, Globalization and Climate Change are Creating New Challenges to Water Management in the Region of Latin America and the Caribbean, Regional Press Release WWDR4 (Mar. 12, 2012).

<sup>76</sup> Kristina Donnelly et al., *Water As A Casualty of Conflict: Threats to Business and Society in High-Risk Areas* (June 2012), available at <http://www.circleofblue.org/waternews/wp-content/uploads/2012/06/water-as-a-Casualty-of-Conflict-Threats-to-Business-and-Society-in-High-Risk-Areas.pdf>.

<sup>77</sup> *Id.*

<sup>78</sup> *Afghans' Dire Need for Clean Water*, ALJAZEERA (Aug. 14, 2011), <http://www.aljazeera.com/video/asia-2011/08/2011814103014219874.html>.

<sup>79</sup> *Id.*

<sup>80</sup> Edward Wong, *Spill in China Underlines Environmental Concerns*, N.Y. TIMES (Mar. 2, 2013), [http://www.nytimes.com/2013/03/03/world/asia/spill-in-china-lays-bare-environmental-concerns.html?pagewanted=all&\\_R=0](http://www.nytimes.com/2013/03/03/world/asia/spill-in-china-lays-bare-environmental-concerns.html?pagewanted=all&_R=0).

<sup>81</sup> *Id.*

<sup>82</sup> *Id.*

20,000 chemical factories dump uncontrolled or partially treated pollutants into China's rivers including the Yangtze.<sup>83</sup> That historic Chinese river is now straddled by the infamous Three Gorges Dam, the largest in the world. This massive project displaced over a million people, flooded 13 cities, 140 towns and 1,350 villages.<sup>84</sup> It also submerged hundreds of factories, mines, and rubbish dumps.<sup>85</sup> The reservoir has already deteriorated into a polluted cesspool, "a festering bog of effluent, silt, industrial pollutants and rubbish."<sup>86</sup> The ecosystem of the historic river is dying and there have been numerous landslides in the surrounding land.<sup>87</sup>

The Chinese have admitted to dumping 45 billion tons of untreated wastewater into that nation's lakes and rivers every year.<sup>88</sup> Seven hundred million Chinese have no choice but to drink sub-standard water. Their drinking water is contaminated with inorganic pollutants like arsenic as well as toxins generated by factory waste, agricultural chemicals and landfill waste.<sup>89</sup> Add these toxic ingredients to agricultural chemicals, and residue from landfills and the health impact of drinking such water can be gauged. There have been increases in cancer cases, particularly in areas termed "cancer villages,"<sup>90</sup> which are located near factories and heavy industries.<sup>91</sup>

There are positive signs that the Chinese government is finally paying attention to the public clamor for environmental improvement.<sup>92</sup> Unfortunately, economic priorities dominate because China still produces and utilizes toxic chemicals that are banned in many other countries.<sup>93</sup> An estimated 3,000 of China's 40,000 chemicals in use were deemed "poisonous, corrosive, explosive or combustible."<sup>94</sup> The economy versus environment controversy is currently being played out right across China.

Unfortunately for the future of the entire planet, the Chinese government has not yet sufficiently demonstrated its grasp of the long-term

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<sup>83</sup> Lucy Allen et al., *Fossil Fuels and Water Quality*, in 7 *THE WORLD'S WATER*, *supra* note 17, at 81.

<sup>84</sup> *Id.*

<sup>85</sup> *Id.*

<sup>86</sup> *Id.*

<sup>87</sup> Jacques Leslie, *A Short History of Dams*, in *WATER MATTERS*, *supra* note 43.

<sup>88</sup> MAUDE BARLOW, *BLUE COVENANT* 7 (2007).

<sup>89</sup> PETER H. GLEICK, *THE WORLD'S WATER 2008–2009*, at 81 (2009).

<sup>90</sup> *Id.*

<sup>91</sup> Jennifer Duggan, *China Comes Clean on Water Pollution*, *ALJAZEERA* (Mar. 4, 2013), <http://www.aljazeera.com/indepth/features/2013/02/20132281157538971.html>.

<sup>92</sup> *Id.*

<sup>93</sup> *Id.*

<sup>94</sup> *Id.*

environmental consequences of such unprecedented growth in the world's most populous nation. According to Peter H. Gleick, MacArthur Fellow and President of the Pacific Institute, "China has developed a set of water quality and quantity problems as severe as any on the planet."<sup>95</sup> Gleick continued: "Rivers and lakes are dead and dying, groundwater aquifers are over-pumped, uncounted species of aquatic life have been driven to extinction, and direct adverse impacts on both human and ecosystem health are widespread and growing."<sup>96</sup> In an incisive article, journalist Charles C. Mann described the impact of rapid economic development in Changzhou, historically noted for the production of silk.<sup>97</sup> Textile industries sprang up there and released their waste, inks, bleaches, detergents, and dyes into canals that fed into the Yangtze River, generating a noxious smell.<sup>98</sup> In March 2013, nearly 6,000 dead pigs were found floating in the Huangpu river in Shanghai, possibly disposed upriver to avoid police who were investigating an illicit trade in meat from diseased pigs.<sup>99</sup>

The number of such incidents has given China the global reputation of being the poster child for "breakneck economic development, which has lifted millions out of poverty but left environmental protection in shambles."<sup>100</sup> Although it has earned the dubious reputation of being one of the worst water polluters in the world, China is by no means the only country in serious environmental trouble. Almost the entire planet is now ravaged by one or other form of environmental pollution, particularly where water is concerned. Jacques Cousteau once lamented this grim reality that "[w]ater and air, the two essential fluids on which all life depends, have become global garbage cans."<sup>101</sup>

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<sup>95</sup> Press Release, Pacific Institute, Peak Water, China's Water Crisis, Climate Change Impacts Among Pressing Topics Examined by Pacific Institute (Jan. 13, 2009), [http://www.pacinst.org/press\\_center/press\\_releases/worlds\\_water\\_0809.html](http://www.pacinst.org/press_center/press_releases/worlds_water_0809.html).

<sup>96</sup> *Id.*

<sup>97</sup> Charles C. Mann, *The Rise of Big Water*, VANITY FAIR May 2007, available at <http://www.vanityfair.com/politics/features/2007/05/bigwater200705.print>.

<sup>98</sup> *Id.*

<sup>99</sup> Associated Press, *China: Dead Pigs in River Near 6,000*, N.Y. TIMES (Mar. 12, 2013), <http://www.nytimes.com/2013/03/13/world/asia/china-dead-pigs-in-river-near-6000.html>; see also David Barboza, *A Tide of Death, But This Time Food Supply is Safe*, N.Y. TIMES (Mar. 14, 2013), <http://www.nytimes.com/2013/03/15/world/asia/a-tide-of-dead-pigs-in-china-but-dinner-is-safe.html>.

<sup>100</sup> *China: Water Safe After Toxic Spill*, ALJAZEERA (Nov. 29, 2005), <http://www.aljazeera.com/archive/2005/11/20084101588656430.html>.

<sup>101</sup> COLIN CHARTRES & SAMYUKTHA VARMA, *OUT OF WATER* 119 (2011).

## III. WATER-RELATED DISEASES

By one estimate, the number of people who die from water-related diseases every day is equivalent to the loss of life from eleven jumbo jets crashing daily without any survivors.<sup>102</sup> Because they die one by one and quietly with no media coverage, their losses go largely unnoticed. Their deaths affect their families but the rest of the world does not know and so cannot care. Absent the drama of “newsworthy” catastrophe, this massive human tragedy continues each and every day, taking its terrible toll, and wreaking havoc in the lives of grief-stricken family members. Ignacio Saiz, Director of the Centre for Economic and Social Rights, explained that “[f]undamentally, these are issues of poverty and inequality, man-made problems.”<sup>103</sup>

One way to overcome the focus on the divisiveness and confrontation surrounding water is to concentrate instead on the hapless victims who are dying daily while the world’s governments seem almost oblivious to their fate. They fall ill and often die because they lack clean water to drink or to bathe in and do not have basic sanitation.<sup>104</sup> The Human Development Report for 2006 estimated that about half of all people living in developing countries suffered from some type of health problem related to water and sanitation issues.<sup>105</sup> Estimates vary widely, but all the numbers are staggering. It is estimated that about 80% of illnesses in developing nations are related to water.<sup>106</sup> Globally, approximately 5 million people die each year from waterborne diseases.<sup>107</sup> Water-related diseases are said to be killing about 2,000 children daily.<sup>108</sup> One of every five deaths of children under five is linked to a disease caused by water. Infants are at the greatest

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<sup>102</sup> Tina Rosenberg, *The Burden of Thirst*, in WATER MATTERS, *supra* note 43, at 62.

<sup>103</sup> Chris Arsenault, *Risk of Water Wars Rises With Scarcity*, ALJAZEERA (Aug. 26, 2012), <http://www.aljazeera.com/indepth/features/2011/06/2011622193147231653.html>.

<sup>104</sup> *Facts & Effective Use*, WATER AMBASSADORS CANADA, [http://www.waterambassadorscanada.org/water\\_crisis.html](http://www.waterambassadorscanada.org/water_crisis.html) (last visited Nov. 17, 2013).

<sup>105</sup> *Id.*

<sup>106</sup> Indep. Evaluation Grp., *Water and Development: An Evaluation of World Bank Support, 1997–2007*, Vol. 2, App’x G, THE WORLD BANK (2010), available at [http://siteresources.worldbank.org/INTWATER/Resources/water\\_vol2.pdf](http://siteresources.worldbank.org/INTWATER/Resources/water_vol2.pdf).

<sup>107</sup> Alex Kirby, *Water Scarcity: A Looming Crisis?*, BBC NEWS (Oct. 19, 2004), <http://news.bbc.co.uk/go/pr/fr/-/1/hi/sci/tech/3747724.stm>.

<sup>108</sup> *The Water and Sanitation Crisis*, END WATER POVERTY, <http://www.endwaterpoverty.org/water-and-sanitation-crisis>.

risk from drinking and being bathed in polluted water.<sup>109</sup> About 90% of the deaths related to unsafe water are those of children under the age of five.<sup>110</sup> It is ironic and tragic that water, the elixir of life, should also be the cause of so much illness and death. Microbial contaminants and industrial and agricultural chemicals<sup>111</sup> are largely to blame for all this suffering. The poor suffer the most because they have no choice but to drink any available water, which is, in far too many cases, seriously polluted. Inadequate sanitary facilities also cause disease and death.

The people of the world have a strange way of demonstrating their priorities in life. There is a certain bizarre aspect to the realization that there are more mobile phones worldwide than there are toilets.<sup>112</sup> The United Nations estimates that 6 billion of the world's present 7 billion people have cell phones but only 4.5 billion have access to toilets.<sup>113</sup> To give just one example, women in rural India carry their cell phones as they walk long distances to fetch water.<sup>114</sup> As author Charles Fishman commented, "you shouldn't have a working cell phone but no water. That's ridiculous."<sup>115</sup>

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The scale of the inadequate sanitation problem prompted United Nations Deputy Secretary-General, Jan Eliasson, to call for an urgent end to the crisis that leaves 2.5 billion people without basic sanitation.<sup>116</sup> Despite all the calls for urgent alleviation, this terrible situation appears unlikely to improve in time to meet the Millennium Development Goals set by the United Nations, targeting major improvement by 2015.<sup>117</sup>

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<sup>109</sup> *Improving Health in Africa Begins With Water*, THE WATER PROJECT, <http://thewaterproject.org/health.asp> (last visited Nov. 17, 2013).

<sup>110</sup> Meena Palaniappan et al., *Water Quality*, in *THE WORLD'S WATER*, *supra* note 26, at 61.

<sup>111</sup> *Id.* at 57.

<sup>112</sup> United Nations News Centre, *Deputy UN Chief Calls for Urgent Action to Tackle Global Sanitation Crisis*, UNITED NATIONS (Mar. 21, 2013), <http://www.un.org/apps/news/printnews.asp?nid=44452>.

<sup>113</sup> *Id.*

<sup>114</sup> *Q & A: Water Crisis Is Serious But Solutions Are At Hand*, RADIO FREE EUROPE RADIO LIBERTY (Aug. 26, 2012), <http://www.rferl.org/content/world-water-week-stockholm-crisis/24688200.html> (Interview by Eugen Tomiuc with Charles Fishman).

<sup>115</sup> *Id.*

<sup>116</sup> United Nations News Centre, *supra* note 112.

<sup>117</sup> UNICEF WHO, Joint News Release, *Millennium Development Goal Drinking Water Target Met Sanitation Target Still Lagging Far Behind* (Mar. 6, 2012), [http://whoint/mediacentre/news/releases/2012/drinking-water\\_20120306/en/index.html](http://whoint/mediacentre/news/releases/2012/drinking-water_20120306/en/index.html).

The poor are most at risk because they lack both clean water and toilets and also because they do not have easy access to physicians and medicines. They simply do not have the education or the means to focus on personal hygiene and their vulnerability to disease is therefore much greater. The tragedy of this aspect of the water crisis is that so many of these illnesses are avoidable and so many of these deaths are preventable.

The World Health Organization has estimated that diarrhea kills about 2 million people every year.<sup>118</sup> Water pollution and inadequate sanitation and hygiene are estimated by the World Health Organization to be the cause of 88% of these deaths.<sup>119</sup> The populations of Southeast Asia and Africa suffer significantly from this disease.<sup>120</sup>

Children under five are the most vulnerable and comprise over 90% of the deaths linked to water-related diseases.<sup>121</sup> In 2013, Sierra Leone continues to be afflicted with high child and maternal mortality rates.<sup>122</sup> The birth of a child in Tanzania is celebrated with gifts given to the mother, the most prized being a quantity of clean water.<sup>123</sup> It is prized because it is rare. Tragically, about 700,000 children are estimated to die each year from diarrhea.<sup>124</sup> In just one country, the Democratic Republic of Congo, over 2 million children under five suffer regularly from diarrhea.<sup>125</sup> Children under five make up almost three-quarters of the number who die from diarrhea and lower respiratory infections.<sup>126</sup> Additionally, childhood diarrhea is linked medically to malnutrition and this can be traced to unsafe water, resulting in 35% of all deaths worldwide of children under five.<sup>127</sup> In 2006, UNICEF

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<sup>118</sup> *Water Sanitation Health: Burden of Disease and Cost-Effectiveness Estimates*, WORLD HEALTH ORGANIZATION, [http://www.who.int/water\\_sanitation\\_health/diseases/burden/en/index.html](http://www.who.int/water_sanitation_health/diseases/burden/en/index.html) (last visited Oct. 31, 2013).

<sup>119</sup> *Id.*

<sup>120</sup> Palaniappan et al., *supra* note 110, at 57.

<sup>121</sup> *Id.* at 61.

<sup>122</sup> UNICEF, News Note, *UNICEF Provides 73 Motorbikes for Water and Sanitation Projects As Part of Accelerating Efforts to Reaching the Millennium Development Goals* (Apr. 12, 2013), [http://www.UNICEF.org/media\\_68723.html](http://www.UNICEF.org/media_68723.html).

<sup>123</sup> Kathy Robb, *On The Heads Of Women*, in WRITTEN IN WATER, *supra* note 45, at 255.

<sup>124</sup> Modupeola Dovi, *The Plight of Refugees: Southern Sudan's Water Crisis*, CAJ (Sept. 3, 2012, 7:52 AM), [http://www.consultancyafrica.com/index.php?option=com\\_content&view=article&id=11=1112:the-plight-of-refugees-southern-sudans-water-crisis&catid=61:hiv-aids-discussion-papers&Itemid=268](http://www.consultancyafrica.com/index.php?option=com_content&view=article&id=11=1112:the-plight-of-refugees-southern-sudans-water-crisis&catid=61:hiv-aids-discussion-papers&Itemid=268).

<sup>125</sup> United Nations News Centre, *supra* note 62.

<sup>126</sup> Larry West, *Cleaning Up the Environment Could Save 13 Million Lives Annually Report Shows*, ABOUT, <http://environment.about.com/od/healthenvironment/a>.

<sup>127</sup> Palaniappan et al., *supra* note 110, at 57.

estimated that 1.5 million children died annually because of unsafe water.<sup>128</sup> The same agency reported in 2011 that 21,000 children under five die every day, 15% from diarrhea.<sup>129</sup> The death rate for children under five is still highest in Africa, with water-related illness dominating as a cause.<sup>130</sup>

Cholera has also taken its toll, one outbreak in Latin America in 1991 resulted in the death of thousands.<sup>131</sup> The majority of those cases occurred in communities lacking clean water and sanitary waste disposal facilities.<sup>132</sup> Globally, cholera cases are increasing and this disease afflicts between 3 million and 5 million people annually, killing over 100,000 of its victims.<sup>133</sup> Typhoid, also a water-related disease, is estimated to kill about 600,000 people annually.<sup>134</sup> “Millions are blinded, disabled, or malnourished because of water-borne illness or pollutants.”<sup>135</sup> The terrible list of fatal and debilitating diseases also includes dengue fever, polio, guinea-worm disease, and river blindness, which affect the poor disproportionately.<sup>136</sup> Similarly millions fall ill from arsenic poisoning, hepatitis and schistosomiasis.<sup>137</sup> The physical and cognitive development of children can be affected if they contract any of the 133 million annual cases of hookworm, roundworm and whipworm.<sup>138</sup>

One of the world’s foremost experts on the water crisis and President of the Pacific Institute, Peter Gleick, has estimated that by 2020 approximately 76 million people could die from water-related diseases. Such illnesses would take a greater toll on human life than the AIDS epidemic. Gleick

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<sup>128</sup> *Id.* at 61.

<sup>129</sup> FISHMAN, *supra* note 1, at 235.

<sup>130</sup> GLEICK, *supra* note 26, at 257.

<sup>131</sup> Jonathon Weigel & Paul Farmer, *Cholera and the Road to Modernity: Lessons from One Latin American Epidemic for Another*, Q. AMERICAS (Summer 2012), <http://www.americasquarterly.org/cholera-and-the-road-to-modernity>.

<sup>132</sup> *Id.*

<sup>133</sup> UNITED NATIONS WORLD WATER DEV. REP. 4, at 1, 104 (2012), available at [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/so/pdf/WWDR4%20Volume\\$201-Managing%20Water%20under%20Uncertainty%20and%20Risk.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/so/pdf/WWDR4%20Volume$201-Managing%20Water%20under%20Uncertainty%20and%20Risk.pdf).

<sup>134</sup> Palaniappan et al., *supra* note 110, at 58.

<sup>135</sup> *Water and Development Report*, *supra* note 106, at 2, 21.

<sup>136</sup> *Id.*

<sup>137</sup> PRABHA KHOSLA & REBECCA PEARL, UNTAPPED CONNECTIONS: GENDER, WATER AND POVERTY, WOMEN’S ENVIRONMENTAL AND DEVELOPMENT ORGANIZATION (2003).

<sup>138</sup> Palaniappan et al., *supra* note 110, at 61.

commented, “This largely hidden tragedy ranks as one of the greatest development failures of the 20th century.”<sup>139</sup>

Calling water “the world’s most prolific killer,” Ellen Johnson Sirleaf, President of Liberia, Nobel Peace Prize winner and Goodwill Ambassador for Water, Sanitation and Hygiene in Africa, explained the contradictory impact of this resource: “Water has the power to enhance life; it also has the power to destroy it.”<sup>140</sup> She made the remark in an interview to mark World Water Day 2013.<sup>141</sup> Many notable environmental advocates keep urging rapid action but there is not yet enough political will to remedy this terrible situation.

Global access to clean water and adequate sanitation are fundamental needs in our time and the world cannot afford to delay resolution of this crisis. The toll in human life, in human health and in global productivity demand urgent action. As this Article will show, the member states of the United Nations have prepared any number of significant formulations declaring water a human right and providing ample philosophical justification and incentive for all governments to take action. What is desperately needed is the will to undertake action. Although there have been improvements, these have not kept pace with population growth or the scale of the crisis. The cost in human misery and death will continue to be high. By one estimate, clean water could reduce water-related deaths by 21%, sanitation could reduce water-related deaths by over 37% and hand washing could reduce water-related deaths by 35%.<sup>142</sup>

#### IV. THE MANY SOURCES OF WATER

Viewed from outer space, planet Earth’s color is a prevailing shade of blue, demonstrating the presence of water in most parts of the world. It is estimated that between 70%<sup>143</sup> and 75% of the planet is “blue,” but only

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<sup>139</sup> Press Release, Pacific Institute, 76 Million Could Perish From Water-Related Disease by 2020 (Aug. 15, 2002), *available at* [http://www.pacinst.org/reports/water\\_related\\_deaths/press\\_release.htm](http://www.pacinst.org/reports/water_related_deaths/press_release.htm).

<sup>140</sup> Ellen Johnson Sirleaf, *Developing Water and Sanitation for a Better Future*, ALJAZEERA (Mar. 23, 2013), <http://www.aljazeera.com/indepth/opinion/2013/03/201332317304944534.html> (statement made as part of an interview marking World Water Day 2013).

<sup>141</sup> *Id.*

<sup>142</sup> *Why Water*, CHARITY: WATER, <http://www.charitywater.org/whywater/> (last visited Nov. 12, 2013).

<sup>143</sup> *Freshwater Crisis*, *supra* note 19, at 9.

2.5% of that is fresh water and of use to human and animal life on earth.<sup>144</sup> Only 1% of the Earth's freshwater is relatively easily accessible as the remainder constitutes glaciers and icefields at the North and South poles.<sup>145</sup> There are additional sources in mountainous regions.<sup>146</sup> Unfortunately, it is clear that the world's glaciers are retreating at an alarming pace. Over one-sixth of the population on this planet is dependent on water provided by glaciers and snowpacks.<sup>147</sup> In Africa, the beautiful and legendary Mount Kilimanjaro has lost 85% of its ice cap since 1912.<sup>148</sup> Asia is facing the prospect of losing its so-called "Water Tower," the 36,000 glaciers that constitute the source of major rivers that are vital to that continent.<sup>149</sup> By one estimate over 80% of these glaciers are retreating. Their waters provide freshwater sustenance to millions through several major rivers: the Indus, the Ganges, the Brahmaputra, the Salween, the Mekong, the Yangtze, and the Hwang.<sup>150</sup> If these vital glaciers, shrinking so quickly now, lose four-fifths of their area by 2030, over a billion people in Asia will have lost a vast natural reservoir of freshwater.<sup>151</sup> Admittedly estimates of glacial melt and the causes for their disappearance vary widely.<sup>152</sup> However, common sense warns us that the trend of glaciers retreating and melting cannot be reversed while global warming afflicts this planet. Anecdotally, albeit non-scientifically, there are numerous reports of retreating glaciers emanating from many countries.

The situation is said to be dire in Latin America. In the past quarter century, Peru's famous glaciers have retreated by 30%, "imperilling the delicately balanced ecosystem of the Andean region, and killing off crops,

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<sup>144</sup> Wheeler, *supra* note 11.

<sup>145</sup> *Freshwater Crisis*, *supra* note 19; *Access to Water and Sanitation*, WSSINFO.ORG, <http://www.wssinfo.org/guided-tours/access-to-watsan/>; Wheeler, *supra* note 11.

<sup>146</sup> Igor A. Shiklomanov, *World Water Resources and Their Use*, St. Petersburg (1999), <http://webworld.unesco.org/water/ihp/db/shiklomanov/index.shtml>.

<sup>147</sup> Wheeler, *supra* note 11.

<sup>148</sup> JONES, *supra* note 16, at 254.

<sup>149</sup> *Id.*

<sup>150</sup> *Id.*

<sup>151</sup> Richard Black, *Water—Another Global 'Crisis'?*, BBC NEWS (Feb. 2, 2009), <http://news.bbc.co.uk/2/hi/science/nature/7865603.stm>.

<sup>152</sup> See, e.g., Moises Velasquez-Manoff, *What's Really Causing Himalayan Glaciers to Melt?*, CHRISTIAN SCI. MONITOR (Feb. 8, 2010), <http://www.csmonitor.com/Environment/Bright-Green/2010/0208/What-s-really-causing-Himalayan-glaciers-to-melt>.

livestock and livelihoods.”<sup>153</sup> In 2009, Bolivia’s highest glacier, Chacaltaya, simply melted away entirely.<sup>154</sup> About 30 million people in Latin America depend on glaciers for their water supply.<sup>155</sup> Drought already plagues large regions in that continent.<sup>156</sup> Countries dependent on glaciers as a source for fresh drinking water are likely to suffer greater problems as the world’s climate and other factors eat away at this significant source of ancient water.

North America is also under threat. According to Jay Famiglietti, by 2100, 90% of the snowpack covering the Californian Sierra Mountains will disappear.<sup>157</sup> This ice is the source for 25% of Southern California’s water supply.<sup>158</sup>

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More easily accessible fresh water is estimated to total only about 0.3% of the global water supply and that comes from rivers and lakes,<sup>159</sup> many of which are now too polluted for safe use by humans and animals. Human beings are still drawn to live near rivers, a significant source of water from ancient to modern times. About 40% of the Earth’s people reside within the approximately 260 international river basins that cover almost half of the planet’s land surface.<sup>160</sup> The United Nations Environment Program reported that “in developing countries, rivers downstream from major cities are little cleaner than open sewers.”<sup>161</sup> Ironically and tragically, India’s holiest river, the Ganges, is also said to be one of the most polluted on earth. World Watch Institute reported that three hundred gallons of raw sewage were dumped into the Ganges every minute.<sup>162</sup> The Yamuna River, so much a part

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<sup>153</sup> Alice Harrison, *A Call for Transparency From the Foothills of the Andes*, TRANSPARENCY INTERNATIONAL (July 31, 2012), <http://blog.transparency.org/2012/07/31/a-call-for-transparency-from-the-foothills-of-the-andes/>.

<sup>154</sup> Bill McKibben, *A World That Works*, in WRITTEN IN WATER, *supra* note 45, at 105 (Irene Salina ed., Washington D.C.: National Geographic 2010).

<sup>155</sup> Press Release, *supra* note 75.

<sup>156</sup> *Id.*

<sup>157</sup> Weber, *supra* note 4, at 15.

<sup>158</sup> *Id.*

<sup>159</sup> Hillary Mayell, *UN Highlights World Water Crisis*, NAT’L GEOGRAPHIC NEWS (June 5, 2003), <http://news.nationalgeographic.com/news/pf/23295728.html>.

<sup>160</sup> Claudia Sadoff et al., *Key Messages*, in SHARE: MANAGING WATER ACROSS BOUNDARIES 6 (Claudia Sadoff et al., 2008).

<sup>161</sup> Paul Alois, *Global Water Crisis: Overview*, ARLINGTON INST. (Apr. 2007), <http://www.arlingtoninstitute.org/wbp/global-water-crisis/441> (internal quotations omitted).

<sup>162</sup> Mayell, *supra* note 159.

of Indian history and culture, is now deemed clinically dead. In Africa, the once beautiful Lake Victoria, the source of the Nile, has become an open sewer.<sup>163</sup>

Unfortunately, many of the world's rivers no longer reach the sea because so much of their flow is diverted by dams, reservoirs and irrigation channels en route. Mark Smith, head of the Water Programme at the International Union for the Conservation of Nature, explained that the Yellow River (China) and the Murray-Darling (Australia) require annual dredging at the mouth of these rivers to prevent them from drying up.<sup>164</sup>

In the past three decades, China has lost more than 25,000 of its rivers which have just dried up and disappeared.<sup>165</sup> The United Nations has numbered China among the thirteen countries most adversely affected by water shortages.<sup>166</sup> British environmental author Fred Pearce noted the number of major rivers that no longer reach the sea because of diversion and over-exploitation. These include the Colorado and Rio Grande (United States), the Nile (Egypt), the Yellow River (China), the Indus (South Asia), the Murray (Australia), the Jordan (Middle East), and the Oxus (Central Asia).<sup>167</sup>

Rivers, once so inviting for humanity to settle, build elaborate civilizations, and provide drinking and bathing water, laundry facilities, navigation, and food in the form of fish have been ill-served for their generosity. Human beings have polluted them to the point of killing all life and creating dead zones; diverted them into so many canals and channels that the flow has been terminated with serious environmental impact; straddled them with dams to control them and turned once pristine waters into veritable cess pools of filth and sludge. Our dying rivers are now not sustaining us as they did once and that situation is unlikely to improve unless the world collectively takes decisive action.

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Water from underground aquifers is very important for agriculture and multiple other domestic uses. Although estimates vary, groundwater that comes from rock and soil underground is thought to raise the amount of

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<sup>163</sup> BARLOW, *supra* note 88, at 7, 9.

<sup>164</sup> Black, *supra* note 151.

<sup>165</sup> Richard Angwin, *Where Have All the Rivers Gone?*, ALJAZEERA (Mar. 30, 2013), <http://www.aljazeera.com/weather/2013/03/201333091446488757.html>.

<sup>166</sup> *Id.*

<sup>167</sup> BARLOW, *supra* note 88, at 12 (citing research of Fred Pearce).

accessible freshwater to about 0.83%,<sup>168</sup> still a miniscule figure for a planet that looks so invitingly blue from outer space. “[W]orldwide, the use of groundwater from nonrenewable sources more than tripled between 1960 and 2000.”<sup>169</sup>

The relative ease of access via pump technology has led to serious depletion problems in many countries. In some parts of India, the aggressive withdrawals of water through pumping have resulted in 50% more depletion than the aquifers can replenish.<sup>170</sup> Indians have been draining their aquifers with little thought to the needs of future generations, often withdrawing and selling water in tankers that supply agricultural and domestic needs across the country. Water withdrawal has become a money-making business in India for those fortunate enough to own land with access to water. The situation in India is replicated in other countries.

A team assessing and evaluating World Bank water projects found that “[g]roundwater is increasingly threatened by overexploitation, inadequate environmental flows, and contamination.”<sup>171</sup> Herbicides, pesticides, fertilizers, and even saline water have infiltrated ground water sources and caused serious toxicity.<sup>172</sup>

UNESCO has estimated that approximately 99% of freshwater is derived from aquifers with around 2 billion people relying exclusively on this source of water.<sup>173</sup> There has been a dangerous dependency on aquifers for water, particularly for agricultural usage. It has aptly been said that the “over-exploitation of groundwater is a time-bomb which threatens the viability of agriculture across the world—from the plains of North East China, to the bread bowl of America.”<sup>174</sup> The Arlington Institute pointed out that aquifers are facing serious depletion in the western United States, northern Iran, north-central China, India, Mexico, Australia, and “numerous other

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<sup>168</sup> *The Earth's Water*, WATERKEEPER ALLIANCE, <http://www.waterkeeper.org/what-we-do/why-water/learn-more/> (last visited Nov. 12, 2013).

<sup>169</sup> *Much Irrigation Water Comes From Non-Sustainable Sources*, PHYS.ORG (Jan. 31, 2012), <http://phys.org/news/2012-01-irrigation-non-sustainable-sources.html> (referencing Y. Wada & L.P.H. van Beek's water resources research).

<sup>170</sup> Wenonah Hauter, *Industrial Agriculture's Water Use: It's Time for Change*, in WATER MATTERS, *supra* note 43, at 68.

<sup>171</sup> Independent Evaluation Group, *supra* note 106, at 36.

<sup>172</sup> FOOD & AGRIC. ORG. OF THE UNITED NATIONS, AGRICULTURE, FOOD AND WATER 26 (FAO 2003) [hereinafter FAO REPORT].

<sup>173</sup> Cooley et al., *supra* note 17, at 3.

<sup>174</sup> Christopher Gasson, “Don't Waste a Drop”—*Water in Mining*, GLOBAL WATER INTELL. (Oct. 2011), <http://www.globalwaterintel.com/dont-waste-drop-water-mining/>.

locations.”<sup>175</sup> In Jakarta, Indonesia, a shallow aquifer supplying water to poorer areas of the city has been contaminated with industrial effluent, wastewater, and salinization, caused by seawater infiltration because of over-pumping.<sup>176</sup>

The over-use of aquifer water and consequent depletion causes subsidence of the ground. Mexico City is a case in point of an urban center that is sinking at a rate of a few inches or six feet a year (estimates vary).<sup>177</sup> The water table under Beijing, China, has fallen about 200 feet, a calamity in the making that might someday occasion a search for a new capital city.<sup>178</sup> Sink holes are appearing in numerous parts of the world.

Over-exploitation of groundwater has created other problems. A potential crisis looms over Sana'a, Yemen, which is likely to be the first capital city in the world to run out of water.<sup>179</sup> Its water table had dropped from thirty meters below surface during the 1970s to twelve hundred meters by 2012.<sup>180</sup> Absent drastic measures, this could be the fate of other cities in the future. Ironically, almost half of the agricultural water in Yemen is used for the cultivation of a narcotic plant called qat, leaving half of the population “food insecure.”<sup>181</sup> Yemen has in 2013 been listed by the Food and Agriculture Organization as being one of the low-income food deficit countries.<sup>182</sup> Yemen has also been called the poorest Arab country and, although its crises are frequently blamed on tribal rivalries, the environmental scarcities could be at the root of violence between communities.<sup>183</sup>

Also under serious threat are sources of ‘fossil groundwater,’ aquifers that filled over millions of years<sup>184</sup> that are not “actively recharged,” and represent “a valuable but exhaustible resource.”<sup>185</sup> Deploring this depletion, Fred Pearce of National Geographic commented that “[w]e are emptying these giant natural reservoirs far faster than the rains can refill them. The

<sup>175</sup> Alois, *supra* note 161.

<sup>176</sup> KAREN BAKKER, *PRIVATIZING WATER* 112 (2010).

<sup>177</sup> Rhodri Davies, *Mexico City's Water Crisis*, ALJAZEERA, <http://www.aljazeera.com/focus/2010/03/201032982731685235.html> (last modified Apr. 22, 2010).

<sup>178</sup> BARLOW, *supra* note 88, at 14.

<sup>179</sup> *Time Running Out for Solution to Yemen's Water Crisis*, GUARDIAN (Aug. 27, 2012), <http://www.guardian.com/global-development/2012/aug/27/solution-yemen-water-crisis>.

<sup>180</sup> *Id.*

<sup>181</sup> *Id.*

<sup>182</sup> Food & Agric. Org. of the United Nations, *Low-Income Food Deficit Countries-List for 2013*, FAO, <http://www.fao.org/countryprofiles/lifdc/en/> (last visited Jan. 2, 2014).

<sup>183</sup> Arsenaault, *supra* note 103.

<sup>184</sup> McKibben, *supra* note 43, at 21.

<sup>185</sup> FAO REPORT, *supra* note 172.

water tables are falling, the wells have to be dug ever deeper, and the pumps must be ever bigger. We are mining water now that should be the birthright of future generations.”<sup>186</sup>

The developed world is also steadily depleting its aquifers. The Ogallala aquifer, underlying eight states in the western United States, has been severely depleted, mainly to sustain agriculture.<sup>187</sup> Extending from South Dakota to Texas, this once pristine water is also being polluted with fertilizers and pesticides turning irrigation into ‘chemigation,’ endangering future supplies and demonstrating a triumph of cleverness over wisdom.<sup>188</sup> Those cynical comments could be appropriately applied to all the other countries where the present generations have been allowed wantonly to loot and waste the water resources by individually pumping out vast amounts of water. Expediency has prevailed over principle and future generations will undoubtedly suffer.

## V. WATER SCARCITY

One reason why all of us are facing so much water scarcity relates to humanity’s traditional notion of viewing water as a free gift from Nature. Water as a historically free resource has generated a sense of complacency that can no longer continue. There have not been sufficient incentives to conserve water, domestically, industrially or in the realm of agriculture.<sup>189</sup>

Statistical estimates on this subject vary but the overarching conclusions are largely consistent, highlighting a crisis that is already affecting millions and can only worsen in scope and impact. The World Water Council estimated in 2010 that while global population tripled during the twentieth century, freshwater usage increased six-fold.<sup>190</sup> By one estimate, globally, annual freshwater availability per capita decreased between 1950 and 2000 from 16,800 cubic meters to 6,800 cubic meters.<sup>191</sup>

A number of experts and environmental writers, some at the United Nations, have concluded optimistically that there is still enough water for the

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<sup>186</sup> Fred Pearce, *Grabbing Water From Future Generations*, NAT’L GEOGRAPHIC DAILY NEWS (Dec. 19, 2012), <http://news.nationalgeographic.com/news/2012/12/121218-grabbing-water-from-future-generations/>.

<sup>187</sup> Hauter, *Industrial Agriculture’s Big Thirst*, in WATER MATTERS, *supra* note 43, at 68.

<sup>188</sup> ROBERT SANDFORD, RESTORING THE FLOW 189–94 (2009).

<sup>189</sup> See Luis S. Pereira et al., *Water Scarcity*, IUNESCO, Technical Documents in Hydrology No. 58 (2002).

<sup>190</sup> AGNEW & WOODHOUSE, *supra* note 47, at 17.

<sup>191</sup> Grover, *supra* note 3, at 13.

earth's present population. On a positive note, "there is still the same amount of water in the world today as there was ten million years ago."<sup>192</sup> However, as they uniformly admit, this water is distributed unevenly. To give just one example, the countries comprising the Middle East and North Africa are home to approximately 5% of global population but have only 1% of accessible water.<sup>193</sup> This inequity between supply and demand underlies the scarcity aspect of the global water crisis.

Additionally, significant amounts of water are lost because of inefficient agriculture, leaking pipes, aging infrastructure, and this problem occurs in rich and poor countries. Formerly pristine water sources are no longer available for human consumption, rivers, lakes, and even aquifers have been exploited and polluted, used as dumps for garbage from farms, industries and urban communities. Many bodies of water, once teeming with life, are now dead zones. These are the factors that individually and cumulatively contribute to the creation of the global water crisis.

The United States Geological Survey estimates that the world's total water supply consists of about 332.5 million cubic miles of water, of which 96% is saline.<sup>194</sup> Freshwater occupies less than 1% of the surface of the Earth and is found in rivers, lakes, swamps, lagoons, bogs and estuaries<sup>195</sup> in varying conditions of health from the pristine to the totally polluted.

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Additionally, some water sources such as wetlands are disappearing under the demands of urban sprawl and the need for commercial buildings, housing and, parking lots. Wetlands have multiple roles in the water cycle. Among numerous other functions, they help to stabilize ecosystems, retain nutrients and sediment, and control soil erosion. By one estimate about 50% of the world's wetlands were lost during the century just past.<sup>196</sup> A survey suggested that over 80% of wetlands in the North China Plain have

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<sup>192</sup> Gasson, *supra* note 174.

<sup>193</sup> *Middle East Faces Water Crisis*, ALJAZEERA, <http://www.aljazeera.com/archive/2003/09/20084101542942308.html> (last modified Sept. 21, 2003).

<sup>194</sup> *Global Water Distribution*, U.S. GEOLOGICAL SURVEY, <http://ga.water.usgs.gov/edu/watercycle.html> (last visited Sept. 4, 2013).

<sup>195</sup> Jackie King & Cate Brown, *Inland Water Ecosystems*, in WATER RESOURCES PLANNING AND MANAGEMENT, *supra* note 7, at 23.

<sup>196</sup> *Top 5 Questions About Water*, WORLD WILDLIFE FUND, [http://www.panda.org/about\\_our\\_earth/top\\_5-environmental\\_questions/faq\\_freshater\\_qa/](http://www.panda.org/about_our_earth/top_5-environmental_questions/faq_freshater_qa/) (last visited Jan. 3, 2014).

disappeared.<sup>197</sup> By contrast, the world's drylands have been expanding by about 2% per decade since 1950.<sup>198</sup>

All this has occurred despite the existence since 1971 of an important international convention to protect wetlands. This Ramsar Convention (from the name of the city in Iran where the text was formally agreed) entered into force in 1975.<sup>199</sup> These United Nations formulations do alert the world and increase awareness of problems but somehow, tragically, the violations of the environment continue unabated. In February 2013, in acknowledgment of the serious crisis affecting wetlands, various international organizations including the Secretariat of the Ramsar Convention united to publish a report on the crisis facing wetlands.<sup>200</sup> The Report explained that “[w]hen we destroy wetlands, we disrupt nature’s water cycle and its ability to provide water for households and farms. So inadvertently we add to the suffering of the poor.”<sup>201</sup> The Report highlighted the imperative necessity for restoring and protecting wetlands to cope with various challenges including water scarcity.<sup>202</sup>

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Water scarcity is inevitably linked to drought and is its most painful consequence. The human role in causing drought and desertification would require a separate article of equal length. Here, suffice it to say that the United Nations has estimated that land affected by drought has doubled since the 1970’s, with about 168 countries now vulnerable to desertification, “a process of land degradation in the drylands that affects food production and is exacerbated by drought.”<sup>203</sup> Since 1900, the death toll from drought is

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<sup>197</sup> Allen et al., *supra* note 83, at 86.

<sup>198</sup> United Nations News Centre, *Risk-Management Strategies Needed to Make Societies Drought-Resilient*, U.N. (Mar. 14, 2013), <http://www.un.org/apps/news/printnewsAr.asp?nid=44383>.

<sup>199</sup> *A Brief History of the Ramsar Convention*, RAMSAR (May 8, 2013), [http://www.ramsar.org/cda/en/ramsar-about-history/main/ramsar/1-36-62\\_4000\\_0\\_\\_](http://www.ramsar.org/cda/en/ramsar-about-history/main/ramsar/1-36-62_4000_0__).

<sup>200</sup> *Urgent Need to Focus on Wetlands as Natural Solutions to Global Water Crisis*, INT’L UNION FOR CONSERVATION OF NATURE (Feb. 1, 2013), <https://www.iucn.org/about/union/members/?11840/Urgent-need-to-focus-on-wetlands-as-natural-solutions-to-global-water-crisis>.

<sup>201</sup> *Id.*

<sup>202</sup> *Id.*

<sup>203</sup> United Nations News Centre, *UN Spotlights Need for Policies to Increase Countries’ Resilience Against Drought*, U.N. (Mar. 8, 2013), <http://www.un.org/apps/news/printnewsAr.asp?nid=44321>.

estimated at 11 million with 2 billion having suffered from this calamity.<sup>204</sup> The Food and Agriculture Organization estimated that two-thirds of the African continent is classified as desert or drylands.<sup>205</sup>

One of the greatest tragedies has afflicted the Sahel region of Africa where drought and political conflict have forced thousands from their homes and put 1 million children at risk of death from malnutrition.<sup>206</sup> Once a flourishing producer of crops, the Sahel has experienced erratic rainfall and a drought that scientists believe began in the 1960s.<sup>207</sup>

In 2011, thousands of Somalis, environmental refugees, fled their country and sought refuge in camps in Kenya.<sup>208</sup> Other regions of Africa like the fabled state of Zanzibar have also suffered as rains have been sporadic and reservoirs have not been replenished sufficiently.<sup>209</sup> In 2006, this historical island was forced to ration water to its 1 million inhabitants.<sup>210</sup> Erratic rainfall, drought and increased food prices caused serious hardship and hunger in Malawi, Zimbabwe, and Lesotho.<sup>211</sup>

Desertification, depleted water resources, and drought have similarly afflicted areas of the Middle East. The United Nations World Water Assessment Programme estimated in 2012 that “[n]early all Arab countries suffer from water scarcity, with water consumption significantly exceeding total renewable water supplies.”<sup>212</sup> About twelve countries in the Arab and Western Asian region are classified as suffering absolute water scarcity, which implies having less than 500 cubic meters of renewable water per head per year.<sup>213</sup>

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<sup>204</sup> UN News Centre, *Cooperation Key to Drought Prevention, UN Officials Stress at High-level Meeting*, U.N. (Mar. 11, 2013), <http://www.un.org/apps/news/printnewsAr.asp?nid=44339>.

<sup>205</sup> United Nations News Centre, *African Nations Strive to Stem Desertification with a ‘Great Green Wall,’* U.N. (Apr. 16, 2013), [http://www.un.org/apps/news/story.asp?NewsID=44671#.UnP\\_BZS8Ccpp](http://www.un.org/apps/news/story.asp?NewsID=44671#.UnP_BZS8Ccpp).

<sup>206</sup> *Sahel Region Faces Malnutrition Crisis*, ALJAZEERA (May 5, 2012), <http://www.aljazeera.com/video/africa/2012/05/201255161255179690.html>.

<sup>207</sup> Steff Gaultier, *Analysis: Understanding the Sahel Drought*, ALJAZEERA (June 22, 2012), <http://www.aljazeera.com/indepth/spotlight/saheldrought/2012/06/2012616174721352901.html>.

<sup>208</sup> Peter Greste, *Refugees in Kenya Seek Water*, ALJAZEERA (July 16, 2011), <http://www.aljazeera.com/video/africa/2011/07/2011716104013626609.html>.

<sup>209</sup> *Zanzibar Imposes Water Rationing*, ALJAZEERA (Jan. 7, 2006), <http://www.aljazeera.com/archive/2006/01/2008410115056523853.html>.

<sup>210</sup> *Id.*

<sup>211</sup> United Nations News Centre, *Over 3.5 million people in drought-hit areas of Africa to receive food relief from UN*, U.N. (Nov. 30, 2012), <http://www.un.org/apps/news/printnewsAr.asp?nid=43641>.

<sup>212</sup> United Nations World Water Dev. Rep., *supra* note 133, at 210.

<sup>213</sup> *Id.*

In Brazil, the worst drought in four decades has affected millions and caused serious deprivation as crops have withered.<sup>214</sup> Human suffering has been intense in areas that were previously stressed because the population already had to endure limited access to water. For those in rural areas already living subsistence economic lives, the additional problems have been a heavy burden. Describing the havoc caused by drought, journalist Gabriel Elizondo contrasted the lives of the poor with the luxury of air-conditioned hotels in Rio, where international delegates gathered in 2012 to debate ways to improve access to water and save the planet.<sup>215</sup> Introducing his readers to ninety-five year old drought survivor, Jose Vincente da Rocha, Elizondo articulated the irony of the situation: “Da Rocha doesn’t have the luxury of simply deliberating the theoretical scenarios of access to water. He is living it. And so are millions of other Brazilians right now.”<sup>216</sup>

The economic boom in China has been denounced by environmentalists for causing water scarcities. China faces increasing water shortages, particularly in the north. By one estimate, “[e]very year, a new desert the size of Rhode Island is created in China.”<sup>217</sup> It is interesting to note that as the world’s most populous and probably most efficient totalitarian dictatorship, China may be well positioned to tackle its environmental problems decisively. As a dictatorship, it is a top-down system which has shown little patience for public opinion. That so many Chinese continue to participate in active and vocal dissent is a tribute to their courage and resilience. Within the space of a few years, the Chinese government transformed an entire nation from the rigid economic constraints of communism to the practice of its own version of free market capitalist economics. This was accomplished at breakneck speed. If that same fervor could be directed toward environmental repair and regeneration, China could undo a great deal of the damage of its recent past.

India, the most populous democracy in the world, has equally serious problems, but the path to environmental reform will inevitably be slower because a democratic government must listen to its many constituencies. That is the great blessing of democratic societies. Although change may be slow, when it comes, it generally reflects a genuine consensus. In India, the problem of water scarcity looms in most parts of the country.

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<sup>214</sup> Gabriel Elizondo, *Drought Ravages Brazil’s Northeast*, ALJAZEERA (June 8, 2012), <http://www.aljazeera.com/indepth/features/2012/06/201267816677814.html>.

<sup>215</sup> *Id.*

<sup>216</sup> *Id.*

<sup>217</sup> BARLOW, *supra* note 88, at 14.

The province of Punjab has justifiably earned the title of being the bread basket of India. This northwestern Indian state normally produces about 50% of India's grain reserves.<sup>218</sup> But farmers have been pumping out water faster than it can be replenished, partly because the country dedicated itself during the Green Revolution to becoming self-sufficient in food.<sup>219</sup> Satellite measurements have established that northwestern India loses a foot of aquifer water annually.

The *Edmonton Journal* of Canada summarized the tragedy of global water scarcity: "The world is running out of water. Humans are polluting, depleting, and diverting its finite freshwater supplies so quickly, we are creating massive new deserts and generating global warming from below."<sup>220</sup>

The international community is dealing with these crises by holding conferences, networking, exchanging ideas and raising public awareness. Awareness of the severity of the drought crisis has resulted in the creation of an International Drought Initiative as a networking source for international entities.<sup>221</sup> This group which includes the International Hydrological Programme and UNESCO, met in Tehran, Iran, in May 2013.<sup>222</sup>

Again, as with the situation concerning wetlands, the world has through the United Nations formulated a Convention To Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, particularly in Africa. This Convention, with all the best intentions the world's diplomats and experts could articulate in writing, entered into force in 1994.<sup>223</sup> Fine-sounding words may be inspirational, but absent effective salutary action deserts continue to creep with treacherous speed into formally fertile territories. And because the poor are closest to Nature and most dependent on the natural world for basic survival, they are the ones who suffer the most when the land dies. The United Nations has emphasized that this Convention is the only legally binding agreement to link environment

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<sup>218</sup> Sudip Mazumdar, *Arid Land, Thirsty Crops*, SCI. AM. (Apr. 11, 2011), <http://www.scientificamerican.com/article.cfm?id=arid-land-thirsty-crops>.

<sup>219</sup> David Biello, *Is Northwestern India's Breadbasket Running Out of Water?*, SCI. AM. (Aug. 12, 2009), <http://www.scientificamerican.com/article.cfm?id=is-india-running-out-of-water>.

<sup>220</sup> *Water Shortage Looming Crisis for Earth*, *supra* note 31.

<sup>221</sup> *Second International Drought Initiative (IDI) Meeting*, UNESCO, [http://www.unesco.org/new/en/unesco/events/natural-sciences-events/?tx\\_browser\\_pi1%5BshowUid%50=11745&cttash=ea9d347e76](http://www.unesco.org/new/en/unesco/events/natural-sciences-events/?tx_browser_pi1%5BshowUid%50=11745&cttash=ea9d347e76).

<sup>222</sup> *Id.*

<sup>223</sup> G.A. Res. 47/188, GAOR, 47th Sess., Supp. No. 49 (Vol. I), U.N. Doc. A/47/49 (Vol. I), at 137 (Oct. 14, 1994), available at [http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-10&chapter=27&lang=en#3](http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-10&chapter=27&lang=en#3).

and development to sustainable land management.<sup>224</sup> It is important to note that water management and conservation are imperative for any form of sustainable land use. It is the absence of water that leads to desertification.

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The seriousness of the water crisis is heightened by the realization that despite all our industrial and scientific advances, humanity has not yet figured out how to manufacture water. As author Robert Glennon and law professor Morris Udall have explained, “[t]he hydrological cycle teaches that we can neither make nor destroy water.”<sup>225</sup> The implication is that every drop of water has a unique history. “This means that we are drinking the same water that the dinosaurs drank, that Cleopatra bathed in, and that splashed in the gardens of Versailles during the reign of Louis XIV.”<sup>226</sup>

The hydrological cycle processes a finite amount of water transforming this vital substance into liquid, solid, or gas as required by Nature and supplying the planet with an amount which might have been sufficient had mankind not intervened and decided to use water for sewage disposal, industrial waste, agricultural run-off and load it with toxic chemicals, minerals, and all kinds of substances that have decreased the amount of clean water available for domestic, agricultural, and industrial uses. The eternal hydrological cycle is not capable of cleansing the mass of pollutants that have made so many rivers and lakes into dead zones. There is a fixed amount of water on this planet. “It was delivered here 4.4 billion years ago.”<sup>227</sup> Via the marvels of the hydrological cycle it is renewed by rainfall but human activity utilizes annually more water than can normally be replenished by rain. At the present time the world extracts an estimated 3,800 cubic kilometers of fresh water from aquatic ecosystems every year.<sup>228</sup> This results in extravagant use for gardens and fountains in some parts of the world but restricted access in others where there is spreading desertification

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<sup>224</sup> *Canada Only UN Member To Pull Out of Droughts and Deserts Convention*, CTV NEWS (Mar. 27, 2013), <http://www.ctvnews.ca/politics/canada-only-un-member-to-pull-out-of-droughts-and-deserts-convention-1.1214065>.

<sup>225</sup> Robert Glennon & Morris K. Udall, *Foreword*, in *THE WORLD’S WATER*, *supra* note 17, at xi.

<sup>226</sup> Weber, *supra* note 4, at 4.

<sup>227</sup> FISHMAN, *supra* note 1, at 17.

<sup>228</sup> *World Confronts Serious Water Crisis, Former Heads of Government and Experts Warn in New Report*, INTERACTION COUNCIL (Sept. 10, 2012), <http://www.interactioncouncil.org/world-confronts-serious-water-crisis-former-heads-gov>.

and drought. Given current trends, by 2025 demand will exceed present supply by 56%.<sup>229</sup> Clearly, “humanity has increasingly lived beyond the margins of its renewable water supply.”<sup>230</sup>

According to the United Nations, water stress occurs when annual water supplies fall below 1,700 cubic meters per person.<sup>231</sup> The Independent Evaluation Group assessing the World Bank’s water-related projects pointed out in 2010 that about 700 million people in forty-three countries were “under water stress.” Water scarcity is usually defined as occurring when annual per capita availability falls below 1,000 cubic meters.<sup>232</sup> Some areas have experienced severe or absolute water scarcity with less than 500 cubic meters available per person per year.<sup>233</sup> By some estimates, at an annual per capita threshold of 2,000 cubic meters, a region would still be considered water-stressed.<sup>234</sup> Given the varied estimates, it is worth noting that these definitions and measurement points are relative. “Scarcity may be a social construct (a product of affluence, expectations and customary behavior) or the consequence of altered supply patterns.”<sup>235</sup>

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Water has appropriately been called the “bloodstream of the planet.”<sup>236</sup> Most experts have warned that the supply is finite and that it cannot cope with the demands made on this resource by an ever-increasing human population. According to Professor James Famiglietti, of the University of California, Irvine, “[w]e have the same amount of water,” as in the past, but “we have 250% more people drinking it.”<sup>237</sup> Environmental activist and author Maude Barlow explained that, “[g]lobal consumption of water is

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<sup>229</sup> Maude Barlow, *Report Summary: Blue Gold: The Global Water Crisis and the Commodification of the World’s Water Supply*, FORUM ON GLOBALIZATION INT’L (June 1999), <http://www.ifg.org/analysis/reports/bgsummary.htm>.

<sup>230</sup> Wheeler, *supra* note 11.

<sup>231</sup> *International Decade for Action ‘Water for Life’ 2005–2015*, UNITED NATIONS DEP’T OF ECON. AND SOC. AFFAIRS, <http://www.un.org/waterforlifedecade/scarcity.shtml> [hereinafter *Water Scarcity*].

<sup>232</sup> Indep. Evaluation Grp., *supra* note 106.

<sup>233</sup> *Id.*

<sup>234</sup> *Id.*

<sup>235</sup> *International Decade for Action ‘Water for Life’ 2005–2015*, *supra* note 231.

<sup>236</sup> Josh Weinberg, *Wise Up To Water Risks*, EUR. FIN. REV. (Feb. 20, 2013), <http://www.europeanfinancialreview.com/?p=6295> (internal quotation marks omitted).

<sup>237</sup> *International Decade for Action ‘Water for Life’ 2005–2015*, *supra* note 231.

doubling every 20 years, more than twice the rate of human population growth.”<sup>238</sup>

The United Nations noted that in the twentieth century, water use grew at more than twice the rate of population increase.<sup>239</sup> If the World Organization’s estimate of global population exceeding 9 billion by 2050<sup>240</sup> does come to pass, the number of water-stressed countries will increase dramatically.

Water is already scarce in parts of Southern and Western Asia, the Middle East, large parts of Africa, Southern Africa, and the North American Southwest.<sup>241</sup> As Charles Fishman explained in his eloquent book, *The Big Thirst*, “[w]ater problems now literally circle the globe.”<sup>242</sup>

The situation is already dire, despite some improvement. As UNICEF’s Executive Director, Anthony Lake, warned in 2012, “at least 11% of the world’s population—roughly 783 million people—are still without access to safe drinking water, and billions are without sanitation facilities.”<sup>243</sup> Unfortunately, “global human population growth is highest in places where there is the least water.”<sup>244</sup> Those so deprived of these basic human needs are scattered across the globe, with four out of ten people in this situation inhabiting Sub-Saharan Africa,<sup>245</sup> which has the most water-stressed countries of any region.<sup>246</sup> With respect to Asia, the United Nations estimated that over two-thirds of the global poor live in that continent, many inhabiting slums with no access to clean water or adequate sanitation.<sup>247</sup> There is a “mismatch” between where water is and where it’s needed.<sup>248</sup>

<sup>238</sup> BARLOW, *supra* note 88.

<sup>239</sup> *Statistics: Graphs and Maps*, U.N. WATER, [http://www.unwater.org/statistics\\_use.html](http://www.unwater.org/statistics_use.html).

<sup>240</sup> United Nations Dep’t of Econ. and Soc. Affairs, Population Division, Population Estimates and Projections Section, *World Population Prospects: The 2010 Revision*, ST/ESA/SER.A/313 (2011).

<sup>241</sup> CHARTRES & VARMA, *supra* note 101, at 10.

<sup>242</sup> FISHMAN, *supra* note 1, at 15.

<sup>243</sup> Thalif Deen, *Access To Water and Sanitation Remains Out of Reach for Millions*, GUARDIAN, Aug. 7, 2012, <http://www.guardian.co.uk/global-development/2012/aug/07/no-access-water-sanitation-millions>.

<sup>244</sup> SANDFORD, *supra* note 188, at 20.

<sup>245</sup> *Are More People Getting Safe Drinking Water?*, ALJAZEERA (Mar. 9, 2012), <http://www.aljazeera.com/programmes/insidestory/2012/03/20123971528670749.html>.

<sup>246</sup> *Water Scarcity*, *supra* note 231.

<sup>247</sup> UN-HABITAT, Nairobi, *Local Actions for Sustainable Development: Water and Sanitation in Asia-Pacific Region* 15 (2007), available at <http://www.unhabitat.org/pmss/getElectronicVersion.aspx?nr=2982&alt=1>.

<sup>248</sup> Anita Hamilton, *Droughtbusters*, TIME, Oct. 3, 2011, <http://www.time.com/time/printout/0,8816,2094377,00.html>.

Koichiro Matsuura, former Director-General of UNESCO, stressed that water shortages and unequal access pose “the greatest ecological and human rights threats of our time.”<sup>249</sup>

According to the United Nations, “[w]ater scarcity is both a natural and a human-made phenomenon. There is enough freshwater on the planet for six billion people but it is distributed unevenly and too much of it is wasted, polluted and unsustainably managed.”<sup>250</sup> The combination of human development and consequent pollution—whether generated by domestic, agricultural, or industrial use—threatens the supply of potable fresh water. It is now widely acknowledged that “[n]utrient pollution from municipal wastewater treatment plants and from agricultural and urban run off has become a major global problem, with many health implications.”<sup>251</sup> While the United States of America and China usually shoulder the blame for causing the most pollution,<sup>252</sup> numerous countries are contributing to that nefarious activity that is daily imperiling the limited water resources of the world.

It is ironic that one of the great achievements of the twentieth century—the alleviation of poverty for millions—has exacerbated the water crisis, especially in terms of water scarcity. As countries like India and China have become industrial giants, significant numbers of their populations have been lifted economically into the middle class. The expectations of this group have naturally led to greater consumerism, better diet—which means more meat and dairy products—and enthusiastic participation in the amenities of middle class life. One feature of this has been the use of more water for domestic purposes. The economic gains made by many developing countries during the last two decades of the twentieth century cannot but generate a greater stress on all resources, including water.

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When considering issues of water scarcity, we have been reminded by experts that it is important to look beyond the obvious first use of water to the multiple uses of water that are included in the production of food or the

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<sup>249</sup> *The Right to Water* UNESCO (Dec. 6, 2011), available at [http://www.unesco.org/new/en/media-services/single-view/news/the\\_right\\_to\\_water/#.UqimaZHLOol](http://www.unesco.org/new/en/media-services/single-view/news/the_right_to_water/#.UqimaZHLOol).

<sup>250</sup> *Water Scarcity*, *supra* note 231.

<sup>251</sup> Zoe Knight & Robert Miller-Bakewell, *Water Scarcity: A Bigger Problem Than Assumed*, MERRILL LYNCH EQUITY STRATEGY 5 (Dec. 6, 2007).

<sup>252</sup> *Id.*

manufacture of any industrial product. Scarcity has to be defined within the parameters of water use. In estimating water usage, the concept of virtual water is used to determine the water value of products as well as the extent to which any country is either a net importer or exporter of ‘virtual water.’ Offering one of the most lucid definitions of ‘virtual water,’ UNESCO explained that it “corresponds to the water content of goods and services either in the finished product or in its production.”<sup>253</sup>

According to the FAO, feeding a population requires one thousand times the amount of water used for slaking its thirst.<sup>254</sup> The estimates of virtual water consumed for various foods and goods can vary, but they all point to an important perception of water use that has to be considered very carefully. The amount of water consumed in food production is huge. Meat production requires between eight and ten times more water than cereal production.<sup>255</sup> Producing one kilogram of rice, a staple in vast regions of Asia, requires 3,500 liters of water. A cup of coffee—a ‘staple’ survival drink in the frenzied working world of North America—requires 140 liters of water to produce.<sup>256</sup> A glass of milk requires 200 liters of water.<sup>257</sup> The much-loved international fast food, the hamburger, requires 2,400 liters of water.<sup>258</sup> It takes 6,000 liters of water to produce one kilogram of poultry meat and 15,000 liters for one kilogram of beef.<sup>259</sup>

Awareness of virtual water has affected trading patterns between nations as countries scramble to save their own water, often at the expense of others. For example, because it takes 1,000 tons of water to produce one ton of wheat,<sup>260</sup> it could be expedient in terms of water usage to import wheat and relieve a community from “having to harness one thousand tons of its own water resources.”<sup>261</sup> This works to the advantage of developed or rich countries that have the financial means to import foods that require a great

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<sup>253</sup> UNESCO, *Facts and Figures: About 80% of Global Virtual Water Flows Relate to Agricultural Products Trade*, available at <http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/facts-and-figures/all-facts-wwdr3/fact-25-virtual-water-flows>.

<sup>254</sup> Knight & Miller-Bakewell, *supra* note 251, at 7.

<sup>255</sup> *Facts and Figures*, *supra* note 253.

<sup>256</sup> *Water and Hunger: Improving Sustainability in Rural Africa*, THE WATER PROJECT, <http://thewaterproject.org/hunger.asp>.

<sup>257</sup> *Id.*

<sup>258</sup> *Id.*

<sup>259</sup> *Agriculture, Food and Water*, 15 U.N. FOOD & AGRIC. ORG. (2003), available at <ftp://ftp.fao.org/agl/aglw/docs/agricfoodwater.pdf>.

<sup>260</sup> Alois, *supra* note 161.

<sup>261</sup> Lawrence Smallman, *Water Crisis, But Not As We Know It*, ALJAZEERA (Apr. 29, 2003), available at <http://www.aljazeera.com/archive/2003/04/2008410121643727369.html>.

deal of water. It is far easier to import a pound of coffee and let the agrarian country (usually in the developing world) consume the 2,500 gallons of its own water<sup>262</sup> required for that task and conserve one's own water resources.

Bill Chameides explored this concept in *Scientific American*, explaining that, as a consequence of globalization, "water-rich nations can produce an excess of food and export it to a water-poor region."<sup>263</sup> UNESCO also estimated that the "global volume of virtual water flows in commodities is 1,625 billion cubic meters per year, accounting for about 40% of total water consumption. About 80% of these virtual water flows relate to agricultural products trade, and the remainder to industrial products trade."<sup>264</sup> The virtual water perspective is an eye-opener in terms of the environmental cost of any commodity. For instance, a pair of leather shoes represents the consumption of 2,000 gallons of water.<sup>265</sup> Some countries like Jordan are coping with their water scarcity by importing goods that require plenty of water and exporting products that utilize very little water.<sup>266</sup>

#### VI. INEQUITY IN AVAILABILITY OF THE RESOURCE

The Earth has, unfortunately, no equitable geographical division of this all-important resource. Nature has displayed no fairness in provisioning the planet with water. "The worldwide distribution and management of water is very uneven."<sup>267</sup> While some countries are water rich, others are not merely at risk but are descending into the frightening realm of becoming arid and may in the future be incapable of sustaining their populations. Early in the new millennium, the top five water rich countries were French Guiana, Iceland, Guyana, Suriname, and Congo. At the bottom of the scale were Kuwait, the Gaza Strip, the United Arab Emirates, the Bahamas, and Qatar.<sup>268</sup> Between those extremes a growing number of countries suffer from various forms of water stress, either caused by the drying up of resources, the

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<sup>262</sup> Hauter, *supra* note 170, at 73.

<sup>263</sup> Bill Chameides, *On Water, Drought and Death*, SCI. AM., July 22, 2010, <http://www.scientificamerican.com/article.cfm?id=on-water-drought-and-death>.

<sup>264</sup> UNESCO, *Facts and Figures*, *supra* note 253.

<sup>265</sup> Hauter, *supra* note 170, at 71.

<sup>266</sup> ARJEN Y. HOCKSTRA & ASHOK K. CHAPAGAIN, GLOBALIZATION OF WATER: SHARING THE PLANET'S FRESHWATER RESOURCES 2 (2008).

<sup>267</sup> Glennon & Udall, *supra* note 225, at xi.

<sup>268</sup> U.N.: *World Water Crisis Due to Leadership Inertia*, ENV'T NEWS SERV., Mar. 5, 2003, <http://ens-newswire.com/wp-content/uploads/2010/05/2003-03-05-02.html>.

depletion of the water table, the pollution of rivers and lakes, or, as in Africa, years of drought.

Over half the countries of the world have been deemed either “dangerously dry” or “under the poverty line of water availability.”<sup>269</sup> This cannot but exacerbate political tension, a point made by Rahmat Bobokalonov, Minister of Land Reclamation and Water Resources of the Republic of Tajikistan.<sup>270</sup> Speaking in January 2013 at the International Annual U.N.-Water Conference, the Minister explained that “[c]ompetition over water is even more tough in water stress zones, leading sometimes to serious tensions among different groups of water users.”<sup>271</sup> A case in point: sharing the waters of the Nile River has generated considerable friction amongst Egypt, Ethiopia, Sudan, Kenya, Tanzania, Uganda, and the Democratic Republic of Congo.<sup>272</sup>

North America is particularly fortunate to be home to the largest source of surface freshwater on Earth, the Great Lakes Basin, containing about 21% of the world’s total supply of fresh water.<sup>273</sup> By contrast, a significant part of the world is deemed arid, making up large parts of Australia, Africa, and Asia. The so-called “hot stain” areas that are running short of potable water “include Northern China, large areas of Asia and Africa, the Middle East, Australia, the Midwestern United States and sections of South America and Mexico.”<sup>274</sup>

India is depleting its groundwater so rapidly that its future food crops and drinking water supplies are threatened.<sup>275</sup> With the world’s second largest population, water shortages in India will continue to have a massive impact. There is always a danger of political unrest in any country facing severe water shortages. Ironically, there is considerable rainfall in many regions of India, but it can be sporadic and erratic, and Indian farmers have for

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<sup>269</sup> H.L. Saeijs & M.J. Van Berkel, *Global Water Crisis: The Major Issue of the 21st Century, A Growing and Explosive Problem*, abstract July 5, 1995, available at <http://www.ncbi.nlm.nih.gov/pubmed/12291371>.

<sup>270</sup> Minister Rahmat Bobokalonov, Address at the International Annual UN-Water Zaragoza Conference (Jan. 8, 2013).

<sup>271</sup> *Id.*

<sup>272</sup> *Egypt Reasserts Nile Water Rights*, ALJAZEERA, Apr. 20, 2010, available at <http://www.aljazeera.com/news/africa/2010/04/20100419194851419735.html>.

<sup>273</sup> Peter Schulte, *The Great Lakes Water Agreement*, in *THE WORLD’S WATER*, *supra* note 17, at 165.

<sup>274</sup> BARLOW, *supra* note 88, at 3.

<sup>275</sup> Somini Sengupta, *India Digs Deeper, but Wells Are Drying Up*, N.Y. TIMES, Sept. 30, 2006, available at <http://www.nytimes.com/2006/09/30/world/asia/30water2.html>.

centuries been ruled by and slave to the monsoon.<sup>276</sup> Unusual weather patterns, exacerbated in recent years, have afflicted India with the competing “curses of drought and deluge.”<sup>277</sup> The escalating problems are blamed on climate change.<sup>278</sup>

## VII. CLIMATE CHANGE

The number of countries like India enduring one form or another of water stress is likely to increase with the impact of climate change. At the time of writing this Article, there are fires burning in the United States and torrential rain-induced floods in Europe, India, and Canada. The escalating pace of these global environmental disasters cannot but convince one of the impact of climate change. “Climate change is characterized by erratic weather patterns leading to droughts, floods, more frequent and more intense natural disasters and other phenomena.”<sup>279</sup> Researcher Peter McIntyre of the University of Wisconsin explained that climate change “is going to affect the amount of water that comes in as precipitation; and if you overlay that on an already stressed population, we’re rolling the dice.”<sup>280</sup> In 2004, well over half of Bangladesh was inundated with water, leaving over 30 million people homeless.<sup>281</sup>

By one estimate, just two degrees rise in temperature can adversely impact water accessibility for 3 billion people.<sup>282</sup> José Graziano da Silva, Director-General of the FAO, commented that “[m]ore extreme and frequent droughts resulting from climate change are having devastating food security impacts, especially in the most vulnerable regions of the world.”<sup>283</sup> While rainfall has for centuries replenished the freshwater supply, given the current

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<sup>276</sup> *Id.*

<sup>277</sup> Somini Sesngupta, *Often Parched, India Struggles to Tap the Monsoon*, N.Y. TIMES, Oct. 1, 2006, available at <http://www.nytimes.com/2006/10/01/world/asia/01india.html>.

<sup>278</sup> *Id.*

<sup>279</sup> Katherine McDonald, *Women and the Right to Water* (High Level Panel), U.N. Human Rights Counsel Session 18 (Sept. 26, 2011), available at [http://www.wunrn.com/news/2011/10\\_11/10\\_17/101711\\_women2.htm](http://www.wunrn.com/news/2011/10_11/10_17/101711_women2.htm).

<sup>280</sup> Richard Black, *Water Map Shows Billions at Risk of 'Water Insecurity'*, BBC NEWS, Sept. 29, 2010, <http://www.bbc.co.uk/news/science-environment-11435522>.

<sup>281</sup> Patrick Webb, *Water and Food Insecurity in Developing Countries: Major Challenges for the Twenty-First Century*, in WATER: GLOBAL COMMON AND GLOBAL PROBLEMS 32 (Velma I. Grover ed., 2006).

<sup>282</sup> Borghild Tonnessen-Krokan, *Analysis: A Right to Water*, NORWEGIAN FORUM FOR ENVIRONMENT AND DEVELOPMENT, <http://www.forumfor.no/Artikler/6056.html>.

<sup>283</sup> United Nations News Centre, *supra* note 203.

levels of usage, precipitation will not suffice to meet the need and demand. “Precipitation is a key source of water supply . . . [but] this will only be useful if it can be caught and utilised effectively.”<sup>284</sup> Peter Gleick explained the connection between climate change and the hydrological cycle: “Global climate change is going to have very dramatic impacts on water resources because the hydrologic cycle is such a fundamental part of the climate cycle.”<sup>285</sup>

These impacts are diverse, shocking, and devastating for people. In the Dominican Republic, global warming has resulted in the unusual phenomenon of an expansion of Lake Enriquillo, that nation’s largest natural water reserve.<sup>286</sup> Between 2004 and 2012, this lake doubled in size and people had to be relocated.<sup>287</sup>

It has correctly been said that “water will be the vehicle through which climate change is felt.”<sup>288</sup> The nexus between the extreme disasters precipitated by climate change and the consequences on access to water cannot continue to be underestimated while the world struggles with the implementation of the Framework Convention on Climate Change of 1992.<sup>289</sup> Now, over two decades later, the world is suffering from the failure of the international community to meet the promises made at the Earth Summit at Rio.

While floods caused significant damage in 2013, climate change has in the recent past also generated severe drought in Africa, Australia, China, and the United States, to name only a few locations.<sup>290</sup> In 2011 approximately 10 million people living in East Africa had to contend with the worst drought that region had suffered in six decades.<sup>291</sup> They had to leave their homes in

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<sup>284</sup> Knight & Miller-Bakewell, *supra* note 251.

<sup>285</sup> Randy Showstack, *Meeting Basic Human Needs for Water Remains Huge Challenge, Expert Says*, 92 EOS 44, pp. 386–87 (Nov. 1, 2011); Media Release, Pacific Institute, *The New Volume of The World’s Water Stresses Sustainable Water Management in the Face of Climate Change* (Oct. 18, 2011) (available at [http://www.pacinst.org/press\\_center/press\\_releases/worlds\\_water\\_vol\\_7.pdf](http://www.pacinst.org/press_center/press_releases/worlds_water_vol_7.pdf)).

<sup>286</sup> Deleda Samboys, *The Enriquillo Lake: Swelling Waters and Pressure on Land*, in WHAT CLIMATE CHANGE AND CORRUPTION MEAN FOR LAND SECURITY, Oct. 18, 2012, [http://www.transparency.org/news/feature/what\\_climate\\_change\\_and\\_corruption\\_mean\\_for\\_land\\_security](http://www.transparency.org/news/feature/what_climate_change_and_corruption_mean_for_land_security).

<sup>287</sup> *Id.*

<sup>288</sup> ALEXANDRA COUSTEU, *Water Is Life*, in WITTEN IN WATER, *supra* note 45, at 286.

<sup>289</sup> Ranee K.L. Panjabi, *Can International Law Improve the Climate? An Analysis of the United Nations Framework Convention on Climate Change Signed at the Rio Earth Summit in 1992*, in THE EARTH SUMMIT AT RIO 156, 186 (1997).

<sup>290</sup> Hamilton, *supra* note 248.

<sup>291</sup> *Id.*

search of fertile land,<sup>292</sup> adding to the world's increasing numbers of environmental refugees. In 2012, an estimated 15 million West Africans were said to be suffering from the consequences of drought.<sup>293</sup> "Rivers have dried up, grain stores are empty, and what water is available from aging wells is often contaminated with parasites."<sup>294</sup>

Bob Sandford, Water Policy Advisor for the InterAction Council (I.A.C.), fears that a "hydro-climatic time bomb is already ticking."<sup>295</sup> Sandford suggested that prolonged drought and severe flooding could result in "new kinds of conflict as the effects of climate change join an already long list of water pressures, including overpopulation, contamination, groundwater depletion and soil loss."<sup>296</sup>

International experts estimate that by 2025, thirty countries will qualify as "water scarce," with approximately 4 billion people inhabiting so-called "water stressed" countries.<sup>297</sup> Climate change will be an integral factor in creating these environmental crises. It should be noted that if these various projections and estimates are correct, more than half the world's population will be affected by water shortages.<sup>298</sup> This looming possibility is a little more than a decade into the future. In 2025, given present growth, the projected global population will be approximately 8 billion.<sup>299</sup> J.A.A. Jones has predicted that by then nearly 2.5 billion people could be in water-scarce regions, with Africa leading that frightening statistic.<sup>300</sup> The FAO has estimated that by 2025, 1.8 billion people will suffer from water scarcity while two-thirds of the entire global population will endure water stress conditions.<sup>301</sup> The naysayers who express doubts about the veracity of climate change may well find that their arguments will increasingly become

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<sup>292</sup> Jacob Otachi & Francis Kairu, *Land Rights, Building Permits and Forest Preservation in Kenya*, in WHAT CLIMATE CHANGE AND CORRUPTION MEAN FOR LAND SECURITY, *supra* note 286.

<sup>293</sup> *In Pictures: The Sahel Drought*, ALJAZEERA, June 25, 2012, <http://www.aljazeera.com/indepth/inpictures/2012/06/2012624213039862469.html>.

<sup>294</sup> *Id.*

<sup>295</sup> INTERACTION COUNCIL, *supra* note 228.

<sup>296</sup> *Id.*

<sup>297</sup> Webb, *supra* note 281, at 17.

<sup>298</sup> *Id.*

<sup>299</sup> *Id.*

<sup>300</sup> JONES, *supra* note 16, at 2.

<sup>301</sup> CHARTRES & VARMA, *supra* note 101, at 50 (citing Global Perspective Studies Unit of the Food & Agric. Org., *World Agriculture: Towards 2030/2050* (June 2006), available at <http://www.fao.org/docrep/009/a0607e/a0607e00.HTM>).

redundant as Mother Nature reacts to the abuse that humanity has heaped upon the most beautiful planet in the universe.

Jouni Paavola of the Centre for Social and Economic Research on the Global Environment at the University of East Anglia commented that “[c]limate change, water and poverty are intimately intertwined in the developing world because climate change will manifest itself primarily through variation in the availability of water.”<sup>302</sup> Fearing that climate change will lead to less renewal of groundwater in the United States, the National Resources Defense Council has projected that about 1,100 counties in the United States of America will face water shortages linked to climate change by the year 2050.<sup>303</sup> Of this large number, about 400 counties will have to endure severe water shortages.<sup>304</sup> By one estimate American farmers are each able to grow enough food to feed over 150 people.<sup>305</sup> Should American farms become water deprived, there will be global consequences and serious food shortages.

In spite of all the scientific controversies surrounding the issue of climate change and despite the years-long political wrangling that has delayed implementation of the Convention on Climate Change, Nature seems to be taking matters into its own hands to show humanity that it can no longer tolerate so much abuse. The result is that natural disasters are becoming commonplace. Speak to any senior citizen and one hears about the fact that in the past such disasters were less frequent and not as terrifying as they appear to be now. Such evidence may be anecdotal but there do seem to be great extremes of climate causing havoc in many parts of the world.

The United Nations World Water Assessment Programme has predicted that water-related disasters are likely to increase, with more floods and drought.<sup>306</sup> Water shortages may lead to conflict and may also generate “mass migration, disruption of livelihoods, social breakdown and health risks, all of which leave their mark on the global community.”<sup>307</sup>

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<sup>302</sup> Jouni Paavola, *Climate Change, Water and Poverty in the Morogoro Region, Tanzania*, in WATER: GLOBAL COMMON AND GLOBAL PROBLEMS, *supra* note 281, at 201.

<sup>303</sup> Weber, *supra* note 4, at 15.

<sup>304</sup> *Id.*

<sup>305</sup> Bryan Walsh, *Feeding the Planet Without Destroying It*, TIME (May 22, 2012), <http://content.time.com/time/health/article/0,8599,2115423,00.html>.

<sup>306</sup> United Nations Water Assessment Programme, *Stakeholder Briefing Notes*, 4 WWDR4 1 (2012), [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/06\\_WWAP\\_BN\\_Donors\\_WEB.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/06_WWAP_BN_Donors_WEB.pdf).

<sup>307</sup> *Id.*

## VIII. WATER TRANSPORTATION

A possible solution for the water shortages could be in transporting and selling large quantities of water from water-rich countries to arid areas. Technologically, it is not yet deemed either feasible or politically advisable to ship water on a massive scale between countries. Because water weighs considerably more than oil per volume, transportation, given its source low value, is not economically feasible.<sup>308</sup> Water transfers by ship were also tried by Barcelona, Spain, in 2008.<sup>309</sup> Only a wealthy city could afford a \$68 million operation on this scale: the first ship's water load of over 5 million gallons only sufficed for one day's requirements for 180,000 people.<sup>310</sup> The population of Barcelona numbered 5.5 million at that time.<sup>311</sup>

Politically, the subject of mass water extraction for export use is a landmine for any leader, particularly one who has an eye on the next election. Economically, it has been deemed only useful on a serious crisis basis. Environmentally, there are serious objections in almost every country to the extraction of water because of consequences on the water table, the soil, and future agricultural needs. Additionally, the depletion of aquifers raises concerns about the disappearance of the underground water table. Mysterious and terrifying sinkholes are appearing with more frequency in a number of countries, causing havoc as houses and cars literally disappear into the shifting and receding earth.<sup>312</sup>

Even the most cosmopolitan of environmentalists feel a deep commitment to national sovereignty when the debate concerns water exports from their own countries to a thirsty foreign nation. There is a profound attachment to one's national sources of water and this will be hard to overcome in any international arena where ideas of mass transportation of water may be floated (no pun intended).

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<sup>308</sup> Weber, *supra* note 4, at 11. One exception is the agreement between Turkey and Israel for the sale of water. *See infra* note 483.

<sup>309</sup> Lisa Abend, *Barcelona Floats Creative Solutions to Water Crisis*, CHRISTIAN SCI. MONITOR (May 15, 2008), <http://www.csmonitor.com/Environment/Global-Warming/2008/0515/barcelona-floats-creative-solution-to-water-crisis>.

<sup>310</sup> *Id.*

<sup>311</sup> *Id.*

<sup>312</sup> *See, e.g.*, Jeremy Berlin, *Why Sinkholes Open Up*, NAT'L GEOGRAPHIC (Aug. 12, 2013), available at <http://news.nationalgeographic.com/news/2013/08/130812-florida-sinkhole-disney-world-explainer-urban-science/>; Mark Byrnes, *9 of This Year's Most Alarming Sinkholes*, THE ATLANTIC CITIES (Oct. 9, 2013), available at <http://www.theatlanticcities.com/neighborhoods/2013/10/9/9-2013s-most-alarming-sinkholes/7385/>.

It is also unfortunately true that with the exception of some wealthy kingdoms in the oil-rich Middle East, most of the arid parts of the world are far too poor to afford to pay millions of dollars for water imports.<sup>313</sup> That leaves those populations in peril insofar as the future is concerned.

#### IX. WATER USAGE

Because of the importance of this resource and its linkage to the sustenance of all life on earth, the human need for water makes us at once vulnerable and also very protective. There is now a global awareness about the importance of maintaining our water supplies and a growing rage against those who willfully waste or pollute water.

The proliferation of pamphlets in every mail box reminding us to conserve every drop of water highlights this increasing sensitivity to the waste of water. Interestingly, non-industrial human consumption is on the lower end of the water usage scale, averaging at about 10% globally for domestic uses.<sup>314</sup>

Industrial uses of water, especially very clean fresh water, are increasing with technological innovations in the production of computers and their parts. Because of the calculated obsolescence in such technology, there is a huge waste of raw materials and resources. The disposal of computers has become yet one more environmental nightmare. It was estimated at the beginning of this century that the manufacture of computer wafers (part of chips) daily utilized 18 million liters of water.<sup>315</sup> Industrial demand for water will inevitably exceed the 22% of overall use that is now generally estimated.<sup>316</sup> “Water intensive industries include power generation, forest products, fertilisers, steel, sugar, textiles and engineering.”<sup>317</sup> The mining

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<sup>313</sup> See, e.g., Central Intelligence Agency, *Country Comparison*, THE WORLD FACTBOOK, <http://www.cia.gov/library/publications/the-world-factbook/rankorder/2004rank.html>; *Middle East GDP per Capita*, GLOBAL PROPERTY GUIDE, <http://www.globalpropertyguide.com/Middle-East/gdp-per-capita>; *Africa GDP per Capita*, GLOBAL PROPERTY GUIDE, <http://www.globalpropertyguide.com/Africa/gdp-per-capita>.

<sup>314</sup> *Facts About Water: Statistics of the Water Crisis*, THE WATER PROJECT (Aug. 17, 2011), [http://thewaterproject.org/water\\_stats.asp](http://thewaterproject.org/water_stats.asp). This figure is corroborated by the U.N. *Statistics: Graphs and Maps*, *supra* note 239.

<sup>315</sup> *Water Justice for All: Global and Local Resistance to Control and Commodification of Water*, FRIENDS OF THE EARTH INTERNATIONAL (Jan. 2003), available at <http://www.foei.org/en/resources/publications/economic-justice-resisting-neoliberalism/2000-2007/water.pdf/view>.

<sup>316</sup> Knight & Miller-Bakewell, *supra* note 251, at 7.

<sup>317</sup> *Id.*

industry uses between 7 billion and 9 billion cubic meters of water annually, equivalent to the total yearly usage of Malaysia.<sup>318</sup>

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Although industrial use is increasing, particularly as developing nations focus on manufacturing, it is agriculture that consumes the lion's share of global water. At the beginning of this new millennium, it was estimated that globally, irrigation consumed approximately 660 trillion to one quadrillion gallons of water annually.<sup>319</sup> As we shall see in this section, "[a]griculture is both a cause and a victim of water scarcity."<sup>320</sup>

The looming water crisis also presages an equally serious food crisis unless the world can collectively act to resolve both these situations. It is important to note again that estimates of usage and statistics do vary quite widely in this subject. Even in a technologically advanced country like the United States, agriculture manages to consume approximately 80% of the nation's water, with the figure rising to 90% in some western states.<sup>321</sup> The situation is similar in some developing nations. To provide just one example, Pakistan utilizes 96% of its water for agriculture.<sup>322</sup> Globally, agriculture, by one estimate, occupies about 38% of the world's land, of which 11% is classified as arable land, 12% is permanent cropland and 26% is permanent pasture.<sup>323</sup> Bryan Walsh, writing for *Time Magazine*, provided somewhat different figures when he stated that over 6 million square miles of land is currently used to grow crops.<sup>324</sup> This amounts to territory equal to the size of South America.<sup>325</sup> Over 11 million square miles—an area equal to the entire continent of Africa—is used for pastureland.<sup>326</sup> Together this constitutes over 40% of the dry land on Earth.<sup>327</sup>

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<sup>318</sup> Gasson, *supra* note 174.

<sup>319</sup> Hauter, in WATER MATTERS, *supra* note 43, at 68.

<sup>320</sup> Food and Agric. Org., *Water Scarcity: An Action Framework for Agriculture and Food Scarcity 2* (2012), available at <http://www.fao.org/docrep/016/i3015e/i3015e.pdf>.

<sup>321</sup> Weber, *supra* note 4, at 13.

<sup>322</sup> Dr. Ahmad Saeed Bhatti & Ayesha Saeed, *Water Crisis: Fallacies and Facts*, NATION NEWSPAPER (Feb. 16, 2013), <http://www.nation.com.pk/columns/16-Feb-2013/water-crisis-fallacies-and-facts>.

<sup>323</sup> Food and Agric. Org., *FAO Statistical Yearbook 2012: World Food and Agriculture 40*, available at <http://www.fao.org/docrep/015/i2490e/i2490e01c.pdf>.

<sup>324</sup> Walsh, *supra* note 305.

<sup>325</sup> *Id.*

<sup>326</sup> *Id.*

<sup>327</sup> *Id.*

Although there are some differences in the calculations, the conclusion is clear, namely, that agriculture of all types utilizes a significant portion of land on this planet and accordingly will use the largest share of water as well. And it is irrigation that consumes the lion's share of water dedicated to agriculture.

The United Nations estimated that about 70% of global use of water goes to irrigation, about 22% to industry, and about 8% for domestic purposes.<sup>328</sup> If the processing of food is factored in as part of agricultural production, the combination consumes approximately 86% of global water.<sup>329</sup>

Reliance on irrigation to grow food increased dramatically during the twentieth century, reaching in 2010 an annual consumption amounting to an estimated one quadrillion gallons of water.<sup>330</sup> Although that usage is massive, it has also to be remembered that irrigation is still a vital and necessary method for providing the world's food supply. Absent this engineering marvel, first used in ancient times, there would have been massive hunger and famine in large parts of the world. In the present, with only 18% of cropland under irrigation, this area produces 40% of the world's food.<sup>331</sup> Developed countries "account for a quarter of the world's irrigated area,"<sup>332</sup> and because of scientific agriculture and machinery, produce a significant proportion of the world's food.

The challenges ahead will be daunting. Given projected increases in global population, it is likely that even more land will have to be devoted to irrigation. "Global demand for irrigation expanded tenfold over the twentieth century."<sup>333</sup> That trend will continue and even intensify with dramatic impact on resources like water. The FAO has predicted an 11% increase in irrigation water consumption between 2008 and 2050.<sup>334</sup> That figure seems quite conservative, especially in light of the fact that economic development generates greater demand for varied food and higher levels of consumption of staples and produce. As more and more countries improve their economic situation, the calorie consumption of the population increases. The demand for more food results in an accompanying need for more water.

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<sup>328</sup> *Statistics: Graphs and Maps*, *supra* note 239.

<sup>329</sup> JONES, *supra* note 16, at 21.

<sup>330</sup> Hauter, *supra* note 170, at 68.

<sup>331</sup> JONES, *supra* note 16, at 21.

<sup>332</sup> WORLD AGRICULTURE: TOWARDS 2015/2030: AN FAO PERSPECTIVE 138 (Jelle Bruinsma ed., 2003).

<sup>333</sup> JONES, *supra* note 16, at 21.

<sup>334</sup> INTERACTION COUNCIL, *supra* note 228.

The time has now come for historical and traditional systems of irrigation to be replaced globally with water-conserving modern technological methods.

It has been estimated that approximately half of the water dedicated to various traditional systems of irrigation is lost through evaporation and seepage.<sup>335</sup> In China, this figure is said to be as high as 80%.<sup>336</sup> Considered a main reason for water scarcity, irrigation “is accused of misuse of water, of producing excessive water wastes and of degrading water quality.”<sup>337</sup> This ancient marvel that contributed to the building of great civilizations like that of ancient Egypt is now criticized for water-guzzling on a scale the world can no longer afford.

Too much irrigation can also damage the soil because salt accompanies the water but remains on the land. If the salt is not periodically removed, the land eventually becomes infertile. The challenge is to utilize irrigation to grow enough food to face an increasing global population but to conserve water and not destroy the soil in the process.

As we have seen, agriculture consumes the lion’s share of the world’s water. Inevitably, it also produces the largest amount of water pollution. Rivers, ponds, and lakes in both the developed and developing world are contaminated with a toxic brew of fertilizers, herbicides, pesticides, animal waste, and a host of other destructive ingredients.<sup>338</sup> For millions in the poorer nations, this type of water is all they have for drinking, washing, laundry, and other domestic uses.

## X. BIOFUELS

Sometimes, in environmental matters, a solution to one problem creates another equally serious problem. The vagaries of global oil prices encouraged farmers to get involved in the production of bioethanol as a substitute for gasoline. Crops were planted to produce fuel to run cars and meet other energy requirements. There was considerable enthusiasm for this oil substitute, particularly with fears about oil supplies dwindling, prices rising, and distant political situations, as in the Middle East, affecting the availability of gasoline in Europe and North America. Biofuels were touted as the energy solution for the future and salvation for the world. There was general conviction that this new fuel could save the energy-guzzling

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<sup>335</sup> Alois, *supra* note 161.

<sup>336</sup> BARLOW, *supra* note 88, at 32.

<sup>337</sup> Pereira et al., *supra* note 189, at 5.

<sup>338</sup> See JONES, *supra* note 16, at ch. 5.

developed world from predatory pricing by oil-rich countries. There was intense discussion around the assumption that biofuels were more energy-efficient and less destructive of the environment.

Governments encouraged this new idea, and farmers eagerly converted their lands to grow crops for fuel. Countries like China anticipated that at least 15% of its transport energy needs could by 2020 be met by biofuels.<sup>339</sup> Projected ethanol production by 2017 will be 127 billion liters.<sup>340</sup>

However, conversion of cropland from food production to energy fuel crops had significant consequences. This involved the allocation of about 2% to 3% of irrigation water for the base energy crops—namely sugarcane, corn, sugar beet, wheat, and sorghum—that were converted to biofuels. That water usage is likely to increase with greater reliance on biofuels in the future. In other words, a significant percentage of agricultural land and water resources were now being dedicated to energy production instead of growing food. The justification was of course that the world was now producing a product deemed to be a viable solution to the gasoline pricing crisis while reducing greenhouse gas emissions. UNESCO reported that bioethanol production tripled between 2000 and 2007, rising to an estimated 77 billion liters in 2008.<sup>341</sup>

Although the percentage of water use was initially small, it was clear that in a water-stressed world, this usage could become one more cause of scarcity and therefore was environmentally questionable. Conservative estimates about the move from gasoline to these biofuels suggest that by 2030, the latter could utilize about 20% of the water used globally for agriculture.<sup>342</sup> Again, estimates vary depending on the source. The production of one liter of ethanol from sugarcane, according to one calculation, requires 1.5 square meters of land and consumes nearly 18.5 liters of water.<sup>343</sup> However, UNESCO has estimated that approximately

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<sup>339</sup> UNESCO WWAP (WORLD WATER ASSESSMENT PROGRAMME), *The U.N. World Water Development Report 4: Managing Water Under Uncertainty and Risk* 26 (2012), available at <http://unesdoc.unesco.org/images/0021/002156/215644.pdf> [hereinafter *U.N. World Water Development Report 4*].

<sup>340</sup> UNESCO, *Facts and Figures: Managing Water under Uncertainty and Risk* (2102), available at [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/WWAP\\_WWDR4%20Facts%20and%20Figures.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/WWAP_WWDR4%20Facts%20and%20Figures.pdf).

<sup>341</sup> UNESCO, *At Global Level, Irrigation Water Allocated to Biofuel Production is Estimated at 2%* (2012), available at <http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/facts-and-figures/all-facts-wwdr3/fact-7-water-biofuel/>.

<sup>342</sup> *U.N. World Water Development Report 4*, *supra* note 339, at 26.

<sup>343</sup> *Id.* at 218.

2,500 liters of water are consumed in the production of one liter of liquid biofuel.<sup>344</sup> The variation in these estimates cannot but raise some questions but again, as stated before, it is the conclusion drawn from the statistics that is important. That conclusion points to a very dramatic increase in water usage in the very near future. Clearly, conversion to biofuels will increase the problem of water shortages, cause more water scarcity, and exacerbate the water crisis. If market values and high financial returns on their efforts encourage more and more farmers to switch from food to energy crops, water scarcity will surely become a bigger problem. A related consequence will be that globally, hunger and thirst will afflict more people. The focus on biofuels (along with other factors) has already led to dramatic increases in food prices. At time of writing, it is apparent that this trend is likely to continue with devastating impact on the very poor. Although this evidence is anecdotal, in our relatively rich developed world, more and more families have to resort to food banks. One can only imagine the plight of the marginalized and poverty-stricken millions in developing world countries where often there are no food banks or any social safety nets to protect them.

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A rather unusual twist on this anticipated need for biofuels has occurred with corporations purchasing vast tracts of land in countries like Indonesia, the Philippines, and the Democratic Republic of Congo. These lands come with water rights and this permits the planting of crops for biofuels, with consequent draining of the available water supplies. Biofuels have increased the global demand for agricultural land. Professor Wendy Wolford of Cornell University commented on the “danger that local people—especially in places like sub-Saharan Africa—are not aware of land purchases and how it could affect their way of life.”<sup>345</sup> The consequences for poverty-stricken communities, already suffering from water stress, could be extremely serious.

If forests are destroyed to create more agricultural land to grow these biofuel crops, the environmental consequences for the planet could be

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<sup>344</sup> UNESCO, *Allocating Water: Facts and Figures Extracted from WWDR3*, available at <http://www.unesco.org/new/en/natural-sciences/environment/water/wwap/facts-and-figures/allocating-water>.

<sup>345</sup> Brian Bienkowski and Environmental Health News, *Corporations Grabbing Land and Water Overseas*, SCI. AM. (Feb. 12, 2013), available at <http://www.scientificamerican.com/article.cfm?id=corporations-grabbing-land-and-water/-overseas>.

extreme. The International Energy Organization has estimated a daily requirement for over 3 million barrels of biofuel by 2030.<sup>346</sup> That conservative estimate would meet only about 5% of global road transport requirements.<sup>347</sup>

Unfortunately, we also face the terrible dilemma caused by the growing need for energy and the terrible impact that oil-based fuels have had on climate change and the environment globally. Wind and solar energy have not been adopted as enthusiastically as was once predicted. The disaster at Fukushima in Japan has made nuclear energy even more risky as an alternative.

Hydropower has generated (no pun intended) a similarly large number of problems. Dams have gone from being praised as engineering marvels to being almost uniformly condemned. To give just one example, the notorious and controversial Three Gorges Dam in China displaced vast numbers of people from their land and destroyed entire communities; and its water reservoir is already seriously polluted. There is a vast literature in this water crisis subject condemning the twentieth century predilection for building huge dams and seeking to control the flow of rivers in order to create electricity and conserve water. Although this Article cannot address the issue of dams, it is worth noting that there is no longer a blind reliance on controlling river flow as the optimum option.

#### XI. IRRIGATION IN THE FUTURE

Although traditional methods of irrigation have proven to be seriously wasteful in their use of water, it cannot be denied that this agricultural technology, in use since ancient times, has successfully fed millions of people across the world. The “green revolution” that revolutionized the availability of cereal grains in countries like India owed its success to an emphasis on irrigation. India, economically devastated after hundreds of years of predatory British rule, emerged with self-sufficiency in food production thanks to its green revolution.

The FAO has emphasized the nexus between irrigation and food production, estimating that 34% of cultivated land in Asia is irrigated, with the figures averaging 10% for North America and 6% for Africa.<sup>348</sup> The

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<sup>346</sup> *U.N. World Water Development Report 4*, *supra* note 339, at 351.

<sup>347</sup> *Id.*

<sup>348</sup> CHARTRES & VARMA, *supra* note 101, at 193–94.

nexus between irrigation, food production, and alleviation of hunger is obvious. Besides growing so much of the world's food, the process of irrigation "provides the livelihood of an enormous part of the world[s] rural population."<sup>349</sup> Irrigation can increase crop yields significantly, ranging from 100% to 400%.<sup>350</sup> By one estimate, in order to meet the food requirements of the world's population in 2025, it will be necessary to increase irrigation by an astounding 2,000 cubic kilometers of water, about the equivalent of twenty-four times the average flow of the Nile River. By 2050, that figure is projected to rise to an annual need for 3,800 cubic kilometers of water.<sup>351</sup>

It is imperative that irrigation continue but become more scientific and less wasteful of water and less destructive to the land. That will require the dedicated efforts of scientists, entrepreneurs, water experts, soil specialists, and a variety of professionals who could, with their combined expertise, enable the world to continue to use this ancient system but with modern improvements. Most important, irrigation will have to become environmentally feasible and environmentally friendly.

As we have seen, despite all its benefits, irrigation also causes serious environmental problems. The FAO has expressed serious concern about the escalating environmental detriment of the world's reliance on irrigation. The FAO reported that irrigation "can . . . lead to waterlogging or salinization, after which the land produces less rather than more food."<sup>352</sup> It has also been evident for some years that agriculture is a significant source of nutrient pollution afflicting water sources.<sup>353</sup> On a more optimistic note, it is clear now that improvements in agriculture contribute in numerous ways to public health, the environment, the economy, and the political stability of any society. Technological inventions and educational experience given to farmers provide benefits for the entire community. The impact on water usage is also considerable. For example, the conversion of traditional to drip irrigation has been proven to save water. It has correctly been suggested that

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<sup>349</sup> Pereira et al., *supra* note 189, at 5.

<sup>350</sup> Food and Agriculture Org., *Water At a Glance: The Relationship Between Water, Agriculture, Food Security and Poverty*, available at <http://www.fao.org/nr/water/docs/waterataglance.pdf>.

<sup>351</sup> SANDFORD, *supra* note 188, at 20–21.

<sup>352</sup> *Water at a Glance*, *supra* note 350, at 7.

<sup>353</sup> See Mindy Selman, *How Food Production Impacts Water Quality*, WORLD RESOURCES INSTITUTE (Aug. 23, 2012), available at <http://www.wri.org/blog/how-food-production-impacts-water-quality>.

“[w]ithdrawals [of water] for agriculture tend to decrease with increasing levels of development.”<sup>354</sup>

## XII. INEQUITABLE USAGE OF WATER

The usage of water differs dramatically between the developed and developing world, reflecting both the poverty of the latter and the economic advancements of the former. The United Nations found that “[a] child born in the developed world consumes 30 to 50 times the water resources of one in the developing world.”<sup>355</sup> By one estimate, just one flushing of a toilet in the Western world consumes more water than most Africans have for their entire day for drinking, washing and cooking.<sup>356</sup> Tragically, the water in a North American flush tank is likely to be cleaner than that found in the ponds or water sources in many developing countries.

Very high on the global consumption list, the fortunate residents of the United States of America each use an estimated 151 gallons of water daily.<sup>357</sup> By contrast, the average Ethiopian has to manage with just three gallons per day.<sup>358</sup> North American consumption is 2.5 times that of Europeans.<sup>359</sup> Anita Hamilton, writing an incisive article for *Time Magazine*, criticized this consumption: “Graced with an abundance of freshwater resources, Americans have long been the poster children for water gluttony.”<sup>360</sup> There have been numerous critiques of North American water usage: “An American taking a five-minute shower uses more water than the average person in a developing country slum uses for an entire day.”<sup>361</sup>

During the twentieth century, Europeans and North Americans enjoyed a lifestyle that became the envy of the world. The United Nations estimated that those levels of resource consumption extrapolated to the population of the entire world would require 3.5 planet Earths to support and sustain.<sup>362</sup>

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<sup>354</sup> U.N. *World Water Development Report 4*, *supra* note 339, at 46.

<sup>355</sup> U.N.: *World Water Crisis Due to Leadership Inertia*, *supra* note 268 (citing UNESCO WWAP, *World Water Development Report: Water for People, Water for Life*).

<sup>356</sup> *Water and Sanitation Factsheet*, WATERCAN EAU VIVE, available at <http://www.watercan.com/videocontest/resourcefiles/Factsheet.pdf> (last visited Oct. 12, 2013).

<sup>357</sup> Christina Roessler, *Is Conservation Enough?*, in WATER MATTERS, *supra* note 43, at 150.

<sup>358</sup> *Id.*

<sup>359</sup> U.N. *World Water Development Report 4*, *supra* note 339, at 9.

<sup>360</sup> Hamilton, *supra* note 248.

<sup>361</sup> *Millions Lack Safe Water*, WATER.ORG, <http://water.org/water-crisis/water-facts/water/> (last visited Oct. 12, 2013).

<sup>362</sup> U.N. *World Water Development Report 4*, *supra* note 339, at 112.

This one planet Earth we have is clearly incapable of replicating the North American way of life in every country. Unfortunately, that lifestyle is now desired by people everywhere, and they are no longer content just to observe it from the sidelines. People in China, India, Brazil and South Africa are engaging in a spree of consumerism, and other countries are rushing to catch up. In the process, the gap between rich and poor appears to be widening.

It is also true that our sensitivities in this new century are tuned to condemning inequity and injustice. The trials and tribulations of the twentieth century taught us that there should be a basic standard of living accessible to all. We created eloquent human rights formulations to articulate that commitment.<sup>363</sup> We have not yet managed to fulfill that aim, but inequity is not shrugged off as readily as it once was, nor is it accepted as an inescapable part of life.

As a reflection of the impact of deprivation, poverty, and consequent social injustice, one could compare average female life expectancy in the United States at eighty years with a mere forty-five years in the developing world.<sup>364</sup> Ease of access to clean water and safe sanitation facilities make a significant difference in life expectancy. The saga of water is filled with many forms of injustice and inequity. This Article can only touch on a few of those problems. Hopefully, by giving the reader examples, the extent and scope of the injustice can be highlighted. For example, the United Nations has estimated that in the same city, slum dwellers are compelled to pay five to ten times more for water than are the wealthy residents.<sup>365</sup> The poor find access to water part of the daily drudgery of their lives.<sup>366</sup> Some aspects of the global water crisis are grounded in searing injustice.

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Western nations are not the only countries to use water in a profligate manner. One of the largest underground reserves of fossil freshwater could until recent years be found in Saudi Arabia.<sup>367</sup> In about a generation, the

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<sup>363</sup> See, e.g., Universal Declaration of Human Rights, G.A. Res. 217 (III) A, U.N. Doc. A/RES/217(III) (Dec. 10, 1948).

<sup>364</sup> JONES, *supra* note 16, at 27.

<sup>365</sup> U.N. DEV. PROGRAMME, *Human Development Report 2006: Beyond Scarcity: Power, Poverty and the Global Water Crisis* 10 (2006).

<sup>366</sup> *Id.* at 6.

<sup>367</sup> Fred Pearce, *Saudi Arabia Stakes a Claim on the Nile*, NAT'L GEOGRAPHIC NEWS (Dec. 18, 2012), <http://news.nationalgeographic.com/news/2012/12/121217-saudi-arabia-water-grabs-ethiopia/>.

Saudi Arabians managed to use up most of this magnificent ancient resource which originally had enough water to fill Lake Erie.<sup>368</sup> The Saudis then went global, leasing vast tracts of water-rich land in countries like Senegal, Ethiopia, and Indonesian New Guinea.<sup>369</sup> They are using this as cropland to grow food for Saudi Arabia on foreign land using foreign water.<sup>370</sup> This has inevitably led to conflicts with local populations that found themselves forcibly displaced by their own governments from their traditional growing and hunting areas.<sup>371</sup> Some local politicians welcomed Saudi “investment.”<sup>372</sup> With classic understatement, the United Nations World Water Assessment Programme extolled the mutual benefit of such arrangements but admitted that “the operationalization of these investments has been controversial.”<sup>373</sup> This practice now engages a number of countries and is likely to proliferate as one more manifestation of globalization. Whether or not one views this as egregious injustice depends on which side of the controversy seems more convincing.

It is important to note that Arab states are particularly susceptible to the water crisis. The area is replete with problems: political instability caused by economic deprivation across a large part of the region; frustration with local governments that appear to be corrupt, inept, and unjust; geographic degradation; sensitivity to climate change; and desertification and poor water management<sup>374</sup> all generate a toxic brew of water-related problems across this vast populous area. Add to that concoction the vagaries of international politics, the competition in the Middle East between world powers like the United States, Russia, and China, the ever-present Israeli-Palestinian crisis, and the fusion of local rebellions and proxy wars, and the situation appears dire. While water is one component of this roiling turmoil, it serves as cause, excuse, justification, target, and anything else conceived during a political crisis with no apparent end in sight. There is a deep-rooted feeling of political, economic, and social injustice, and this region has enough volatility to become the tinderbox for the next world war.

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<sup>368</sup> *Id.*

<sup>369</sup> *Id.*

<sup>370</sup> *Id.*

<sup>371</sup> *Id.*

<sup>372</sup> *Id.*

<sup>373</sup> Press Release, UNESCO, Arab Region Faces Ever-Increasing Water Challenges (Mar. 12, 2012), available at [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/WWDR4\\_Regional%20Press%20Release\\_Arab%20and%20Western@50Asia\\_02.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/WWDR4_Regional%20Press%20Release_Arab%20and%20Western@50Asia_02.pdf).

<sup>374</sup> *Iraq's PM Warns Arab States May Face 'Water War,'* BBC NEWS (May 30, 2012), <http://www.bbc.co.uk/news/world-middle-east-18262496?print=true>.

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Unless dramatic improvements occur in the interim, another feature of globalization is likely to increase the negative impact of the water crisis. Urban centers inevitably appeal to the majority of the world's population, especially the young, because of the easier access to jobs, foods, and a more varied, cosmopolitan life. Over half of the global population now inhabits cities,<sup>375</sup> and this figure is expected to increase dramatically to about 6.3 billion in 2050, with about 5.1 billion of these people residing in less developed regions.<sup>376</sup> This increase will be accompanied by a decline in developing world rural population to 2.9 billion.<sup>377</sup> In Latin America, an astounding 80% of the population inhabits towns and cities.<sup>378</sup> If, as projected, three-quarters of the world's population has become urban by 2050,<sup>379</sup> there will be a corresponding need for new, efficient plumbing infrastructure to meet the water requirements of this massive influx. Water will have to be made available for them as well as food supplies.

The most dramatic shift in population from rural to urban areas is likely to occur in the developing world.<sup>380</sup> In 2011, United Nations agencies reported that about 40% of Africa's 1 billion people lived in urban centers.<sup>381</sup> Of these, about 60% inhabited slums with little or no access to either clean water or adequate sanitation.<sup>382</sup> Municipal governments in African nations now cannot keep pace with the growing urban population that rose from about 30 million in 1990 to over 55 million in 2008.<sup>383</sup> The situation is particularly dire in that continent because, as Joan Clos, Executive Director of UN-HABITAT, explained, "Africa is the fastest urbanizing continent on the planet and the demand for water and sanitation is outstripping supply in

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<sup>375</sup> JONES, *supra* note 16, at 19.

<sup>376</sup> DEP'T OF ECON. AND SOC. AFFAIRS, UNITED NATIONS, WORLD URBANIZATION PROSPECTS 3 (2012), available at [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/WWDR4\\_Regional%20Press%20Release\\_Arab%20and%20Western%20Asia\\_02.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/WWDR4_Regional%20Press%20Release_Arab%20and%20Western%20Asia_02.pdf).

<sup>377</sup> *Id.*

<sup>378</sup> Press Release, *supra* note 75.

<sup>379</sup> JONES, *supra* note 16, at 19.

<sup>380</sup> *Id.*

<sup>381</sup> *Africa's Urbanization Outpaces Capacity to Provide Water, Sanitation* — UN, U.N. NEWS CENTRE, Mar. 21, 2011, <http://www.un.org/apps/news/story.asp/www.unaids.org/en/sotry.asp?NewsID=37836&Cr=water&Cr1=santiation#.UssHMHnn1j>.

<sup>382</sup> *Id.*

<sup>383</sup> *Id.*

cities.”<sup>384</sup> African cities have not been able to build the physical infrastructure to cope with the inflow of people, and the future prospects for betterment are quite grim. Future scenarios in terms of inequity are very depressing. The gap between the sophisticated urban richer and middle classes in Africa and the uneducated, deprived poorer people is likely to widen. This is all the more ironic as African countries recently appeared to be in the vanguard of economic progress.

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However bad life may be in the cities, life in the village is deemed to be far worse and hence the migration to urban centers is bound to continue. Availability of water has played a crucial role in pushing people toward cities. Inequity in access to water will continue to drive rural migration to the cities. Rural communities are five times more likely to use “unimproved water sources” than are urban areas.<sup>385</sup> Three-quarters of the estimated 2.5 billion people who lack adequate sanitation facilities live in rural areas.<sup>386</sup> Approximately one third of these people live in South Asia, one third in sub-Saharan Africa, and one third in China.<sup>387</sup>

The move to an urban center provides no immediate guarantee of a better life—indeed, often the contrary is true. New arrivals are frequently homeless, hapless, and helpless. Lucky to find shelter in slums, they are deprived of adequate food and water, sanitation, and many of the basic necessities of life. The increasing numbers flocking to urban centers have already generated massive social and economic challenges. The World Health Organization estimated that by 2030, about 2 billion people could be slum dwellers.<sup>388</sup> If they are deprived of access to clean water and adequate sanitation, the health consequences for them will be serious. Given the overcrowding that marks all slums, the spread of disease will become a potent problem. In the crowded urban centers, there will be no assurances of

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<sup>384</sup> *Id.*

<sup>385</sup> *Are More People Getting Safe Drinking Water?*, *supra* note 245.

<sup>386</sup> *Id.*

<sup>387</sup> ‘King of Bollywood’ Shahrukh Kahn Puts His Star-power Behind Life-Saving Sanitation and Hygiene Issues, WATER SUPPLY & SANITATION COLLABORATIVE COUNCIL (Oct. 10, 2011), <http://wsscc-global-forum.org/%E2%80%9Cking-of-bollywood%E2%80%9D-shahrukh-khan-puts-his-star-power-behind-life-saving-sanitation-and-hygiene-issues.html>.

<sup>388</sup> JONES, *supra* note 16, at 32.

immunity. Rich 'islands' of comfort cannot protect their inhabitants from or stave off the diseases generated in the tenements and slums.

There can be little doubt that a serious global crisis does exist with respect to the lack of clean water and inadequate sanitation facilities for many millions of people in the world. This is not merely a crisis. Its consequences are catastrophic in terms of the quality of life for the millions of victims. Its persistence, despite all our technological wonders and the great advances in human civilization in the century just past, is a real disgrace. The plight of all those who are deprived of this vital commodity and have to drink filthy water and risk disease is a reflection on all of us who enjoy the comfort of water at the turn of a tap.

The enjoyment of life's many amenities in the so-called developed world cannot in this new millennium be allowed to blind us to the plight of those who are not so fortunate. Nor can we afford to be complacent and assume that the amenities of clean water will eventually get to them. If water is to be a genuine human right, then the universal fulfillment of that right has to become a global responsibility. No longer are human rights simply a state obligation. The innovative concepts that now make the implementation of human rights a concern for non-state actors make all of us responsible to do whatever we can to assist in fulfilling such fundamental needs across the planet. Until that occurs, the physical deprivation afflicting so many millions reflects our moral and ethical indifference.

### XIII. CORRUPTION

One reason why so many of the world's poor are deprived of water is because there is so much corruption involved in every facet of water accessibility and delivery. In many countries, corruption has permeated every phase of water governance. Absent radical reforms, the poor will be doomed to their plight because they cannot afford to participate in the corruption game and bribe their way to water access.

Transparency International has dedicated its efforts to combating corruption, which it defines as "abuse of entrusted power for private gain."<sup>389</sup> The United Nations has also drawn attention to the problem of corruption, citing it along with restricted political rights and limited civil liberties as

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<sup>389</sup> Juanita Olaya, *Integrity Pacts in the Water Sector*, TRANSPARENCY INTERNATIONAL 20 (2010), available at [http://www.transparency.org/whatwedo/tools/resources\\_about\\_integrity\\_pacts](http://www.transparency.org/whatwedo/tools/resources_about_integrity_pacts).

factors underlying the growing water crisis.<sup>390</sup> In an excellent and succinct report on corruption written for Transparency International and the Water Integrity Network, Juanita Olaya described the many manifestations of this phenomenon with respect to water issues. Olaya explained that project costs could be inflated; water intended for rural development could be diverted; officials must be bribed to secure household connections; safety features in dams could be overlooked; pollutants could be dumped into water sources; meter readings could be falsified; infrastructure procurement could be expensive and of shoddy construction; and directorships on water boards could be purchased as a lucrative investment.<sup>391</sup> Olaya added that “corruption can be found at every point along the water delivery chain: from policy design and budget allocation to operations and billing systems.”<sup>392</sup> Additionally, “corruption and corruption risks can occur throughout the entire public contracting process, from needs assessment, project design and bid preparation, to contractor selection, contract execution and closure.”<sup>393</sup> In 2012, Transparency International commented that, despite a public outcry against corruption, “the levels of bribery, abuse of power and secret dealings”<sup>394</sup> were still very apparent in many countries.

It is important to clarify that corruption occurs globally and probably few countries are exempt. In the Corruption Perceptions Index of 2012, Denmark, Finland, and New Zealand received the desirable highest score of ninety while Afghanistan, North Korea, and Somalia ranked at the bottom.<sup>395</sup> Cobus de Swardt, Managing Director of Transparency International, called corruption the “world’s most talked about problem.”<sup>396</sup>

Water issues form a very significant part of the crime of corruption because incentives are high<sup>397</sup> and risks are relatively low because most governments lack the will to act decisively against it. However, the consequences of water-related corruption are very severe, especially for the poor who become ill and lose their lives by the thousands because they lack

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<sup>390</sup> *World Water Crisis Worsened by Corruption, Repression: U.N. Report*, U.N. NEWS CENTRE, Feb. 20, 2006, <http://www.un.org/apps/news/story.asp?NewsID=17551&Cr=&Cr1>.

<sup>391</sup> Olaya, *supra* note 389.

<sup>392</sup> *Id.*

<sup>393</sup> *Id.* at 25.

<sup>394</sup> Press Release, Transparency International, Governments Should Hear the Global Outcry Against Corruption (Dec. 5, 2012), *available at* <http://www.transparency.org/cpi2012/press/%23en#en>.

<sup>395</sup> *Id.*

<sup>396</sup> *Id.*

<sup>397</sup> Olaya, *supra* note 389.

the means to indulge in this crime. Corruption is also linked to the amount of inefficiency in the governance of water systems.<sup>398</sup> When personal financial gain becomes the only job incentive, there is no inducement to work or to take pride in one's accomplishments. Like a cancer, corruption seeps into every realm of the institution, weakening and defeating the best intentions of the truly dedicated and honest employees. So corruption and inefficiency go hand in hand, dooming the vital social service of provision of water in the community. Leakage through faulty pipes or theft through illegal water connections afflict many cities in the developing world. By one estimate, water losses in Latin America during the 1980s amounted to \$1 billion annually.<sup>399</sup>

The United Nations has attempted to address the global crimes associated with corruption by tasking businesses to work against all its manifestations, including extortion and bribery.<sup>400</sup> Regrettably, corruption prevails as a global phenomenon and will not be eradicated that easily.

#### XIV. THE GLOBAL SCOPE OF THE WATER CRISIS

Having examined some features of the water crisis, it would be useful to view the situation as it has unfolded in some countries. Although conditions vary in each nation, the scope of the crisis can be better understood from an international perspective that provides insights into the particular challenges facing different parts of the world.

Following the conclusion of the Second World War in 1945, the center of global power shifted from Western Europe to the United States of America and, somewhat later, its main rival, the Soviet Union. The declining significance of Western European States like Britain and France enabled countries like India, China, and numerous others throughout Asia and Africa to regain their independence and enjoy the benefits of freedom. Regrettably, political freedom did not immediately bring economic independence. The economic consequences of centuries of Western imperial rule would prove to be far more difficult to tackle than the political. A change of government,

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<sup>398</sup> See *id.* (asserting that the consequences of corruption include a reduction in overall financial resources and a skewed allocation of investment towards those who can pay the most for the water).

<sup>399</sup> Webb, *supra* note 281, at 24.

<sup>400</sup> U.N. Global Compact, Principle 10, available at <http://www.unglobalcompact.org/AboutTheGC/TenPrinciples/Index.html>; see also *infra* notes 641–45 (discussing U.N. efforts to work with business against corruption).

usually to the nationalists who had agitated and often suffered for freedom, was far easier to obtain than the liberation of an entire economic system that had made the colonies subservient to requirements of the European “mother country.”

The economic problems prevalent throughout the colonial domains of Afro-Asia arose because the self-sufficient, diverse, mainly agrarian economies of the pre-colonial era had been forcibly converted to subservient economies that provided both raw materials and markets for Western industrialized products. Under the economic depredations of colonial rule, countries like India, which were formerly fabled for their vast wealth, sank to the level of acute poverty and deprivation for millions, especially in rural regions.

The introduction of market economics forced peasants and farmers to focus on one cash crop—usually a raw material like cotton or tea or rubber—that was required by the European imperial power. Cash crop cultivation made farmers in the colonies dependent on a global price for their product and dragged them into the vagaries of a cash economy where barter had little or no viability. Additionally, they suffered because the price for their crop was set by speculators or uncaring economic interests in the West who had little or no knowledge of the hardship they were causing thousands of miles away. If a farmer worked hard and produced more, the unit price of his crop fell, and he suffered more. The economic laws of supply and demand effectively doomed him to a cycle of poverty from which there was no release. Indebted peasants were forced into indentured labor where their situation was one of near-slavery, a condition often passed on from one generation to the next. Unable to read and write, these laborers fell prey to unscrupulous landlords, money-lenders, and businessmen, and that version of slavery and bondage unfortunately still afflicts thousands of people in a number of countries.<sup>401</sup> Although most of the world now has political independence, economic and social freedom are still not assured for many of the poorest members of these new nations. A most egregious form of inequity afflicts children, sometimes very young children, who are burdened by their parents’ debts and become the victims of dangerous and sometimes deadly employment as child laborers.<sup>402</sup>

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<sup>401</sup> See Ranee K.L. Panjabi, *Born Free Yet Everywhere in Chains: Global Slavery in the Twenty-First Century*, 37 DENV. J. INT’L L. & POL’Y 1 (2008).

<sup>402</sup> See Ranee K.L. Panjabi, *Sacrificial Lambs of Globalization: Child Labor in the Twenty-First Century*, 37 DENV. J. INT’L L. & POL’Y 421 (2009).

In the colonial scenario of overwhelming injustice, farmers found no recourse and were at the mercy of several impersonal structures: uncaring central imperial governments; district governments whose main agenda was to tax them regardless of their productivity; local landlords and large landowners who monopolized both the land and the water; and money-lenders who were so notorious for their usury that their profession has become a curse word in some areas. Unfortunately, many features of this situation still prevail, only the predators are now not foreigners but fellow citizens of the same nation. The foreign exploiters have now been replaced by local exploiters.

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The conversion to cash crop production has also severely impacted small farmers who now have to contend with larger, richer, agribusiness food growers who create vast plantations to grow the demand crop of the moment, usually a plant that liberally consumes water. This leaves the traditional farmer with little water for his own land. In Thailand, agribusiness interests have leased land and grown trendy crops of roses, maize and potatoes, which consume vast quantities of water.<sup>403</sup> Local traditional rice farmers have few options available but to sell off their family land.<sup>404</sup> There is also a serious ecological price being paid. In Thailand the basin of the Nan River, which covers five provinces, is now threatened with drought because vast ancient forest areas have been destroyed and replaced by cash crop plantations growing rubber and maize.<sup>405</sup>

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Although Asian countries have experienced dramatic economic progress and development in the last decades of the twentieth century, fundamental needs have been overlooked across that vast continent. The frenetic race to equal the famed American standard of living with its lavish consumption and lifestyle has often generated vast disparities between the haves and the have-

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<sup>403</sup> Apinya Wipatayotin, *Rich Farmers Move In, Use Up All The Water*, BANGKOK POST, Apr. 19, 2012, <http://www.bangkokpost.com/learning/learning-from-news/289494/rich-farmers-move-in-use-up-all-the-water>.

<sup>404</sup> *Id.*

<sup>405</sup> Apinya Wipatayotin, *From Floods to Drought*, BANGKOK POST, Mar. 12, 2012, <http://www.bangkokpost.com/learning/learning-from-news/284019/from-floods-to-drought>.

nots, environmental catastrophes and levels of degradation that are horrifying, and social and political inequities that have resulted in unrest, rage, and discontent. There is now a dawning realization that there has been a terrible price paid by the many for the benefits reaching a pampered few. People who do not share in the largesse feel marginalized, alienated, and, in an age of instant information and news, extremely angry.

Water, so basic a human need, frequently becomes a catalyst for the economic, political, and social ills of these countries. Catarina de Albuquerque, Special Rapporteur on the human right to safe water and sanitation, emphasized the situation in Thailand, mentioning “huge disparities in access to safe drinking water and in the systematic monitoring of water quality.”<sup>406</sup> The Thai Ministry of Health admits to a low 25% rate of rural access and a 40% rate for urban users of water.<sup>407</sup> The Special Rapporteur expressed her particular concern about “the people who live in the shadows of Thai society.”<sup>408</sup>

Marginalized communities, particularly of ethnic or religious minorities, can be found in many countries, and their plight is serious whether they inhabit democracies or dictatorships. Countries like China and India have experienced rapid and dramatic economic growth. However, the rural parts of those countries—particularly the regions with minorities—still manifest a world of inequity and deprivation. One reason for this is that both India and China have become notorious for the amount of corruption and greed that have literally consigned the most vulnerable of society to lives of poverty and misery beyond comprehension. One serious and obvious manifestation of this deprivation relates to the absence of clean water and adequate sanitation. Clean water is a privilege in these regions, not a right, and they struggle against multiple forms of injustice to survive.

In so many countries of Asia and Africa and Latin America, the fine-sounding promises made in the luxurious halls of the United Nations in New York are belied by the suffering of men, women, and children who struggle daily just to gain access to drinking water and a minimum amount of food. These, the most vulnerable of society, have in the real world no rights, despite all the Covenants and promises that have been formulated on their behalf. They, especially the women and children, have no privacy and have

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<sup>406</sup> *UN Expert Calls on Thailand To Eliminate Disparities On Access To Water and Sanitation*, UNITED NATIONS NEWS CENTRE, Feb. 8, 2013, <http://www.un.org/apps/news/story.asp/story.asp?NewsID=44099&Cr=Thailand&Cr1=#>.

<sup>407</sup> *Id.*

<sup>408</sup> *Id.*

to defecate in open fields, where they are subject to snake bites, rape by criminals, various forms of terror, and embarrassment and humiliation. In some urban slums, the absence of toilets forces residents to use plastic bags which, because of no garbage disposal, they fling wherever they can.<sup>409</sup> These 'flying toilets' have become notorious for the terrible consequences they cause wherever they land. Lacking proper toilets, over half the citizens of Madagascar's 20 million people are compelled to defecate in the open every day.<sup>410</sup> There are tragic economic, environmental, and health consequences. Children under five in Madagascar die at a staggering rate of 72 per 1,000, one of the highest in the world.<sup>411</sup>

At its very foundation, this subject of the water crisis is a study of injustice and inequity, two forms of cruelty and discrimination that affect the most vulnerable and often the weakest members of any society. And the scope of such injustice is global. Regrettably, while political colonialism may well be deemed over, economic imperialism still persists and daily chalks up thousands more on its horror list of victims. Again, as in the past, the rural areas suffer most.

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Despite a booming economy, countries like India experience severe water shortages, and there is rationing in almost every part of the country. The combination of rising population, economic development, increasing food production, and serious weather crises have made water scarcity a constant worry for everyone in India. The *New York Times* described the situation from the perspective of a middle-class Indian housewife who had to call a private water tanker because there was no water flowing from the pipes.<sup>412</sup> A weary Mrs. Prasher recounted how she had to keep phoning for the tanker and worried whether there was enough water stored at home in case no one came. She commented: "Your whole day goes just planning how you'll get water. . . . You become so edgy all the time."<sup>413</sup>

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<sup>409</sup> See Rose George, *The Unmentionables*, in WRITTEN IN WATER, *supra* note 45, at 82–91.

<sup>410</sup> *Glimmer of Hope for Elimination of Open Air Defecation in Madagascar*, WATER SUPPLY & SANITATION COLLABORATIVE COUNCIL (Sept. 7, 2013), available at <http://www.wsscc.org/resources/resource-news-archive/glimmer-hope-elimination-open-air-defecation-madagascar>.

<sup>411</sup> *Id.*

<sup>412</sup> Somini Sengupta, *In Teeming India, Water Crisis Means Dry Pipes and Foul Sludge*, N.Y. TIMES, Sept. 29, 2006, at A1.

<sup>413</sup> *Id.*

In the state of Gujarat, where Mahatma Gandhi was born, the prospect of chronic water scarcity looms.<sup>414</sup> The *Economic Times* in a compelling but accurate headline wrote: “India Stares at Drinking Water Crisis.”<sup>415</sup> There are justifiable fears that India’s burgeoning economic growth has already been slowed because of water scarcity and increasing pollution of water sources. An estimated 70% of India’s once pristine lakes and rivers are now deemed unfit for drinking or bathing.<sup>416</sup>

Thankfully, because India is a democracy, Indians are free to vent their grievances, and individuals, the media, and non-governmental organizations make full use of the freedom of speech and press to voice a clamorous complaint about the water situation. In that very articulate and vocal democracy, the public has taken the Indian government to task for not delivering adequately on either access to clean water or sanitation. Nina Brooks, writing for the Arlington Institute, explained that “[i]n managing water resources, the Indian government must balance competing demands between urban and rural, rich and poor, the economy and the environment.”<sup>417</sup> The government is constantly on the defensive against the multiple complainants. Again, those most deprived are the millions of Indians who live in rural areas. The situation in cities is better, but there too the expanding slums deflate public enthusiasm about another reality, that India has today one of the fastest-growing middle classes in the world. However, as we have seen, regardless of class, in India it seems almost everyone has to worry about water.

Egyptian politics in recent years have managed to keep the world riveted. The Arab Spring of 2011 manifested in massive public demonstrations in Tahrir Square, Cairo, that dislodged dictator Hosni Mubarak. To the horror of the democratically-inclined revolutionaries, their liberal revolution was allegedly hijacked by the ultra-organized Muslim Brotherhood that managed to win power in an election. In 2013, this government was displaced by the army because of public outrage about the encroachments of fundamentalism on the people and because of economic regress. The irony of an army coup

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<sup>414</sup> Kapil Dave, *Gujarat Faces Grim Water Scenario*, TIMES OF INDIA, Apr. 13, 2013, available at <http://timesofindia.indiatimes.com/city/ahmedabad/Gujarat-faces-grim-water-scenario/art>.

<sup>415</sup> Rituraj Tiwari & Himangshu Watts, *India Stares at Drinking Water Crisis*, ECON. TIMES, July 23, 2012, available at [http://articles.economictimes.indiatimes.com/2012-07-23/news/32804833\\_1\\_reservoirs-storage-capacity-monsoon-rains](http://articles.economictimes.indiatimes.com/2012-07-23/news/32804833_1_reservoirs-storage-capacity-monsoon-rains).

<sup>416</sup> BARLOW, *supra* note 88, at 7.

<sup>417</sup> Nina Brooks, *Imminent Water Crisis in India*, ARLINGTON INSTITUTE, Aug. 2007, <http://www.arlingtoninstitute.org/wbp/global-water-crisis/606>.

displacing a democratically elected President, avowedly to restore liberal democracy to a nation, has confounded political pundits and the public around the world. Egypt's economic, political and religious issues will no doubt continue for some time. Its environmental problems are, however, equally serious, and water is pivotal in this very populous country. The once agriculturally rich area of the Nile Delta is receiving so little freshwater because of dam and irrigation schemes upriver that it is now sinking and "being overtaken by the Mediterranean Sea."<sup>418</sup> Water shortages and severe pollution in Egypt have environmental and economic consequences. The complaints against the Muslim Brotherhood Government related both to its alleged mishandling of the economy and to problems with meeting the fundamental needs of the people of Egypt.

With respect to China, it is important to note that while the North suffers from severe water shortages, the South does for the most part have adequate water.<sup>419</sup> However, as we have seen, millions of Chinese citizens have to drink polluted water and environmentalists have not generally had much impact when opposing the economic development plans of the governing class. That may change in the future.

China may have become a very significant economic powerhouse, but the people have paid a terrible environmental price for their nation's success. The historic Yellow River, deemed the 'mother river' of that ancient civilization, has been running dry and silting up because of too much diversion of its waters for irrigation.<sup>420</sup> Aquatic life cannot survive in over 80% of Chinese rivers.<sup>421</sup> Approximately 90% of groundwater systems under cities are now contaminated.<sup>422</sup> Seven of the world's ten most polluted cities are in China.<sup>423</sup>

Although economies like India and China are forging ahead at incredible speed, the water problem may well serve to weaken their economic growth, endanger agricultural output, frustrate the aspirations for a higher living standard, and engender anger and rage, sparking, particularly in the case of the Chinese government, possible political unrest. India has achieved the

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<sup>418</sup> Sandra Postel, *Honest Hope*, in WRITTEN IN WATER, *supra* note 45, at 50.

<sup>419</sup> WORLD AGRICULTURE, *supra* note 332, at 142.

<sup>420</sup> Postel, *supra* note 418, at 50.

<sup>421</sup> BARLOW, *supra* note 88, at 6.

<sup>422</sup> *Id.*

<sup>423</sup> *Id.* at 7.

miracle of self-sufficiency in food but that nation “is living on borrowed water and borrowed time.”<sup>424</sup>

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The World Development Movement revealed early in 2013 that in Cambodia, industrial companies growing sugar cane have been given land grants and this has enabled them to burn the houses of farmers who were practicing diverse agriculture.<sup>425</sup> The cash crop emphasis on sugar cane has also resulted in heavy use of pesticides and consequent pollution of water sources.<sup>426</sup> Access to forests has been cut off by the cash crop planters and some evicted peasants have been jailed.<sup>427</sup> European companies like Tate & Lyle (famous for its Golden Syrup—almost a staple in England) have been accused of buying the sugar output of these Asian plantation companies, thereby indirectly supporting the injustices being committed against Cambodian farmers and fishermen.<sup>428</sup>

In Indonesia, years of dictatorship have taken their toll on the provision of adequate basic services for the population. At the beginning of this new century Jakarta had a less than 3% sanitation sewage hookup.<sup>429</sup> Indonesia endured not only one of the lowest sanitation rates in the world but suffered extensive pollution of its rivers and lakes and contamination of 90% of Jakarta’s shallow wells.<sup>430</sup> Urban household waste is often flung into canals that were dug to control flooding.<sup>431</sup> During the rainy season, sewage from these canals frequently overflows into the streets.<sup>432</sup> Indonesia is one example of a terrible water crisis that prevails through many of the Pacific countries.

The United Nations expressed serious concern about the growing water crisis in the Asia Pacific region, including countries like Indonesia, Malaysia, and Papua New Guinea. According to the World Water Assessment Programme, this region now faces shortages and quality problems in major

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<sup>424</sup> Pearce, *supra* note 46, at 69–70.

<sup>425</sup> Christine Haigh, *Swap Sugar For Solidarity*, WORLD DEVELOPMENT MOVEMENT, Jan. 11, 2013, <http://www.wdm.org.uk/multinational-corporations/swap-sugar-solidarity>.

<sup>426</sup> *Id.*

<sup>427</sup> *Id.*

<sup>428</sup> *Id.*

<sup>429</sup> BARLOW, *supra* note 88, at 7 (citing the Indonesian Environment Monitor).

<sup>430</sup> *Id.*

<sup>431</sup> *Id.*

<sup>432</sup> BAKKER, *supra* note 176, at 112.

cities “because of population growth, growing water consumption, environmental degradation, damaging agricultural activities, poor management of water catchment areas, industrialization, and groundwater overuse.”<sup>433</sup> A number of Pacific islands, once fabled for their scenic beauty, are now victims of the water crisis. Some, like Nukulaelae, are compelled to ration water.<sup>434</sup> The island nation of Tuvalu declared a state of emergency in 2011 because of severe water shortages.<sup>435</sup>

The Asian Development Bank blamed the water crisis on an absence of adequate water governance.<sup>436</sup> Water Specialist Ranesh Vaidya commented that “[t]here is a definite link between good governance and good water.”<sup>437</sup>

Vaidya helped prepare a Report for the Asian Development Bank that confirmed that 65% of people in the Asia-Pacific region still live without secure household water supplies.<sup>438</sup> Ironically, this region is now an “economic powerhouse,” but no developing country in the region can boast of being secure in terms of water.<sup>439</sup>

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Over seven decades of communist rule caused serious harm to the environment of Russia and its satellite States. A report prepared by the National Intelligence Council in 1999 found that water pollution was the most serious environmental problem: “Less than half of Russia’s population ha[d] access to safe drinking water.”<sup>440</sup> The report also included mention of a form of pollution quite specific to the communist era, namely the dumping

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<sup>433</sup> Press Release, UNESCO, Water Resources in the Asia-Pacific Region are Increasingly Threatened by Pollution and Vulnerable to Natural Disasters (Mar. 14, 2012), available at [http://www.unesco.org/new/en/rio-20/single-view/news/water\\_resources\\_in\\_the\\_asia\\_pacific\\_region\\_are\\_increasingly\\_threatened\\_by\\_pollution\\_and\\_vulnerable\\_to\\_natural\\_disasters/#.Us8EyXnS7wl](http://www.unesco.org/new/en/rio-20/single-view/news/water_resources_in_the_asia_pacific_region_are_increasingly_threatened_by_pollution_and_vulnerable_to_natural_disasters/#.Us8EyXnS7wl).

<sup>434</sup> *Tuvalu Faces Drinking Water Emergency*, ALJAZEERA, Oct. 3, 2011, <http://www.aljazeera.com/news/asia-pacific/2011/10/201110364857797250.html>.

<sup>435</sup> *Id.*

<sup>436</sup> *Asia-Pacific facing water crisis—ADB*, INQUIRER.NET, Mar. 13, 2013, <http://globalnation.inquirer.net/68901/asia-pacific-facing-water-crisis-adb>.

<sup>437</sup> *Id.*

<sup>438</sup> *Id.*

<sup>439</sup> *Most Asian Countries Face Water Crisis: ADB*, XINHUA AGENCIES, Mar. 13, 2013, [http://news.xinhuanet.com/english/world/2013-03/13/c\\_132230497.htm](http://news.xinhuanet.com/english/world/2013-03/13/c_132230497.htm).

<sup>440</sup> National Intelligence Council & DCI Environmental Center, *The Environmental Outlook in Russia* (Jan. 1999), available at [http://fas.org/irp/nic/environmental\\_outlook\\_russia.html](http://fas.org/irp/nic/environmental_outlook_russia.html).

of nuclear material.<sup>441</sup> The report was alarming, stating that “nuclear contamination could leach into key water sources as well.”<sup>442</sup> Summarizing the water crisis in Russia, the U.S. Congress found that 75% of surface water was polluted, many rural wells were contaminated, and 30% of available groundwater was seriously tainted.<sup>443</sup> Russian leader Vladimir Putin has enraged environmentalists for allegedly sanctioning the pollution of Lake Baikal, the source of one-fifth of the world’s freshwater.<sup>444</sup> He is alleged to have taken this action to reopen a pulp and paper mill that was closed on ecological grounds.<sup>445</sup> The British newspaper *The Guardian* alleged that the owner of the mill was a close friend of Putin.<sup>446</sup> The enabling legislation allowed for the dumping of radioactive and other waste on the shores of Lake Baikal, which has been declared a UNESCO world heritage site by the United Nations.<sup>447</sup>

One of the most egregious violations of the environment occurred with the ruination of the Aral Sea, deemed as “the world’s worst human-caused ecological disaster.”<sup>448</sup> Located in Uzbekistan and Kazakhstan, the Aral Sea was once the fourth-largest freshwater lake in the world.<sup>449</sup> From about the 1960s on, water from this source was withdrawn indiscriminately by the Soviet Union to irrigate fields of rice and cotton, resulting in a tragic depletion of water by almost 85%.<sup>450</sup> Between 1981 and 1990, the level of the Aral Sea declined by sixteen meters, the shoreline receded, and the now-dry seabed spewed toxic salt-laden dust on surrounding farms.<sup>451</sup> This man-made environmental catastrophe annually results in 75 million tons of toxic dust laden with pesticides and salt flying across Central Asia.<sup>452</sup> The Aral Sea shrank because the rivers that fed into it had been diverted and mostly

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<sup>441</sup> *Id.*

<sup>442</sup> *Id.*

<sup>443</sup> BARLOW, *supra* note 88, at 8.

<sup>444</sup> Luke Harding, *Anger at Putin Decision to Allow Lake Baikal Paper Mill to Reopen*, GUARDIAN, Jan. 20, 2010, available at <http://www.theguardian.com/world/2010/jan/20/Vladimir-putin-lake-baikal-mill>.

<sup>445</sup> *Id.*

<sup>446</sup> *Id.*

<sup>447</sup> *Id.*

<sup>448</sup> U.N. DEV. PROGRAMME, *supra* note 365, at 21.

<sup>449</sup> *Hot Spots*, in WATER MATTERS, *supra* note 43, at 36.

<sup>450</sup> Food and Agriculture Org., *supra* note 350, at 11.

<sup>451</sup> *Id.*

<sup>452</sup> *Hot Spots*, *supra* note 449.

dried out.<sup>453</sup> A similar fate befell Lake Chad in Africa.<sup>454</sup> That lake has shrunk by an astounding 95% since the 1960s.<sup>455</sup>

The African continent has become a source of major concern with respect to the water issue because the combination of political upheaval, revolutions, dictatorships, terrorism, guerrilla insurrections, tribal warfare, economic deprivation and environmental destruction have produced a toxic stew of misery that afflicts millions of the inhabitants of that continent. Water deprivation is just one problem among many that daily plague the lives of millions in Africa. However, it happens to be one of the most important because water deprivation takes a daily toll on human life. One of the most seriously afflicted populations inhabits the Democratic Republic of the Congo, an area rich in biodiversity, forests, and mineral resources but where, by U.N. estimates, 51 million people are without access to potable water.<sup>456</sup> There is no doubt that “one of the greatest causes of poverty in Africa is . . . the lack of access to clean drinking water.”<sup>457</sup>

All too frequently, it is government projects that create negative environmental consequences for the people. A case in point is in northern Nigeria, where diversion of river waters was drying up a large oasis and wetlands area bordering the Sahara.<sup>458</sup> The government viewed the project as one that would ‘green the desert’ when “[i]n fact, it was creating desert.”<sup>459</sup>

Water deprivation and scarcity are important reasons, among others, for the tribal, ethnic, and political warfare that has plagued Darfur (a region in Western Sudan) for so many years. About 400,000 people have died in this genocide.<sup>460</sup> Such tragedy is compounded alarmingly when the perpetrators of the horror represent the United Nations and come to alleviate the plight of local people. In March 2012, former U.S. President Bill Clinton, in his capacity as U.N. Special Envoy to Haiti, admitted that the troops of the

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<sup>453</sup> *Id.*

<sup>454</sup> Black, *supra* note 151.

<sup>455</sup> Frederick Kirschenmann, *Tending the Land*, in WRITTEN IN WATER, *supra* note 45, at 224.

<sup>456</sup> UN News Centre, *supra* note 35.

<sup>457</sup> *Poverty in Africa Begins With a Lack of Clean Water*, THE WATER PROJECT, <http://thewaterproject.org/poverty.asp>.

<sup>458</sup> Pearce, *supra* note 46, at 72.

<sup>459</sup> *Id.*

<sup>460</sup> *Genocide In Darfur*, U.N. HUMAN RIGHTS COUNCIL, <http://www.unitedhumanrights.org/genocide/genocide-in-sudan.htm>.

international organization brought an epidemic of cholera to Haiti.<sup>461</sup> These U.N. troops went to assist the people of Haiti, but they carelessly dumped bacteria-laden human waste into the Artibonite River, a main source of that nation's water supply.<sup>462</sup> Already short on clean water and adequate sewage, the Haitians suffered terribly from this unexpected epidemic.<sup>463</sup> Almost 8,000 Haitians had died by 2012.<sup>464</sup> It is significant to note that the United Nations continued to deny any responsibility despite former President Clinton's admission.<sup>465</sup>

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In one part of the world, water stress is inextricably linked to political conflict and has unfortunately become both a cause and consequence of serious inequities in accessibility to water. The long-simmering conflict between Israel and the Palestinians has resulted in a series of wars, consignment of the latter in huge numbers to refugee camps, and the alleged confiscation of their lands, homes, orchards, wells, aquifers, and water sources.<sup>466</sup> In its defense, Israel has consistently maintained that it is in a precarious situation as a Jewish state surrounded by Arab hostility.<sup>467</sup> It expresses a strong desire for peace and mutually beneficial economic relations with its neighbors. According to Israel, this goal has proved elusive with respect to the Palestinians and their supporters.<sup>468</sup> It has been alleged that the June War of 1967 was fought partly to give Israel ample access to the freshwater sources from the Golan Heights, the Sea of Galilee, the Jordan River, and the West Bank.<sup>469</sup> Occupation of these crucial areas has resulted in substantive gains in water access for Israel and severe deprivation for the local population still living in those regions.<sup>470</sup> The prospects for future peace could well be jeopardized by these conflicting requirements for water.

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<sup>461</sup> Mark Weisbrot, *Haiti: More Pressure Needed to Get Clean Water*, ALJAZEERA, Dec. 12, 2012, <http://www.aljazeera.com/indepth/opinion/2012/12/2012121263738325821.html>.

<sup>462</sup> *Id.*

<sup>463</sup> *Id.*

<sup>464</sup> *Id.*

<sup>465</sup> *Id.*

<sup>466</sup> Vandana Shiva, *Water Wars Excerpt*, THIRD WORLD TRAVELER (2002), available at [http://www.thirdworldtraveler.com/Vandana\\_Shiva/Water\\_Wars\\_VShiva.html](http://www.thirdworldtraveler.com/Vandana_Shiva/Water_Wars_VShiva.html).

<sup>467</sup> *Id.*

<sup>468</sup> *Id.*

<sup>469</sup> *Id.*

<sup>470</sup> *Id.*

Israel is the closest ally of the U.S. in that region and has been the recipient of considerable American aid for many years. Israel has been accused of denying the Palestinians access to water and of willfully destroying their water infrastructure during military operations.<sup>471</sup> Writing for the United Nations Global Compact, Kristina Donnelly and a team of researchers stated that “in the Occupied Palestinian Territories, Israeli Defense Forces in Jenin intentionally destroyed or damaged booster pumps, water lines, and valves.”<sup>472</sup>

In 2008, Michael Bailey, Media Manager for Oxfam, labeled the situation in the West Bank as critical.<sup>473</sup> According to Bailey, a “pattern starts to emerge where it appears that the Israelis are deliberately trying to sabotage Palestinian efforts to both access and fully develop their water resources.”<sup>474</sup> Amnesty International reiterated Oxfam’s findings, insisting that Israel only allowed Palestinians access to a fraction of West Bank water resources, as evidenced by “swimming pools, well-watered lawns and large irrigated farms in Israeli settlements,” contrasted with Palestinian villages where meeting even domestic needs was a struggle.<sup>475</sup> Israel has firmly denied such charges and has insisted that it is adequately supplying the West Bank with water.<sup>476</sup> Israel accused the Palestinians of inefficient distribution.<sup>477</sup> The allegations and refutations fly back and forth. If water does become a catalyst for conflict, the Middle East crisis may well be the most likely venue for a water war.

According to an Aljazeera news report, an Israeli human rights organization named B’Tselem estimated that while Israelis daily consumed 280 liters of water for domestic and urban use, the similar figure for Palestinians was sixty liters per day.<sup>478</sup> The World Health Organization recommended a minimum of 100 liters per day.<sup>479</sup>

Palestinians and their supporters have pointed out that the Israeli wall, built to protect that nation from Palestinian attacks, has encompassed, on the

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<sup>471</sup> Donnelly et al., *supra* note 76, at 8.

<sup>472</sup> *Id.*

<sup>473</sup> Mel Frykberg, *NGO: West Bank Faces Water Crisis*, ALJAZEERA, Feb. 29, 2008, <http://www.aljazeera.com/focus/Palestine/2008/02/200852519453269658.html>.

<sup>474</sup> *Id.*

<sup>475</sup> *Israel ‘Cutting Palestinian Water,’ supra* note 52 (quoting Amnesty International).

<sup>476</sup> *See* Frykberg, *supra* note 473.

<sup>477</sup> *Israel ‘Cutting Palestinian Water,’ supra* note 52.

<sup>478</sup> Frykberg, *supra* note 473.

<sup>479</sup> *Id.*

Israeli side, most of the water sources.<sup>480</sup> Israel denies the accusations, defends its actions as militarily protective of its territory and its population, and argues that the water gap is not as severe as organizations like Amnesty International have alleged.<sup>481</sup> Israel “has long made it a national mission to stretch existing sources by developing non-conventional water sources, while promoting conservation. These efforts have focused on the following: reclaimed wastewater effluents; intercepted runoff and artificial recharge; artificially-induced rainfall—cloud seeding; and desalination.”<sup>482</sup> The sharing of such technological innovations with its neighbors could bring considerable goodwill to Israel, and this entire water-stressed region could benefit.

It is interesting to note that water-related conflicts tend to be settled in other regions with bilateral or multilateral agreements signed between the various riparian states (in the case of rivers) or involved countries (in other instances). It is unlikely in most parts of the world that water controversies will escalate to become water wars. However, in the Arab-Israeli conflict, anything is possible. It seems apparent that a significant number of Israelis do want to live peacefully in that region. That cannot be accomplished by depriving the Palestinians of water. They have already accumulated considerable grievances against Israel. Were serious peace talks ever to develop, the water issue will be very significant, and Israeli policies on this matter could be pivotal to determining whether or not peace will someday come to this troubled part of the Middle East.

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<sup>480</sup> *Israel Water Grab Harms Palestinians*, ALJAZEERA, Mar. 20, 2006, <http://www.aljazeera.com/archive/2006/03/20084916449688710.html>.

<sup>481</sup> *Id.*; see also *A Palestinian Water Crisis?*, ALJAZEERA, Oct. 28, 2009, <http://www.aljazeera.com/programmes/insidestory/2009/10/2009102862316952344.html> (noting that Israel “called [Amnesty’s] report ‘biased and incorrect at the very least’ ”); Laila El-Haddad, *Water Warfare: Gaza Faces Shortages*, ALJAZEERA, Nov. 19, 2003, <http://www.aljazeera.com/archive/2003/11/200841014241889659.html> (detailing water access problems in specific areas occupied by Palestinians); Khalid Amayreh, *Jewish Settlers Usurp Palestinian Water*, ALJAZEERA, Oct. 16, 2003, <http://www.aljazeera.com/archive/2003/10/2008410162829550743.htm> (noting Palestinian villages facing water shortages and related political disputes); *Palestinians Denied Access to Water*, ALJAZEERA, Nov. 16, 2009, <http://www.aljazeera.com/news/middleast/2009/11/2009111483826384398.html> (discussing efforts by Palestinian farmers to siphon water for irrigation).

<sup>482</sup> *Briefing Book: Water*, ISRAEL STUDIES, <http://www.israel-studies.com/water> (last visited Nov. 12, 2013).

Interestingly, Israel has signed a twenty-year water agreement to purchase 15 million cubic meters of water annually from Turkey.<sup>483</sup> Water has cemented a close relationship between the Jewish state and this Islamic ally. Israel and Turkey have also agreed to military cooperation.<sup>484</sup> Where both sides discern a common interest and appreciate mutual benefit, such agreements are possible. Whether or not any such arrangement will one day resolve the years-long Middle East crisis remains to be seen.

The examples above have shown the global nature of the water crisis and have highlighted the fact that the problems are severe in varied ways across the world. It would seem timely for the world to now address this issue urgently and effectively. Each day, people are dying because they are victims of the water crisis.

#### XV. THE IMPACT OF THE WATER CRISIS ON WOMEN AND GIRLS

There are multiple layers of discrimination and many levels of deprivation in this issue of access to clean water. Ironically, while the dichotomy unfolds on the basis of have and have-not regions, it also prevails within each society and community. There are different levels of access depending on wealth, on status and position, on location of one's home and, in some places, even on one's ethnicity, religion, and caste. Most depressing of all is the fact that the water crisis takes the heaviest toll on women and girls who have traditionally been given the onerous task of accessing and delivering water and providing it for their families. Acquiring water has become the daily anxiety and the daily chore for thousands of women and girls in developing nations. This task of fetching water afflicts women in almost every part of the world. Where there are no nearby taps, these women walk miles, carrying heavy loads of water pots on their heads, bringing home enough of the precious liquid for drinking, washing, laundry, and any other domestic needs. Katherine McDonald of the Women's Environment and Development Organization told the U.N. Human Rights Council in 2011 that often women travel daily over six kilometers for four to five hours, carrying twenty liters of water.<sup>485</sup> The numbers of those so victimized by the water crisis are staggering. According to Indian census estimates, about 170 million people, amounting to 32 million households, get

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<sup>483</sup> *Israel Signs Water Deal with Turkey*, ALJAZEERA, Oct. 7, 2003, <http://www.aljazeera.com/archive/2003/10/2008410145953530613.html>.

<sup>484</sup> *Id.*

<sup>485</sup> McDonald, *supra* note 279, at 3.

their daily drinking water because someone has walked a distance to acquire this resource.<sup>486</sup> The U.N. Development Report of 2006 concluded that in sub-Saharan Africa, fetching water takes up 40 billion woman-hours of labor annually.<sup>487</sup>

Accessing water is a burdensome chore for urban poor women and children as much as for their rural counterparts. In Sana'a, Yemen, women and children daily walk to collect water from public urban fountains and then use pushcarts to wheel the heavy canisters back home.<sup>488</sup> Twenty-five million Yemenis are in danger of residing in a country that could soon run dry.<sup>489</sup>

Often, these chores take so much time that young girls find themselves literally becoming the water-slaves of their families, sacrificing any right to an education or to play time, all because they are consigned from an early age to this onerous task. The Human Development Report of 2006 quoted the poignant words of ten-year old Yeni Bazan of Bolivia: "Of course I wish I were in school. I want to learn to read and write . . . But how can I? My mother needs me to get water."<sup>490</sup> Deprived of an education, these girls are doomed to a continued life of poverty, illiteracy, and consequent increase of the gender gap.<sup>491</sup>

"They walk miles, carry heavy burdens, wait for hours and pay exorbitant prices. The work is back-breaking and all-consuming."<sup>492</sup> The daily bearing of so much weight cannot but negatively impact their backs and general health, and thus the water crisis claims more victims. Inevitably, the daily carrying of and walking with such heavy loads impacts their health, especially the neck, spine, back, and hips. An engineer in Haiti estimated that each bucket of water carried by a woman weighed about forty pounds.<sup>493</sup> Although India has fared so well economically in recent decades, particularly with respect to lifting thousands of people into the middle class, the situation is still dire for those not so fortunate. "Across India, millions of girls are literally trapped by having to walk and fetch water each day. . . . India . . . gives up a huge pool of labor,

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<sup>486</sup> FISHMAN, *supra* note 1, at 240 (citing the Census of India).

<sup>487</sup> Palaniappan et al., *supra* note 110, at 61.

<sup>488</sup> *Time Running Out for Solution to Yemen's Water Crisis*, *supra* note 179.

<sup>489</sup> *Id.*

<sup>490</sup> U.N. DEV. PROGRAMME, *supra* note 365, at 1.

<sup>491</sup> McDonald, *supra* note 279, at 3.

<sup>492</sup> *For Women, It's Personal*, WATER.ORG, <http://water.org/water-crisis/womens-crisis/> (last visited Nov. 12, 2013).

<sup>493</sup> Robb, *supra* note 123, at 254.

energy, creativity, and talent by allowing girls to go uneducated just so they can walk to fetch water.”<sup>494</sup>

In various parts of the world, especially in rural Africa, the daily trek for water has exposed women to rape and even death when they have been attacked by revolutionaries, terrorists, criminals, or hostile tribesmen. The clear conclusion is that access to clean and affordable water has to be an international priority particularly in areas that are prone to revolution, terrorism, and war. However challenging such infrastructure construction might be, the suffering of thousands of women would be considerably eased with the provision of water within their communities. It is worthwhile to note that Olcay Ünver, Coordinator of the United Nations World Water Assessment Programme, approved the need to “include the delivery of water as one of the priorities for interventions in conflict ridden areas.”<sup>495</sup> There is no lack of awareness of the terrible consequences for women trapped in this situation but, as yet, the governments of many countries have not prioritized this as a primary concern.

Although the worst scenarios occur in rural parts of Africa, Asia, and Latin America, the urban poor also face serious challenges in acquiring water. Again, it is the women who bear the brunt of this problem. Where municipal pipe systems do not extend to certain slum areas of cities, water vendors arrive in large trucks and sell water, often at exorbitant prices, to a long line of waiting women and young girls, who then dodge traffic to carry heavy buckets, bottles, and pots back to their homes. Women queue for hours for this one source of water and suffer from some of the same indignities that afflict their rural sisters.

All too often, the water gained after so much effort is contaminated. In rural areas, wells and river sources are sometimes polluted. In cities, the delivery from truck to bucket usually proceeds via a filthy garden hose or is poured out with no concern for keeping the water sanitary. Indeed, the trucks are themselves not very clean. In such circumstances, the water purchased or acquired is itself quite dangerous. The women and girls then “face an impossible choice—certain death without water or possible death from illness.”<sup>496</sup> Their options are extremely limited when there is just no clean water to be found. Inevitably, the choices for women and children who

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<sup>494</sup> FISHMAN, *supra* note 1, at 20.

<sup>495</sup> Coordinator of the U.N. World Water Assessment Programme, *Addendum to U.N. World Water Development Report 4*, at 2 (2012), available at [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/pdf\\_WWDR\\_Ch-35\\_addendum.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/pdf_WWDR_Ch-35_addendum.pdf).

<sup>496</sup> *For Women, It's Personal*, *supra* note 492.

constitute the majority of those deemed the ‘abject poor’ (estimated to number 1.3 billion)<sup>497</sup> are almost non-existent.

Although this Article is primarily about water issues and only in a very limited sense about the equally terrible sanitation crisis, it is important to note that women and girls suffer far more than men from the non-availability of private and clean toilet facilities. The absence of such facilities deprives women of necessary privacy and dignity, and subjects them to humiliation and often rape and other physical dangers when they emerge at night and go to nearby fields or woods.<sup>498</sup> Additionally when schools lack adequate toilet facilities, girls tend not to attend, particularly after they reach puberty.<sup>499</sup> This impacts negatively on their education<sup>500</sup> and, indeed, on their entire lives.

Where there is insufficient sanitation and people have to resort to any options, including defecating in the open, conditions deteriorate very quickly. Mary Akinyi described a slum in Kenya: “The conditions here are terrible. There is sewage everywhere. It pollutes our water. Most people use buckets and plastic bags for toilets. Our children suffer all the time from diarrhoea and other diseases because it is so filthy.”<sup>501</sup>

Wherever access to water has been simplified because of the digging of wells or the provision of community or residential plumbing and taps, women and girls are the first to benefit. The Food and Agriculture Organization reported that women in Tanzania, freed from the onerous chore of walking miles to acquire water, used their free time to plant market gardens and were able to gain additional income and improve their diet.<sup>502</sup>

The impact of the water crisis on women and girls is both serious and long-term. It negatively impacts their health, their education, their opportunities to work, and indeed their entire lives. Although every feature of this crisis is important and its alleviation urgent, the suffering of thousands of women across so many countries stands as one of the most egregious consequences of the global water problem.

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<sup>497</sup> AGNEW & WOODHOUSE, *supra* note 47, at 238.

<sup>498</sup> *For Women, It's Personal*, *supra* note 492.

<sup>499</sup> *Id.*

<sup>500</sup> *Id.*

<sup>501</sup> U.N. DEV. PROGRAMME, *supra* note 365, at 1.

<sup>502</sup> *Water At a Glance*, *supra* note 350, at 5.

## XVI. INTERNATIONAL LAW AND WATER PRIOR TO THE MILLENNIUM

In recent decades the world has paid a great deal of attention to the legal aspects of water, both within nations and internationally as well. Indeed, one could justifiably, albeit cynically, suggest that if the amount of energy, money, and time expended on securing the wording of various legal instruments had been instead devoted to upgrading water infrastructure and extending pipes to water-stressed communities, a large part of the problem would have been resolved. However, it appears to be the way of our modern society to talk ourselves into a near stupor in preference to taking forthright action. This is all the more tragic because we do have the technology and the expertise around the world to alleviate the lot of the deprived; additionally, we can garner the required resources by prudent management, and we have the ethical foundation as represented by a range of international agreements and instruments that reflect both the ideals and values that should inspire implementation. All that is now needed is firm and dedicated political and moral will to act to “prevent the crisis from turning into a catastrophe.”<sup>503</sup>

As the primary purpose of this Article is to gauge the possibility of a consensus approach to facilitate action and practical resolution of this crisis, it is necessary to investigate a few of the numerous formulations that have been adopted internationally. At the very least, such brief analysis, with no pretensions to comprehensive study of all the international law instruments, will hopefully convince those who require the prior sanction of global consensus on the principles and aims to be followed before taking action.

The body of international and national law on water is now vast and has been analyzed by experts in numerous countries. Besides the agreements and Covenants which have been generated at the United Nations, there are legal principles and customary law, judicial opinions in many jurisdictions, and tribunal awards and arbitration decisions.<sup>504</sup>

There has been vociferous debate and occasionally vehement controversy to secure these formulations. Water is such a fundamental part of life that its use and abuse can elicit considerable verbal drama prior to the enactment of any agreement. The many legal formulations have been comprehensively studied in the massive literature. This section of the instant Article seeks merely to underscore the fact that we do have enough legal sanction and the

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<sup>503</sup> Glennon & Udall, *supra* note 225, at xii.

<sup>504</sup> See Food and Agric. Org., *Law for Water Management: A Guide to Concepts and Effective Approaches* (2009), available at <http://www.fao.org/docrep/012/i1284e/i1284e00.htm>.

imprimatur of the United Nations to proceed to action to improve the water situation in the many countries of the world.

This Article will briefly assess a few of the international instruments while noting that there are also many significant national formulations that have emphasized water, such as the 1996 Constitution of the Republic of South Africa.<sup>505</sup> Article 23(20) of the 1998 Constitution of Ecuador guaranteed potable water as one element of the right to a quality of life, and the state was mandated to provide for the management and provision of water.<sup>506</sup> In 2004, Uruguay held a referendum that resulted in “a constitutional amendment creating a human right to water.”<sup>507</sup> Two-thirds of voters supported the measure, partly to protect one of the largest aquifers in Latin America from being utilized by water corporations.<sup>508</sup> The 2008 Plurinational Constitution of Bolivia declared water a fundamental right for life.<sup>509</sup> In 2010, Article 43 of the Constitution of Kenya recognized the human right to water.<sup>510</sup> The Constitutions of Uganda and of the Democratic Republic of the Congo also make reference to the right to water.<sup>511</sup>

The admittedly brief survey that follows also aims to provide some assurance that much of the world is aware of the problem we all share with water. Thoughtful people are also alert to the fact that unless we act quickly and assertively, this crisis will exacerbate to the point of catastrophically endangering life in a large part of our planet. The limits of the Article preclude inclusion of all the other legal aspects of the issue of water. The causes, controversies and consequences of the issues of water privatization, governance, and management, pollution accountability, and others have been dealt with extensively and with considerable expertise by a number of scholars.

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<sup>505</sup> Salman & McInerney-Lankford, *supra* note 22, at 79–80.

<sup>506</sup> Malcolm Langford, *The Right to Water in National Law: A Review*, in *THE HUMAN RIGHT TO WATER* 116 (Eibe Riedel & Peter Rothen eds., 2006).

<sup>507</sup> Karen Bakker, *Commons Versus Commodities*, in *THE RIGHT TO WATER* 26 (Farhana Sultana & Alex Loftus eds., 2012).

<sup>508</sup> Tony Clarke, *On Making Water a Human Right Through Public Policy Action*, in *THE HUMAN RIGHT TO WATER*, *supra* note 506, at 162.

<sup>509</sup> Rocio Bustamante et al., *Seeing Through the Concept of Water as a Human Right in Bolivia*, in *THE RIGHT TO WATER*, *supra* note 507, at 232.

<sup>510</sup> CONSTITUTION, art. 43 (2010) (Kenya); Thomas R. Lansner, *Countries at the Crossroads 2012: Kenya*, FREEDOMHOUSE, <http://www.kenyaembassy.com/pdfs/The%20Constitution%20of%20Kenya.pdf>.

<sup>511</sup> U.N. Office of the High Comm’r for Human Rights, *The Right to Water: Fact Sheet No. 35*, at 7 (Aug. 2010).

Here, it is sufficient to indicate that there are numerous legal facets to the issues involving water sourcing, accessibility, usage, and disposal. Additionally, there are equally significant and very controversial economic and legal debates surrounding the topic of ownership rights, with equally vehement supporters and detractors on both sides arguing for and against water as a public commons subject to community ownership and management against those who would claim that private property rights extend to water and its usage. Large multinational corporations have been buying land in many countries mainly to acquire water rights and have been confronted by serious opposition from local populations. As we have seen, the public versus private issue involving access to water has been rife with tension and controversy across the globe.

The management of water by municipal, town, and village institutions has also generated legal conflict in many parts of the world, as tax-poor governing structures have attempted to utilize the private sector to carry out the task of water governance. The necessity of making a profit has impelled such private companies to raise water fees and to disconnect residents who fail to pay. Water governance has become a major problem in many societies that will require significant funding to improve infrastructure, extend water delivery systems, improve pollution controls, expand hygiene education, hire trained expertise to replace mentally 'water-logged' bureaucracies, and above all, implement a fair and economically reasonable service to rich and poor sectors of every community.

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With the benefit of hindsight, it appears unusual that one of the most important post World War II formulations on international law neglected any specific mention of water. The Universal Declaration of Human Rights was adopted and proclaimed on December 10, 1948 by the United Nations. Now, over six decades later, this instrument has become part of customary law<sup>512</sup> in many societies. It remains an ideal standard, an inspiration for all governments and peoples across the globe. Although the right to water is not mentioned in this all-important document, it is implicit in Article 3: "Everyone has the right to life, liberty and security of person."<sup>513</sup> It is

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<sup>512</sup> Stephen C. McCaffrey, *The Human Right to Water*, in FRESH WATER AND INTERNATIONAL ECONOMIC LAW 96 (Edith Brown Weiss et al. eds., Oxford Univ. Press 2005).

<sup>513</sup> G.A. Res. 217 art. 3, U.N. GAOR, 3d Sess., U.N. Doc. A/810 (1948).

obvious that there can be no life without water and hence the logical conclusion of Article 3 can only be that there is an implicit right to water. Additionally, Article 25 includes the right to food,<sup>514</sup> which again, cannot be produced without water and therefore, logically, this Article also presumes the right to water. Peter Gleick concluded that the framers of this Declaration did not intend to exclude water. Rather they considered water too obvious to include in the formulation.<sup>515</sup> It is certainly true that “[a]ccess to water and sanitation is a *sine qua non* for the fulfillment”<sup>516</sup> of other human rights.

However eagerly one may seek to infer a pro-accessibility stance from these instruments, realistically any right to water has to be accompanied by some consideration of the government’s financial capacities. It has aptly been stated that “[n]o government can immediately turn on the tap for each and every unserved person in the country. The infrastructure involved in making this possible is enormous and expensive.”<sup>517</sup>

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Communities across the planet concluded that the one way to protect water and its accessibility as a common resource was to insist on its status as a human right and to bring water within the fold of international human rights instruments. It was soon realized that because the early formulations on human rights had not specified the importance of water to the extent of conserving the resource for equal and fair access by all, urgent action was necessary to protect this vital resource.

There has been considerable speculation about the reason why water was not included in the initial human rights instruments that have served as signposts for the value system of the twentieth and now twenty-first century. One easy conclusion might be that water accessibility at that time was so obvious an issue that emphasizing it in separate clauses of the Universal Declaration of Human Rights (1948), the initial formulations of the International Covenant on Civil and Political Rights (1966), and the International Covenant on Economic, Social and Cultural Rights (1966) was not considered necessary. Nor had pollution of rivers, lakes, oceans, and land become as severe an issue as it has since that time. Indeed,

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<sup>514</sup> *Id.* art. 25.

<sup>515</sup> Gleick, *supra* note 15.

<sup>516</sup> UNESCO, *Outcome of the International Experts’ Meeting on the Right to Water*, Paris, Fr., July 7–8, 2009, at 1, available at <http://unesdoc.unesco.org/images/0018/001854/185432e.pdf>.

<sup>517</sup> McCaffrey, *supra* note 512, at 98.

environmentalism, now a major concern globally, was not as high on the international agenda at that time. Those legal instruments reflected the major concerns of that time frame. Implicit reference could have been considered sufficient and a derived human right to water was probably deemed adequate at the time. Sheer common sense would dictate that one could not enjoy the rights to life or to health without adequate water.

Soon after the adoption of these landmark human rights Covenants, it was universally realized that water was under severe threat globally and that some articulate formulation had to be made to reverse, or at least slow, this looming crisis. The need to safeguard water was identified at the 1972 United Nations Conference on the Human Environment held at Stockholm, Sweden.<sup>518</sup> The Stockholm Declaration sought careful management and planning of water, among other natural resources, as a safeguard for future generations.<sup>519</sup>

Echoing the precedent in the Universal Declaration of Human Rights, the right to life is reiterated in Article 6 of the International Covenant on Civil and Political Rights which entered into force on March 23, 1976, almost ten years after its initial adoption by the United Nations General Assembly.<sup>520</sup> It is worth noting that the right to life is to be protected by law.<sup>521</sup> However, the right to life was linked in this instrument to issues such as capital punishment and genocide. There was clearly a lacuna with respect to water.

The International Covenant on Economic, Social and Cultural Rights also took about ten years from adoption at the United Nations to its coming into force on 3rd January 1976.<sup>522</sup> It took that long for the requisite number of thirty-five member states to sign and ratify the document. Article 11 of this Covenant includes the right to food and acknowledges the right of everyone to be free from hunger, but does not mention water.<sup>523</sup> It is worth noting that Article 12 calls for the improvement of all "aspects of environmental and industrial hygiene."<sup>524</sup> Water is so integral an aspect of environmental

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<sup>518</sup> Salman & McInerney-Lankford, *supra* note 22, at 797.

<sup>519</sup> U.N. Conference on the Human Environment, *Stockholm Declaration*, U.N. Doc. A/CONF.48/14/Rev.1 (June 16, 1972). *See also* Salman & McInerney-Lankford, *supra* note 22, at 7.

<sup>520</sup> International Covenant on Civil and Political Rights, Dec. 16, 1966, S. Treaty Doc. No. 95-20, 6 I.L.M. 368 (1967), 99 U.N.T.S. 171.

<sup>521</sup> *Id.* art. 6.

<sup>522</sup> International Covenant on Economic, Social and Cultural Rights, Dec. 16, 1966, S. Treaty Doc. No. 95-19, 6 I.L.M. 360 (1967), 993 U.N.T.S. 3.

<sup>523</sup> *Id.* art. 11.

<sup>524</sup> *Id.* art. 12.

hygiene that by inference, it could be determined to be part of the logical underpinning of the wording. Although the document omits mention of the right to water, the right could easily be implicit, given the wording of Articles 11 and 12. The omission of water from these landmark international formulations is thought to have “resulted not from the framers’ affirmative decision to exclude it but from their inability to imagine a world in which water access would be contested.”<sup>525</sup>

The landmark United Nations environmental conference held in 1972 at Stockholm, Sweden, called for the safeguarding of water through careful management in its Declaration of Principles.<sup>526</sup> A far more comprehensive framework for water was adopted twenty years later at the Earth Summit at Rio.<sup>527</sup>

In the meantime, in 1977, a United Nations Conference held in Mar del Plata, Argentina, came up with a number of ideas related to the efficient use of water and considered pragmatic means of dealing with pollution, agricultural usage, and a number of ancillary global concerns. The Conference participants decreed that “all peoples, whatever their stage of development and their social and economic conditions, have the right to have access to drinking water in quantities and of a quality equal to their basic needs.”<sup>528</sup> This early acknowledgment of the right to water is worth noting. The Declaration also called for national policies and plans to supply drinking water to the entire population,<sup>529</sup> a goal not yet fulfilled nearly four decades later. The Mar del Plata Action Plan made recommendations on “assessment of water resources; water use and efficiency; environment, health, and pollution control; policy, planning, and management; and regional and international cooperation.”<sup>530</sup>

In an effort to draw global attention to the issue, the era between 1981 and 1990 was proclaimed the “International Drinking Water Supply and Sanitation Decade.” It was hoped that governments would work to rectify

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<sup>525</sup> Paul J. Nelson, *Local Claims, International Standards, and the Human Right To Water*, in *THE INTERNATIONAL STRUGGLE FOR NEW HUMAN RIGHTS* 132 (Bob Clifford ed., Univ. of Pa. Press, 2009).

<sup>526</sup> *Stockholm Declaration*, *supra* note 519, Principle 2.

<sup>527</sup> See generally RANEE K. PANJABI, *THE EARTH SUMMIT AT RIO* (1997).

<sup>528</sup> For an excellent discussion see Food and Agriculture Organization of the United Nations, *Law for Water Management: FAO Legislative Study* (Jessica Vapnek et al., eds., 2009).

<sup>529</sup> Report of the U.N. Water Conference, Mar del Plata, Arg., Mar. 14–25, 1977, U.N. Doc. E/CONF. 70/29, U.N. Sales No. E.77.II.A.12 (1977).

<sup>530</sup> Salman & McInerney–Lankford, *supra* note 22, at 7.

both of these fundamental problems.<sup>531</sup> The setting of targets for achievement during the decade was a progressive development.

Meanwhile, a number of alleviative international instruments were adopted and water was included in the 1979 Convention on the Elimination of All Forms of Discrimination Against Women; the 1989 Convention on the Rights of the Child; and the 2006 Convention on the Rights of Persons with Disabilities.<sup>532</sup> Article 14, paragraph 2(h) of the Convention on the Elimination of All Forms of Discrimination Against Women specifies that rural women have a right of access to water.<sup>533</sup> Article 24 of the Convention on the Rights of the Child requires the parties to combat disease and malnutrition “through the provision of adequate nutritious foods and clean drinking-water.”<sup>534</sup> The Convention on the Rights of Persons with Disabilities ensures equal access to clean water.<sup>535</sup>

Although this Article concentrates on international formulations there is a need briefly to examine one regional treaty that is now en route to becoming an international convention. European nations negotiated a Convention on the Protection and Use of Transboundary Watercourses and International Lakes in 1992 at Helsinki, which “obliges Parties to prevent, control and reduce transboundary impact, use transboundary waters in a reasonable and equitable way and ensure their sustainable management.”<sup>536</sup> In its regional context, this Convention entered into force in 1996.<sup>537</sup> In 2003, this Convention was expanded to include all member states of the United Nations and that process entered into force in February 2013.<sup>538</sup>

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<sup>531</sup> *Id.* at 8.

<sup>532</sup> Vapnek et al., *supra* note 528, at 334.

<sup>533</sup> Convention on the Elimination of All Forms of Discrimination Against Women, art. 14, ¶ 2(h), Sept. 3, 1981, 1249 U.N.T.S. 13.

<sup>534</sup> U.N. Econ. and Soc. Council, Comm. on Economic, Social, and Cultural Rights, 29th Sess., Nov. 11–29, 2002, General Comment 15, U.N. Doc. E/C.12/2002/11 (Jan. 20, 2003).

<sup>535</sup> Convention on the Rights of Persons With Disabilities, Dec. 13, 2006, 46 ILM 433, U.N. Doc. A/Res/61/106, art. 28.

<sup>536</sup> U.N. Convention on the Protection and Use of Transboundary Watercourses and International Lakes, Mar. 17, 1992, U.N. Doc. E/ECE/R67.

<sup>537</sup> Status of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes, U.N. TREATY COLLECTION, [https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg\\_no=XXVII-5-a&chapter=27&lang=en](https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-5-a&chapter=27&lang=en).

<sup>538</sup> Water Convention, U.N. ECON. COMM. FOR EUROPE, <http://www.unece.org/env/water/> (last visited Dec. 12, 2013).

In 1999, a very significant Protocol was adopted in London and it entered into force in 2005.<sup>539</sup> This Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes “is the first international agreement of its kind adopted specifically to attain an adequate supply of safe drinking water and adequate sanitation for everyone, and effectively protect water used as a source of drinking water.”<sup>540</sup>

The Protocol acknowledges the essential nature of water in sustaining life and links this to the issue of access as a pre-requisite for health and sustainable development. The objective of the Protocol is to promote “the protection of human health and well-being,” nationally and internationally, “through improving water management, including the protection of water ecosystems, and through preventing, controlling and reducing water-related disease.”<sup>541</sup> Adequacy in water supply and sanitation systems and monitoring systems are included. Significantly, the precautionary principle is advocated and where problems occur, the polluter pays principle is invoked. The Protocol specifies that “[w]ater has social, economic and environmental values and should therefore be managed so as to realize the most acceptable and sustainable combination of those values.” Article 6 calls for the establishment of target dates for implementation.<sup>542</sup>

One of the largest environmental conferences in history was held at Rio de Janeiro, Brazil, in 1992.<sup>543</sup> The United Nations Conference on Environment and Development was notable for the adjacent adoption of the landmark Conventions on climate change and biodiversity.<sup>544</sup> It was also noted for the production of a massive testament to the wide range of environmental concerns titled Agenda 21. This mammoth document included reference to the need for sufficient quantity and quality of water.<sup>545</sup>

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<sup>539</sup> Status of the Protocol on Water and Health to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes, *supra* note 537.

<sup>540</sup> Water Convention, *supra* note 538.

<sup>541</sup> Protocol, *supra* note 536, art. 1.

<sup>542</sup> *Id.* art. 6.

<sup>543</sup> See Panjabi, *supra* note 289, at 11.

<sup>544</sup> *Id.* at 218–309.

<sup>545</sup> United Nations Conference on Environment & Development, Rio de Janeiro, Braz., June 3–14, 1992, Art. 21, Ch. 18.47, <http://sustainabledevelopment.un.org/content/documents/Agenda21.pdf>.

The less wordy Rio Declaration<sup>546</sup> succinctly articulated the state of global environmentalism at that moment in history.

This Declaration expressed environmental principles that have stood the test of time in terms of public acceptance even if implementation has lagged. Some of these twenty-seven Rio principles are linked to considerations surrounding water. They set the stage for future articulations specific to the water crisis. This Article can only briefly allude to some of the principles that would have so much global impact in later years. The Rio Declaration called for fulfillment of the right to development on an equitable basis; protection of the environment as an integral part of development; eradication of poverty; protection and restoration of ecosystems; elimination of unsustainable production and consumption; development of international law regarding liability and compensation for environmental damage; prevention of the relocation of harmful substances; the precautionary approach; and full participation by women, indigenous people and youth in the pursuit of sustainable development.<sup>547</sup> Water forms a basic element of almost all the principles accepted at the Earth Summit. In gathering thousands of environmental activists from around the world in one city, this gigantic international meeting allowed for the exchange of knowledge and ideas that would prove vital for water debates in the future.

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Domestic use of water was discussed in the Comprehensive Assessment of the Freshwater Resources of the World, prepared for the United Nations Commission on Sustainable Development: "All people require access to adequate amounts of clean water, for such basic needs as drinking, sanitation and hygiene."<sup>548</sup> Environmental concerns focused on water as the basic element that either guaranteed or negated all other rights, upheld or denied all principles of environmental betterment, and underpinned all efforts for restoration and conservation.

Earlier, in 1992—the year of the Earth Summit at Rio—an International Conference on Water and the Environment was held in Dublin, Ireland.

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<sup>546</sup> United Nations Conference on Environment & Development, Rio de Janeiro, Braz., June 3–14, 1992, Rio Declaration on Environment & Development, U.N. Doc. A/CONF.151/21(Vol.1), Annex 1 (Aug. 12, 1992).

<sup>547</sup> For a detailed analysis of the Rio Declaration and the earlier Stockholm Declaration, see Panjabi, *supra* note 289, at 25–92.

<sup>548</sup> Gleick, *supra* note 15, at 4.

Although much of what occurred at Dublin has become mired in controversy, three of the so-called Dublin principles struck a positive note: first, acknowledging that water is a finite and vulnerable resource; second, that its development and management require a participatory approach involving users, planners and policy-makers; and third, recognition of the central role that women play in the provision and management of water.<sup>549</sup> In tacit acknowledgment of the social and traditional constraints that inhibited women in many societies from participating in important deliberations concerning access to water and sanitation, this third principle sought to empower women and give them a voice in formulating and implementing decisions.<sup>550</sup>

The highly controversial fourth Dublin Principle perceived water as an economic good, having value, and suggested that there is a right to water “at an affordable price.”<sup>551</sup> The Dublin principle did concede that all human beings had a basic right to access clean water and sanitation; the controversy surrounded the inclusion of water pricing.<sup>552</sup> As the world began to pay more attention to water, realization dawned that it was imprudent to treat an increasingly threatened resource as a public good, subject only to free use by all takers.

Placing a commodity value and soon a market value on water became a matter of intense debate and dispute all across the world. Traditionalists accustomed to paying only for the delivery of water fought bitterly against those who advocated payment for the resource—partly to prevent waste—and additionally for its more efficient delivery. Environmental activist and author Maude Barlow commented scathingly on this economic value-based thinking that had become prominent in the United Nations. As she pointed out, “[n]o official recognition was given to the fact that in the global North, water waste is rampant compared to the global South.”<sup>553</sup>

The 1994 International Conference on Population and Development, held at Cairo, generated a Program of Action that recognized the right to an

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<sup>549</sup> AGNEW & WOODHOUSE, *supra* note 47, at 32.

<sup>550</sup> *Id.*

<sup>551</sup> Salman & McInerney-Lankford, *supra* note 22, at 9.

<sup>552</sup> *The Dublin Statement on Water and Sustainable Development*, International Conference on Water and the Environment, Dublin, Ireland, Jan. 31, 1992, <http://www.un-documents.net/h2o-dub.htm>.

<sup>553</sup> BARLOW, *supra* note 88, at 44.

adequate standard of living, including water and sanitation.<sup>554</sup> In 1996, the Habitat Agenda was adopted by the United Nations Conference on Human Settlements (Habitat II), recognizing water and sanitation as parts of a right to an adequate standard of living.<sup>555</sup>

Given the number of conferences, international pronouncements, declarations and so on that have been generated about water, it is rather shameful that so many people still suffer deprivation, having no access to clean water or to sanitary facilities. Arguably, the massive amount of global money expended on just these conferences could have been utilized to bring water connections to several thousand homes around the world. World Water Forums are held every three years in attractive tourist destination cities. Delegates from stakeholders and various countries gather in interesting cities like Marrakech (1997), The Hague (2000), Kyoto (2003), Mexico (2005), Istanbul (2009) and Marseille (2012).<sup>556</sup> There they debate, argue and eventually produce declarations and pronouncements. The 2012 conference at Marseille attracted 15 Heads of State and Government; representatives from 173 countries; over 100 Ministers, Vice-Ministers and Secretaries of State; more than 750 elected officials including 250 mayors and numerous others.<sup>557</sup> Regrettably, to be blunt, the cost of these “junkets” must have been substantial, whoever was paying. The debates and discussions at these meetings notwithstanding, the poorest of the world continue to suffer without clean water and adequate sanitation. While the delegates deliberated and drafted declarations in these exotic cities, the people whose plight had brought them all to the conference continued to fall ill and die.

The amount of attention paid to the critical issues of water and sanitation has also resulted in massive expenditure on the production of statistical data, the writing of numerous reports and the drawing of charts on every facet of these crises. While the data is a godsend for researchers studying this subject, absent effective action for the victims of the crisis, all these reports

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<sup>554</sup> International Conference on Population and Development, Cairo, Egypt, Sept. 5–13, 1994, *Report of the International Conference on Population and Development*, Chapter II, Principle 2, U.N. Doc. A/CONF.171/13.

<sup>555</sup> U.N. Office of the High Comm’r for Human Rights, *supra* note 511.

<sup>556</sup> Resolution of the European Parliament on the 6th World Water Forum taking place in Marseille on 12–17 Mar. 2012, 2013 O.J. (C 251).

<sup>557</sup> *A Recognized Success for the 6th World Water Forum Which Gathered More Than 35,000 Participants in Marseille*, 6TH WORLD WATER FORUM (Mar. 20, 2012), <http://www.worldwaterforum6.org/en/news/single/article/a-recognised-success-for-the-6th-world-water-forum-which-gathered-more-than-35000-participants-in/>.

and statistics may not be utilized where this information can tangibly improve lives. With respect to the formulations and resolutions and agreements, delegates from governments across the world have met and met again and again to debate interminably on the wording of one or other water-related clause, and then after the conference or meeting returned to their own comfortable homes that are well-equipped with clean water running from taps and personal toilets. The passage of each resolution or international instrument produces considerable euphoria among delegates, but in reality, until those promises are kept and the goals are reached universally, the gap between intention and action becomes a veritable chasm. The authors of the Human Development Report of 2006 articulated the cynicism and frustration that haunts those who are close to the international consideration of the water crisis: “So many conferences, so much activity—and so little progress . . . water and sanitation have suffered from an excess of words and a deficit of action.”<sup>558</sup>

#### XVII. THE WORLD BANK AND WATER CONTROVERSIES

It would be worthwhile to briefly examine the role of the World Bank as one of the primary lending agencies involved in funding water projects in numerous developing countries. Although the achievements of such funding are viewed in the financial community as impressive, some of the underlying policies of the Bank have generated major controversy in the recipient countries, and among environmentalists around the world. In an article devoted to finding constructive solutions, it is necessary to examine and analyze what went so terribly wrong in these water projects funded with loans from the World Bank. This participation by the Bank in water reforms ought to have been a very positive development, but instead it became a lightning rod for allegations against the Bank that ranged from neo-colonialism to economic exploitation. There are numerous facets to this issue; the literature is extensive and being mindful of word restrictions in this Article, some of these problems can only be touched upon. Time alone will tell whether or not so much rage against the Bank as presently exists in so many countries can or cannot be justified.

The Bank was positioned to perform a great service to the world and alleviate the plight of millions. It has the resources and access to global expertise. Had the Bank placed the deprived people at the forefront of its

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<sup>558</sup> U.N. DEVELOPMENT PROGRAMME, *supra* note 365, at 8.

concerns and its programs, it might have earned their blessings for helping. Instead, very sadly, a great opportunity was missed and in some—not all—of its alleviative projects, its focus was misdirected. The result was that it earned no gratitude and was instead roundly cursed for the additional problems its actions created. It is also important to note that while the public rage is usually aimed at the World Bank, the actual controversial policies and actions may in some instances have been initiated by sister institutions such as the International Monetary Fund. In public parlance as manifested in loud street demonstrations, the World Bank unfortunately absorbs most of the fallout that should accrue to various international lending institutions.

The World Bank was established in 1944 and presently has 188 member countries.<sup>559</sup> Although it operates in many countries, the head office is in Washington D.C.<sup>560</sup> The Bank comprises various institutions, two of which are the International Bank for Reconstruction and Development and the International Development Association.<sup>561</sup> Poverty reduction is the Bank's articulated aim along with the achievement of sustainable development.<sup>562</sup> It is interesting to note that a study of the Bank's mission statement and its aims, goals, and values are indicative of an institution dedicated to serving clients and emphasizing integrity: "Our dream is a world free of poverty."<sup>563</sup> It is somewhat hard to reconcile these uplifting phrases with the terrible fear and panic this institution has created in so many developing nations, especially those that are very poor and have been compelled to deal with it because of dire financial necessity. The avowed aims and philosophical values of the Bank do not give any hint of the harsh conditions it has imposed on some borrower nations. Nor is the imposition of privatization of services mentioned as part of its proclaimed agenda. Indeed, the encouraging phrases of the aims and mission of the Bank give no clue to the terrible consequences and the social and economic upheaval that resulted for some of its clients. And yet, the accusers are numerous and the allegations quite similar.

The crux of most of the complaints refers to the insistence of these lender institutions that borrower nations privatize their social services, especially with reference to water delivery. Privatization was made a condition for a

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<sup>559</sup> *What We Do*, THE WORLD BANK, <http://www.worldbank.org/en/about/what-we-do> (last visited Dec. 12, 2013).

<sup>560</sup> *Id.*

<sup>561</sup> *Id.*

<sup>562</sup> *Id.*

<sup>563</sup> *Id.*

number of the loans for improvement of water services and therein lay the big divide. Author Constance Elizabeth Hunt stated that “[b]oth the World Bank and the IMF have promoted a corporate role in water resources management,” with about 40% of water and sanitation projects in 2002 being reported by the Bank itself as involving private sector participation.<sup>564</sup> Hunt emphasized that well under 1% of the Bank’s spending was actually used to provide water to thirsty people.<sup>565</sup>

Author Karen Bakker in her interesting study on privatization explained that policy priorities, termed the ‘Washington Consensus,’ guided the support by financial institutions for “financial liberalization, privatization, deregulation, the creation of secure property rights, tax reform, the introduction of competition, and public sector fiscal ‘discipline.’”<sup>566</sup> These policies seemed justifiable to the lending institutions because of a general feeling that privatization promoted efficiency. Additionally, they could pressure developing nation governments to accept these policies because the latter, shouldering huge national debt burdens, had few options.<sup>567</sup> Water privatization became a condition imposed on Tanzania, Niger, Rwanda, parts of Nicaragua, Honduras and numerous other countries.<sup>568</sup> The underlying immense criticism of the World Bank and its sister organization, the International Monetary Fund, with respect to the water crisis, occurred because despite the complaints, there was a persistent concentration on privatization as a condition for water project loans to poorer nations. Philippe Cullet and Alix Gowlland-Gualtieri have explained how the World Bank promoted privatization of the water sector by attaching this as a condition to its loans to developing countries.<sup>569</sup> These nations who desperately needed the funds had few options but to agree to the terms imposed upon them. Friends of the Earth International has sharply criticized the World Bank and the International Monetary Fund for pressuring poor nations into privatization of water resources by making such action a condition for loans.<sup>570</sup> This has allegedly affected many of the poorest

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<sup>564</sup> CONSTANCE E. HUNT, *THIRSTY PLANET: STRATEGIES FOR SUSTAINABLE WATER MANAGEMENT* 285 (Zed Books, 2004).

<sup>565</sup> *Id.*

<sup>566</sup> BAKKER, *supra* note 176, at 71.

<sup>567</sup> See generally *id.* for an excellent explanation of this subject.

<sup>568</sup> HUNT, *supra* note 564, at 285–89.

<sup>569</sup> Philippe Cullet & Alix Gowlland-Gualtieri, *Water Investments and the Participation of Local Communities*, in *FRESH WATER & INT’L ECON. L.* 303, 318 (Edith Brown Weiss et al. eds., 2005).

<sup>570</sup> See FRIENDS OF THE EARTH INTERNATIONAL, *supra* note 315.

nations in the world like Mozambique, Benin, Niger, Rwanda, Honduras, Yemen, Tanzania, Cameroon, and Kenya.<sup>571</sup> Discussing the example of Ghana, Friends of the Earth International has alleged that such conditions resulted in the doubling of the average price of water.<sup>572</sup>

Maude Barlow, in her very interesting book *Blue Covenant*, explained that international lending agencies pushed an agenda of privatization on developing nations accompanied by water management by multi-national European companies. "By 2006," wrote Barlow, "the vast majority of loans for water were conditional on privatization."<sup>573</sup> Barlow concluded that the "World Bank uses its power to open markets in the global South for northern corporations."<sup>574</sup> It has also been alleged that "water service corporations have benefited from substantial World Bank support, including financing, insurance against investment risks and adjudication of disputes through the International Center for Settlement of Investment Disputes."<sup>575</sup> The Bank has been accused by water activists of having a shared agenda with the large multinational water corporations.<sup>576</sup> Such activities are a clear violation of the idealistic phraseology of the Bank's mission statement.

One of India's leading environmentalists, Vandana Shiva, was even more blunt about the role of the World Bank. Shiva complained that the Bank compelled farmers to switch from diverse agriculture that was more productive, to monoculture, specifically cash crops, like sugar cane that were very water demanding.<sup>577</sup> Water shortages ensued. Shiva explained that the World Bank's priority was return on its investment and cash crops were most useful to that end.<sup>578</sup> Shiva continued: "They are squeezing out loan repayments by killing water systems and killing people who depend on them."<sup>579</sup> Shiva expressed her beliefs bluntly: "[n]ot only has the World Bank played a major role in the creation of water scarcity and pollution, it is now transforming that scarcity into a market opportunity for water corporations."<sup>580</sup>

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<sup>571</sup> *Id.*

<sup>572</sup> *Id.*

<sup>573</sup> BARLOW, *supra* note 88, at 38.

<sup>574</sup> *Id.*

<sup>575</sup> Nelson, *supra* note 525, at 134.

<sup>576</sup> *Id.*

<sup>577</sup> Interview by Nic Paget-Clarke with Vandana Shiva, in Johannesburg, South Africa (Sept. 1, 2002), available at <http://www.inmotionmagazine.com/global/vshiva3.html>.

<sup>578</sup> *Id.*

<sup>579</sup> *Id.*

<sup>580</sup> Shiva, *supra* note 466.

There has been so much controversy because the Bank has made water reform a significant part of its mandate. A major feature of World Bank activity in developing nations has concerned water-related projects. Almost one third of projects since 1997 have been connected to water.<sup>581</sup> Between 1997 and 2007, the Bank has financed projects worth U.S. \$54.3 billion with many of them involving irrigation, hydropower, floods, water supply, sanitation, watershed management, fisheries, coastal zones and inland waterways.<sup>582</sup> The number of countries seeking help for water improvement has risen dramatically. In 1997 forty-seven countries borrowed from the World Bank for water projects, by 2007, the number had risen to seventy-nine.<sup>583</sup> In that time span the “lending for water had increased by over 50%.”<sup>584</sup>

The severe condemnation of the World Bank by some environmentalists has concentrated on this policy of encouraging by various means this spate of private experiments in water delivery in developing countries. Ironically—as water activists point out—and simultaneously, most water systems in the developed world remained entrenched within and regulated by the public sector.<sup>585</sup> It seemed as though the World Bank was pushing privatization on the poorest of countries, those who were in no position to resist the pressure. The unfortunate consequences of this policy became an issue of global concern. The Women’s Environment and Development Organization blamed the World Bank and the International Monetary Fund for aggressive pursuit of privatization and for having made this a condition for loans made to at least eight African countries.<sup>586</sup>

The borrower nations had to face serious consequences because of their dealings with the World Bank and other such institutions. In the late 1980s and 1990s, the World Bank worked to encourage the adoption of privatized urban services such as water and sewage and this resulted during the 1990s in “rising barriers to access.”<sup>587</sup> By 2000, “governments in 93 nations had

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<sup>581</sup> WORLD BANK, *supra* note 66.

<sup>582</sup> *Id.*

<sup>583</sup> *Water and Development: An Evaluation of World Bank Support 1997–2007*, at vii.i (2010), available at <http://documents.worldbank.org/curated/en/2010/01/12575829/water-development-evaluation-world-bank-support-1997-2007-vol-1-2>.

<sup>584</sup> *Id.*

<sup>585</sup> BARLOW, *supra* note 88, at 41–42.

<sup>586</sup> Women’s Environment and Development Organization, *supra* note 137, at 5.

<sup>587</sup> Patrick Bond, *The Right to the City and the Eco-Social Commoning of Water*, in *THE RIGHT TO WATER 196–97* (Farhana Sultan & Alex Loftus eds., 2012).

begun to privatize their drinking water and wastewater services.”<sup>588</sup> The gap between water haves and have-nots became a chasm in many societies. Inevitably, the foreign entity that had brought about this conversion from free or cheap water to expensive water bore the brunt of the blame.

The actions of the Bank, often supported by local governments and the privileged class in some communities, created a significant social and economic rift. Water prices rose, sometimes astronomically and well beyond the economic capacity of a significant portion of the population who lived on the brink of subsistence. Inability to pay led to disconnection from water supplies and this further exacerbated public rage. Deprivation of the poor from this vital human need generated immense frustration and anger. According to the Women’s Environment and Development Organization, “poor and working women have been forced to decide between paying for water and feeding their children.”<sup>589</sup>

It was this grim reality that has underpinned much of the clamor for water to be declared a human right with equal and affordable access for all. Ironically, the Bank’s efforts to privatize water may have indirectly given a real boost to the global movement for declaring water a human right.

In the eyes of many water activists, the ‘infliction’ of private as opposed to public models of water management practices for the developing world resulted in tension and confrontation in numerous villages, towns, and cities that were vehemently against multinational corporations controlling the delivery of water to their communities. It was a subject so near and dear to everyone that galvanizing the public rage was not that difficult. Oliver Hoedeman of Corporate Europe Observatory, based in Amsterdam, commented that privatization of water “is asking for abuse.”<sup>590</sup>

However, as journalist Charles C. Mann wryly commented: “What’s bad for humanity can be good for business.”<sup>591</sup> In 1998, the International Monetary Fund provided a loan to Bolivia that was contingent on the privatization of various state enterprises including the water system of its third largest city, Cochabamba.<sup>592</sup> The World Bank recommended that the Bolivian Government cease subsidies to the water system of Cochabamba.<sup>593</sup> The privatization of water services (encouraged by the World Bank), resulted

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<sup>588</sup> Mann, *supra* note 97.

<sup>589</sup> Women’s Environment and Development Organization, *supra* note 137, at 5.

<sup>590</sup> Mann, *supra* note 97.

<sup>591</sup> *Id.*

<sup>592</sup> BAKKER, *supra* note 176, at 166.

<sup>593</sup> *Id.*

in the doubling of water charges and clear hardship for the poor.<sup>594</sup> For some of them, water charges drained a quarter of household income.<sup>595</sup> Water rate increases accompanying privatization schemes have been viewed as a “wolfish tax which is cloaked in the garb of a sheepish fee.”<sup>596</sup> Public rage erupted because this forty-year concession agreement (signed in 1999)<sup>597</sup> gave a local subsidiary of large multi-national corporate entities the right to all the water in Cochabamba, including water from nearby rural privately-owned wells along with a guaranteed profit of 15%.<sup>598</sup> Mamani, an activist in Bolivia expressed the frustration felt by the poor during that conflict: “You can’t use a thing as important as water, which is synonymous with life, to make money.”<sup>599</sup>

Oscar Olivera, a shoemaker and union leader from Cochabamba, led the opposition in his community, with about 100,000 people protesting.<sup>600</sup> The military response resulted in one death of a student leader, but the people won this fight.<sup>601</sup> Over 100 people were injured<sup>602</sup> but the contract was unilaterally rescinded,<sup>603</sup> and the Bolivian President eventually resigned.<sup>604</sup> To understand the reason for the public outcry, it is interesting to note that when Cochabamba’s water system was privatized, the corporation’s annual receipts “were larger than Bolivia’s gross national product.”<sup>605</sup>

The Bolivian example sparked similar unrest over water in a number of other communities. Though the victory was celebrated, it is important to

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<sup>594</sup> Salman & McNerney-Lankford, *supra* note 22, at 72 (citing William Finnegan, *Letter from Bolivia: Leasing the Rain*, NEW YORKER, Apr. 8, 2002, at 47).

<sup>595</sup> *Id.*; see also *Thirst for Profits: Are Major Corporations Fit to Deliver Water to the World?*, FRIENDS OF THE EARTH INTERNATIONAL, WATER JUSTICE FOR ALL (Jan. 2003), <http://www.eldis.org/vfile/upload/1/document/0708/Doc/5468.pdf>.

<sup>596</sup> *City of Clarksburg v. Grandeotto, Inc.*, 204 W. Va. 404, 409, 513 S.E.2d 177, 182 (1998) (Maynard, J., dissenting) (describing a municipal fire protection service fee).

<sup>597</sup> Annika Kramer et al., *The Cochabamba Conflict Over Privatization of Water Services*, A World of Science Vol. 11, Issue 1, UNITED NATIONS EDUCATIONAL, SCIENTIFIC AND CULTURAL ORGANIZATION (Jan.–Mar. 2013).

<sup>598</sup> BAKKER, *supra* note 176, at 166.

<sup>599</sup> *Bolivia: Water is a Human Right*, ALJAZEERA (Mar. 21, 2006), <http://www.aljazeera.com/archive/2006/03/200849132918247466.html>.

<sup>600</sup> BARLOW, *supra* note 88, at 103.

<sup>601</sup> Ann Doherty & Antia Portillo, *Bolivia: From the Frontlines of the Water Wars, Interview with Osvaldo Pareje, Cochabamba*, FRIENDS OF THE EARTH INTERNATIONAL, Water Justice for All, Issue 102 (Jan. 2003), <http://www.eldis.org/vfile/upload/1/document/0708/Doc/5468.pdf>.

<sup>602</sup> Kramer et al., *supra* note 597.

<sup>603</sup> BAKKER, *supra* note 176, at 166.

<sup>604</sup> Mann, *supra* note 97.

<sup>605</sup> SNITOW ET AL., *supra* note 5, at 16.

note that by one estimate, as of 2012, nearly half of rural Bolivian homes still had no access to clean water.<sup>606</sup>

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The Government of Tanzania had borrowed from the World Bank, succumbing to the condition that Dar es Salaam's water be privatized under multinational management.<sup>607</sup> By 2005, it was obvious that the corporate entities were not performing to expectations.<sup>608</sup> The Dar es Salaam water authority terminated the contract and the Government deported three British managers.<sup>609</sup> Water activists in Tanzania have demanded that their Government refuse to repay the World Bank for its share of the loans for this water project which "yielded no positive results."<sup>610</sup> Rate hikes, high fees for service connection, and prepaid meters generated citizen protest movements in Argentina, Ghana, New Zealand, India, South Africa, Brazil, the Philippines, Nigeria, and the United States.<sup>611</sup> Buenos Aires and Manila are only two more examples of cities where privatization of water led to serious political problems.<sup>612</sup> Wenonah Hauter, Executive Director of the advocacy group Food and Water Watch, explained that "[p]rivate companies that operate water systems have appalling track records of rate increases, poor system maintenance, faulty billing practices and other failures, sometimes even jeopardizing the health and safety of local residents."<sup>613</sup>

In contrast to the many detractors of the Bank, the Independent Evaluation Group's 2012 report on World Bank activities found that "project performance in water has been good, being the most improved sector against stated objectives in recent years."<sup>614</sup> Further, the Report found that the "Bank has contributed to improving access to clean water, especially in

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<sup>606</sup> *Clean Water to Reach Thousands in Rural Bolivia*, PLAN CANADA (Mar. 22, 2012), <http://plancanada.ca/page.aspx?pid=4589>.

<sup>607</sup> Tim Jones, *Tanzanian Activists Call for Non-Payment of World Bank Water Debt*, WORLD DEVELOPMENT MOVEMENT (Apr. 30, 2013), <http://www.wdm.org.uk/world-bank-inf/Tanzanian-activists-call-none-payment-world-bank-water-debt>.

<sup>608</sup> *Id.*

<sup>609</sup> *Id.*

<sup>610</sup> *Id.*

<sup>611</sup> Nelson, *supra* note 525, at 134.

<sup>612</sup> CHARTRES & VARMA, *supra* note 101, at 159.

<sup>613</sup> Richard G. Little & Wenonah Hauter, *Are We Better Off Privatizing Water*, WATER INDUSTRY NEWS, <http://www.waterindustry.org/Water-Facts/infrastructure-13.htm>.

<sup>614</sup> *Summary of the Report*, *supra* note 66 (summarizing Parker, *supra* note 106).

urban areas.<sup>615</sup> It has balanced investments in infrastructure with improvements in the institutions that manage and allocate water.”<sup>616</sup> In its response to the Evaluation, the Bank’s Management noted that “[w]hen requested, the Bank has also supported public-private partnerships in urban and rural water utilities, which have proved a valid option to turn around poorly performing water utilities and improve service quality and efficiency.”<sup>617</sup> The World Bank’s Management continued: “This approach fosters a virtuous circle whereby the utility improves its financial situation and gradually becomes able to finance a larger share of its investment needs.”<sup>618</sup> However, these explanations did little to ease the anxiety of opponents who perceived this entire privatization scenario as being “due in part to politicians from wealthy nations twisting wrists in poor nations on behalf of influential corporations.”<sup>619</sup>

Although there is considerable discord and polarization on this issue of privatization, there are attempts being made to articulate a more neutral position. Explaining that water shortages are caused and exacerbated by governmental mismanagement, infighting, and corruption, Paul Alois, writing for the Arlington Institute, supports the World Trade Organization’s perspective that privatization could alleviate such problems.<sup>620</sup> However, Alois also concedes that while increasing efficiency, “privatization rarely has an effect on corruption, and often disadvantages the poor.”<sup>621</sup> It has also been suggested that when governments are favorable to private involvement, there is a need for well-maintained regulatory systems and this has “remained elusive.”<sup>622</sup> The Chairperson of the Committee on Development Effectiveness, writing a commentary on the 2010 Independent Evaluation of the Bank’s water projects, noted support for the Bank’s “pragmatic, but principled approach” to water pricing, but emphasized that some members had commented “on the potential of the private sector to provide efficient services, if accompanied by appropriate legal frameworks and regulatory institutions.”<sup>623</sup>

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<sup>615</sup> *Id.*

<sup>616</sup> *Id.*

<sup>617</sup> Parker, *supra* note 106.

<sup>618</sup> *Management Response to the Independent Evaluation Group: An Evaluation of World Bank Support 1997–2007*, THE WORLD BANK (2011), <http://go.worldbank.org/TWK9TMF930>.

<sup>619</sup> Mann, *supra* note 97.

<sup>620</sup> Alois, *supra* note 161.

<sup>621</sup> *Id.*

<sup>622</sup> Parker, *supra* note 97.

<sup>623</sup> *Id.*

From the Bank's perceptive there was a critical need for reform in some developing countries. Paul J. Nelson explained that in those areas, public water systems were inefficient and the water quality was questionable.<sup>624</sup> Nelson continued: "They also serve the wealthy far better than the poor: slums, shanty-towns, and temporary urban settlements are rarely served well, with residents in those areas often paying a premium for water delivered by truck. In this context, reforms were (and are) clearly needed."<sup>625</sup>

Unfortunately, in many instances, the record of private interests regarding provision of clean water to the poorest in the communities was not progressive. The profit motive dominated the actions of most of the multinationals and their local subsidiaries and this naturally precluded the expenditure of vast sums to connect the poor to a clean water supply.

Corporations sensed that the public relations debacle associated with participation in water extraction and delivery systems could seriously endanger the reputation and future economic profitability of the multinational water businesses. Involvement with water was so rife with controversy and confrontation that enthusiasm for seizing the privatization opportunities cooled. No global business could afford to be oblivious to the consequences of being seen as exploitative, iniquitous and unjust. Accusations of neo-colonialism and economic exploitation were deemed a public relations disaster by any business caught in this type of messy situation. Pragmatically, they realized that the corporate reputation had to be cleansed. Ironically, the water activists had inadvertently provided their corporate opponents with the ideal method to repair their ragged reputations.

Multinational corporations, with a possible eye on the public relations impact, eagerly embraced and adopted both the concepts of human rights and the attendant environmental priorities. They shrewdly understood that "sustainable water management is not only an essential economic need but an opportunity for competitive advantage as well."<sup>626</sup> There was still plenty of money to be made from the water crisis. It just required a more subtle persona: a kinder, gentler corporate image. Surprisingly, or perhaps not surprisingly, the United Nations pragmatically accepted the corporate desire for affiliation and embraced the idea.

The world soon witnessed some strange and unusual alliances between elements of the United Nations community and multinational businesses. In

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<sup>624</sup> Nelson, *supra* note 525, at 133.

<sup>625</sup> *Id.*

<sup>626</sup> Beavers, *supra* note 12, at 136.

a very real sense, this was practical and a tribute to U.N. attempts to forge inclusive affiliations to achieve the idealistic aims of the World Organization. However, water activists were alarmed because the United Nations appeared to be getting far too chummy with multinationals. Large water corporations like Suez and Veolia worked with the United Nations to form the Global Compact in 2000, whereby corporate entities committed formally to human rights and environmental standards. International corporations also funded a UNESCO Conference on water in 2002.

This unusual friendly relationship caused considerable discomfort among water activists, particularly those who felt that the United Nations was increasingly leaning toward free trade and a greater role for the multinationals.<sup>627</sup> Having commanded the moral high ground for so long, there was now a fear that exploitative business elements were eagerly seizing these principles and hijacking the all-important matter of water as a fundamental human right. The vast body of environmental and activist literature is replete with continued fear that privatization could some day dominate the supply of water in the developing world and deprive even more people of that vital need. Privatization by the back door was deemed to be just as dangerous as the earlier form. To the dismay of elements of the environmental community, the Secretariat of the United Nations, the World Bank, and the leaders of a number of countries appeared to be in favor of privatization. Author Paul J. Nelson concluded that “[w]ithin international institutions, official policy clearly favors market mechanisms, and public-private partnership arrangements to mobilize capital and provide water services.”<sup>628</sup>

From a somewhat different perspective, these international overtures to the corporate world could be regarded as constructive. From that vantage point, bringing corporations within the fold of human rights accountability seems a far safer proposition than leaving them outside and presumably free to be as predatory as they fancy. There are ways of accomplishing this aim. For example, in July 2007, U.N. Secretary-General Ban Ki-moon launched a public-private initiative called the CEO Water Mandate.<sup>629</sup> This organization aims to “assist companies in the development, implementation and disclosure

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<sup>627</sup> For an eloquent explanation of the opposition to this alliance, see BARLOW, *supra* note 88, at 44.

<sup>628</sup> Nelson, *supra* note 525, at 139.

<sup>629</sup> Press Release, United Nations Global Compact, Water Aid Signs Up to Global Initiative on Water Stewardship (Apr. 17, 2013), <http://www.unglobalcompact.org/news/320-04-17-2013>.

of water sustainability policies and practices.”<sup>630</sup> Approximately 100 companies endorsed this idea.<sup>631</sup> From a pragmatic perspective, it may make eminent sense to impose “direct human rights obligations on corporations,” especially those that operate in the more vulnerable developing countries.<sup>632</sup> It has been recognized for some time now that human rights accountability must extend to non-state actors, and the issue of water would appear to be an excellent springboard for the universal acknowledgment of this growing twenty-first century approach to human rights implementation. This perception, if made part of binding international law, could also fit neatly within the realities of globalization that have made the grip of sovereign governments much looser, more flexible, and more amenable to economic priorities. Whether we like it or not, those priorities are often dictated by non-sovereign multinational interests who frequently command larger financial holdings than many sovereign states. The extensive research for this Article established that some corporations are already interested in working within a business model that allows for profit while embracing this new perspective of accountability and responsibility. They seek guidance in the appropriate mission statements, codes of behavior and conduct, and methodologies and practices they have to observe in the course of development projects. The United Nations has been contributing considerably to answer that need. Pragmatically, it makes eminent sense to conduct one’s business without alienating the local community. No business could possibly seek to be reviled, even expelled, its reputation in tatters.

The challenge now is for the water activists to become as pragmatic as some of the corporations have been, thinking inclusively, and utilizing the expertise of the business interests to fulfill the laudable aims of ending the water crisis. While critiquing anti-privatization campaigners, author Karen Bakker expressed their concern, arguing that “[f]ull privatization is . . . inconsistent with a human right to water unless it is coupled (as it is in England) with a universality requirement . . . and with [a] strong regulatory framework for price controls and quality standards.”<sup>633</sup> Bakker felt that the “human rights regime is flexible enough to be fully compatible with private property rights.”<sup>634</sup> Environmental author Robert Sandford agreed, pointing

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<sup>630</sup> *Id.*

<sup>631</sup> *Id.*

<sup>632</sup> KNUT BOURQUAIN, FRESHWATER ACCESS FROM A HUMAN RIGHTS PERSPECTIVE 107 (2008).

<sup>633</sup> Bakker, *supra* note 507, at 27–28.

<sup>634</sup> *Id.*

out that “water can be at one level a human right and at another a market commodity.”<sup>635</sup> Sandford emphasized, however, that “markets are not a panacea.”<sup>636</sup> The ultimate contribution of the water activists who have made such a significant difference in raising awareness in the entire world, could now be in delineating the frameworks for public regulatory systems. Such systems could operate in tandem with private companies while simultaneously monitoring them. Polarized positions have played a role in raising awareness about injustice. However, only an inclusive approach will get the work accomplished. For those who are ill or dying because of the water crisis, it is now time to get the job done.

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Very briefly, this Article needs only to mention that there are international agreements that have formally favored the notion of placing a market value on water. If we place the water deprived people at the forefront of our concern, our priorities have to reflect their ultimate best interest. When any financial or other institution acts to alleviate their lot, it should be supported. If on the other hand, there appears to be a possibility of more inequity and injustice toward the deprived, then that would require opposition. That is the nature of democratic society which demands active citizen participation. There is no doubt that the water crisis will require every person on earth to become a participant in this very fundamental issue.

Length constraints preclude more discussion of this feature of the subject.<sup>637</sup> The reader is encouraged to explore the extensive literature already produced in this field.

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<sup>635</sup> SANDFORD, *supra* note 188, at 32.

<sup>636</sup> *Id.*

<sup>637</sup> Very briefly, the commodification of water proceeded in novel directions with the 1995 creation of the World Trade Organization. Of particular concern was the General Agreement on Tariffs and Trade (G.A.T.T.) that deemed water as a “good,” subject to a series of controls over the sovereign exercise of ownership rights by member nations. BARLOW, *supra* note 88, at 45. There was also serious concern when multinational business interests lobbied hard to utilize the framework of the World Trade Organization’s General Agreement on Trade in Services (GATS) to allow them access to water facilities in several of the least developed countries of the world. The agenda was to develop open markets for large businesses “for the collection, extraction, purification and distribution of bulk and retail water.” Alexandra Wandel, *GATS*, LINK (Friends of the Earth Int’l, Amsterdam, Neth.), Jan. 2003, at 8, <http://www.eldis.org/vfile/upload/1/document/0708/DOC15468.pdf>.

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The United Nations has played a significant role in demonstrating the possibility of public and private interests working in tandem to bring about the implementation of human rights. The United Nations General Assembly Resolution on the Right to Development was issued in 1999 and it emphasized the important nexus between human rights, development and the right to clean water (as itself a fundamental human right).<sup>638</sup> The U.N. also resolved that the right to clean water constituted a moral imperative nationally and internationally. The global realization of the seriousness of this crisis was generating stronger language in these formulations.<sup>639</sup> Affiliation with the United Nations became a significant imperative for both the pro- and anti-privatization interests and that struggle for pre-eminence continues.

Given the vast outlays in money, materials, and expertise required to improve infrastructure; extend accessibility to water; and build sanitation facilities, it may well be necessary for the public and private sector to cooperate and formulate joint projects. This is not to suggest that the mistakes of the past be repeated. Nor is the suggestion being made that water sources be simply privatized for decades to the public detriment. What is suggested is that there be a compromise that enables business to provide its experience while the public sector legislates, regulates, and monitors, so that this crisis can be ended.

In 2000 the United Nations formulated the U.N. Global Compact asking “companies to embrace, support and enact, within their sphere of influence, a set of core values in the areas of human rights, labour standards, the environment and anti-corruption.”<sup>640</sup> These principles commit member businesses to respect and protect human rights; ensure that they do not commit violations; uphold freedom of association; eliminate compulsory labor, including child labor; eliminate discrimination in employment; support a precautionary environmental approach; promote environmental responsibility, including the diffusion of environmentally friendly technologies; and “work against corruption in all its forms, including extortion and bribery.”<sup>641</sup> It is interesting to note that by 2013, the Compact

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<sup>638</sup> The Right to Development, G.A. Res. 54/175, U.N. Doc. a/RES/54/175 (Dec. 17, 1999).

<sup>639</sup> Salman & McInerney-Lankford, *supra* note 22, at 11.

<sup>640</sup> *The Ten Principles*, U.N. GLOBAL COMPACT, <http://www.unglobalcompact.org/AbouttheGC/TheTenPrinciples/index.html>.

<sup>641</sup> *Id.*

already had over 3,200 participants.<sup>642</sup> It is even more interesting to note that in 2013, the U.N. Global Compact expelled 99 companies for “failure to communicate progress for at least two consecutive years.”<sup>643</sup> Perhaps in some years from now, the global water crisis—hopefully resolved—will be historically viewed as the pivot on which a twenty-first century design was created, a paradigm geared to new visions in human rights and in business practices.

In 2005, the United Nations appointed Professor John Ruggie of Harvard University as the Secretary-General’s Special Representative for Business and Human Rights. Ruggie prepared a series of very interesting reports<sup>644</sup> which articulated a practical framework for active involvement by business but with a commitment to ensure human rights, advocating the duty of government to protect against human rights abuses, including any committed by businesses; stressing the importance of business respecting all human rights; and elucidating a requirement for appropriate remedies for those subjected to human rights violations perpetrated by corporate entities.<sup>645</sup> The involvement of the United Nations in this attempt to enable private participation but within human rights guidelines will hopefully generate more mutual understanding and less friction in the future. Time alone will tell whether water companies will be able to implement the Ruggie principles on site without encountering or creating more complex problems for themselves and for the communities in which they are working on water projects.

While this public versus private aspect of the water crisis has been very controversial, it would appear timely now to get beyond the mutual demonization that occurred and spilled over into so much printed material as advocates of public versus private railed against each other. This confrontation misdirected a great deal of the productive energy and the

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<sup>642</sup> *UN Global Compact Expels 99 Companies In First Half of 2013*, UN GLOBAL COMPACT (July 1, 2013), <http://www.unglobalcompact.org/news/339-07-01-2013>.

<sup>643</sup> *Id.*

<sup>644</sup> In April 2008, April 2009, and April 2010.

<sup>645</sup> For an excellent summary of Ruggie’s contribution please see U.N. Global Compact & Pacific Institute, *The Human Right to Water: Emerging Corporate Practice and Stakeholder Expectations* 3–4 (Nov. 2010), [http://www.paninst.org/wp-content/uploads/2013/02/ceo\\_water\\_mandate\\_human\\_right\\_to\\_water7.pdf](http://www.paninst.org/wp-content/uploads/2013/02/ceo_water_mandate_human_right_to_water7.pdf). Professor Ruggie’s reports are available at <http://www.reports-and-materials.org/Ruggie-report-7-April-2008.pdf>, <http://www2.ohchr.org/English/bodies/hrcouncil/docs/11session/A.HRC.11.13.pdf>, and <http://www.reports-and-materials.org/Ruggie-report-2010.pdf>.

resources that could have gone to alleviating the misery of millions who are deprived of clean water and adequate sanitation.

The context of the lenders' policy priorities balanced against the concerns of those who have opposed them so eloquently and successfully, have now to be considered and some resolution sought. This should provide a role for wider community participation, involvement by the private sector for a fair but not usurious profit, and effective water governance and management by public institutions. While it may appear to be a polarized debate, there are always ways to build bridges across chasms. The financial institutions and corporate entities might concede that they destroy their public persona and reputation by placing profit above human needs. Demonstrated greed does not serve their long-term interest. Similarly, those devoted to the traditional idea of water as a free commons resource may have to recognize that scarcity requires placing some value on this vital element of life and that the private sector could provide the technology and the expertise to build the needed infrastructure to implement universal access. Hopefully, the search for solutions later in this Article may provide some answers.

#### XVIII. THE HUMAN RIGHT TO WATER

The 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses specifies the importance of vital human needs.<sup>646</sup> Although not yet in force, it is still significant because it is a universally applicable convention governing shared freshwater resources.<sup>647</sup> Appreciation for the significance of human needs, brings humanity a step closer to acceptance of the principle of human rights. If the need is universal and vital for life—as is the case with water—there can be only one outcome: the determination of its status as an important human right.

The wording on human needs in the 1997 Convention was clarified with a statement to the effect that: “[i]n determining ‘vital human needs,’ special attention is to be paid to providing sufficient water to sustain human life,

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<sup>646</sup> Convention on the Law of the Non-Navigational Uses of International Watercourse, G.A. Res. 51/229, art. 10(2), U.N. Doc. A/RES/51/229 (May 21, 1997).

<sup>647</sup> Stephen C. McCaffrey, *Convention on the Law of the Non-Navigational Uses of International Watercourses*, U.N. AUDIOVISUAL LIBRARY OF INT'L LAW (2008), [http://legal.un.org/avl/pdf/ha/clnuiw/cinuiw\\_e.pdf](http://legal.un.org/avl/pdf/ha/clnuiw/cinuiw_e.pdf).

including both drinking water and water required for production of food in order to prevent starvation.<sup>648</sup>

The Convention highlights two very important principles where competing usage is involved, namely equitable utilization and the obligation not to cause significant harm.<sup>649</sup> It does not however, cover the multitude of issues that surround the extraction and delivery of water and the provision of adequate sanitation in all countries of the world.

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At the Millennium Summit in 2000, countries agreed to halve by 2015 the proportion of people who lacked access to safe drinking water.<sup>650</sup> The baseline year for calculation was 1990.<sup>651</sup> Although water was only one of their many concerns, it formed a part of many of the stated goals and its inclusion is very significant in terms of the amount of global attention being paid to this issue. The Millennium Declaration was issued on September 8, 2000, and adopted unanimously by the General Assembly.<sup>652</sup> The main focus of the goals related to poverty and hunger, primary education, gender equality, child mortality, maternal health, diseases, environmental sustainability and the development of a global partnership for development.<sup>653</sup> The need for clean water and adequate sanitation underlies most of the global goals. Member States agreed to eight goals and twenty-one targets to be met by 2015.<sup>654</sup> It is interesting to note that the much-criticized World Bank which concentrated on water services infrastructure during the 1980s and turned to the very controversial issue of water management systems during the 1990s, has since 2001, decided to focus its attention on the Millennium Goals.<sup>655</sup> However, the Goals are only one stage

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<sup>648</sup> Rep. on the Convention on the Law of the Non-Navigational Uses of Int'l Watercourses, 6th Comm. convening as the Working Group of the Whole, U.N. Doc. A/51/869, 5 (Apr. 11, 1997).

<sup>649</sup> BOURQUAIN, *supra* note 632, at 22.

<sup>650</sup> Office of the High Commissioner for Human Rights, Briefing Note on the Right to Water 1 (Mar. 2008), [http://ceowatermandate.org/files/research/Right\\_to\\_Water\\_Briefing\\_Note.pdf](http://ceowatermandate.org/files/research/Right_to_Water_Briefing_Note.pdf).

<sup>651</sup> Guy Hutton & Jamie Bartram, *Global Costs of Attaining the Millennium Development Goal for Water Supply and Sanitation*, 86 BULL. OF THE WORLD HEALTH ORG. 14 (Jan. 2008), available at <http://www.who.int/bulletin/volumes/86/1/07-046045/en>.

<sup>652</sup> Salman & McInerney-Lankford, *supra* note 22, at 14.

<sup>653</sup> JONES, *supra* note 16, at 8.

<sup>654</sup> GLEICK, *supra* note 26, at 251.

<sup>655</sup> Indep. Evaluation Grp., *supra* note 106, at 1.

in a long process. As Peter Gleick commented: "The UN Millennium Goals are a step in the right direction, but they are inadequate in the face of the appalling death toll facing the poorest people in the poorest countries."<sup>656</sup>

Although the Millennium Goals have been universally praised for setting specific targets and for encouraging rapid implementation, these aims cannot on their own generate action unless nations demonstrate the political will to reach the desired goal. This problem underlies every issue tackled by the United Nations. It can draft endless eloquent, if wordy documents; it can articulate inspiring principles; elucidate practical steps; hold many meetings to encourage global debate; but it cannot act when the sovereign state members are unwilling. National sovereignty still holds primary place in international politics. The cosmopolitanism that the United Nations represents is unfortunately still a distant goal, perhaps the ultimate goal that has yet to be reached.

Water issues were again emphasized at the Johannesburg Summit that met in September 2002.<sup>657</sup> The Summit reinforced commitment to achieving the millennium development goals related to water and sanitation, and promoted the transfer of technology for infrastructure creation.<sup>658</sup>

Although passage of the Millennium Goals demonstrated the best of intentions, the intervening years have witnessed a number of serious natural disasters, floods, drought, hurricanes and fires in a number of countries as well as the very severe economic crisis of 2008. It seems unlikely that all the goals will be reached by 2015. However, Peter H. Gleick believes that the world is "on track" to meet the access to water target but concludes that "not all regions are performing as well as others."<sup>659</sup> Clarifying this remark, Gleick explains that Europe, Latin America, the Caribbean and much of Asia "have met or are on track to meet the established targets."<sup>660</sup> Unfortunately the situation has worsened in Oceania with insufficient progress made in Northern and sub-Saharan Africa and South-East Asia.<sup>661</sup> A United Nations Environment Programme survey reported in 2010 that each African had access to a depleting amount of water and it was then estimated that only 26 of the continent's 53 countries were on track to halve the number of people

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<sup>656</sup> PAC. INST., *supra* note 139.

<sup>657</sup> Women's Environment and Development Organization, *supra* note 137, at 11.

<sup>658</sup> *Id.*

<sup>659</sup> GLEICK, *supra* note 26, at 251.

<sup>660</sup> *Id.*

<sup>661</sup> *Id.*

without sustainable access to clean drinking water by 2015.<sup>662</sup> According to United Nations estimates, even if the goal for delivery of clean water is reached by 2015, this will still leave 800 million people without such access.<sup>663</sup>

In contrast to the cautious, somewhat pessimistic projections on water, United Nations Secretary-General Ban Ki-moon announced in 2012 that the millennium goal of halving the number of people without access to safe drinking water had already been reached.<sup>664</sup> On March 6, 2012, UNICEF and the World Health Organization issued a report stating that between 1990 and 2010 over 2 billion people had gained access to improved drinking water.<sup>665</sup> The new projection for 2015, the target year, was 92% of the world's population gaining access to improved drinking water.<sup>666</sup> The U.N. did admit, however, that it was not possible on a global scale to measure water quality.<sup>667</sup>

The divergence with respect to the water-related goal is somewhat disconcerting. There are a variety of positions being articulated by various divisions within the United Nations. Although the Secretary-General's statement is most encouraging, even if the goal has been reached, the numbers of water-deprived people are still very high. It might be preferable for the world not to pat itself on the back until all people have equitable access to clean water. Anything less than that is still something of a failure.

This crisis requires consistent and determined political will and commitment for complete success. Dr. Rowan Williams, Archbishop of Canterbury, articulated very clearly and honestly a universal realization when he explained the reason for the failure: "The cause is not a lack of resources, but a lack of global political will."<sup>668</sup>

With respect to improvements in sanitation, now also a human right, the condition is far worse. In 1990, 2.6 billion people lacked access to basic sanitation. The projected figure by 2015 will still be as high as 2.1 billion.<sup>669</sup>

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<sup>662</sup> UN News Centre, *UN Survey Shows Declining Water Availability in Africa, Highlights Solutions* (Nov. 25, 2010), <http://www.un.org/apps/news/story.asp?NewsID=36872&Cr=environment&Cr1#.UNOohbu404M>.

<sup>663</sup> WORLD BANK, *supra* note 66.

<sup>664</sup> UNICEF WHO, *supra* note 117.

<sup>665</sup> *Id.*

<sup>666</sup> *Id.*

<sup>667</sup> *Id.*

<sup>668</sup> JONES, *supra* note 16, at 27.

<sup>669</sup> GLEICK, *supra* note 26, at 254.

Some estimates suggest the latter figure will be 1.8 billion<sup>670</sup> but that is still a staggering statistic. WaterAid, a nongovernmental organization, estimated that access to sanitation provided by the Government actually declined in Nigeria between 1990 and 2012, leaving over 100 million people in that oil-rich nation without adequate facilities.<sup>671</sup>

All the idealistic U.N. pronouncements notwithstanding, implementation of the human right to water eludes millions of people and the right to adequate sanitation is even more elusive. There is little doubt that “the human right to water is violated with impunity on a widespread and systematic basis—and it is the human rights of the poor that are subject to the gravest abuse.”<sup>672</sup> There can be no doubt that “[p]overty and water poverty go hand in hand.”<sup>673</sup> Koichiro Matsuura, Director-General of UNESCO warned that the “twin realities of growing freshwater shortages, combined with deeply inequitable access to the resource, pose the greatest ecological and human rights threats of our time.”<sup>674</sup>

However much critics may lament the inability of the World Organization to implement its many well-intentioned formulations, there can be little doubt that in terms of raising public awareness, the United Nations has been a very successful organization. From the learning kits produced by volunteers for school children to the lobbying and informing of world diplomats assembled at Headquarters and elsewhere, the U.N. provides a mass of statistical and relevant information on a vast number of global issues. By declaring special days, years and even decades, the United Nations can draw even more attention to serious problems. In 2000, the General Assembly declared the year 2003 as the “International Year for Freshwater” and in 2003, it also proclaimed the years between 2005 and 2015 as the “International Decade for Action, ‘Water for Life.’”<sup>675</sup> Meanwhile March 22nd has been specified as World Water Day.<sup>676</sup> As further inducement, the United Nations awards communities and countries

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<sup>670</sup> WORLD BANK, *supra* note 66.

<sup>671</sup> Yvonne Ndege, *Nigeria's Daunting Sanitation Problems*, ALJAZEERA, Dec. 6, 2012, available at <http://www.aljazeera.com/news/africa/2012/12/201212573912574643.html>.

<sup>672</sup> U.N. DEV. PROGRAMME, *supra* note 365, at 4.

<sup>673</sup> JONES, *supra* note 16, at 35.

<sup>674</sup> Koichiro Matsuura, Dir. Gen., Address at the Summit of Nobel Peace Laureates, Right to Water as a Human Right, Paris (Dec. 11, 2008).

<sup>675</sup> Salman & McInerney-Lankford, *supra* note 22, at 15.

<sup>676</sup> *Id.*

for outstanding best practices in relation to improvements in water management and for meeting international goals.<sup>677</sup>

The United Nations also provides a forum where experts and delegates from all the countries can meet to discuss solutions, exchange ideas, and come up with feasible plans of action. The existence of an international meeting place should not be underestimated. Author Richard Matthews correctly stated that “[s]uccessfully addressing the problems associated with water, demands local, national, and regional cooperation.”<sup>678</sup> While the United Nations can provide the venues, plan the meetings, organize the events, and bring delegates from the world together, it cannot without clear permission from the Member States, undertake actions that infringe on national sovereignty. With respect to political matters it can only do so when it has the clear permission of the Security Council and that includes an affirmative vote from the five Permanent Members, the United States, Great Britain, China, Russia and France.<sup>679</sup> Under normal circumstances the General Assembly can only recommend specific actions even though it is far more representative of the global community. With respect to the water crisis and its deadly daily toll in disease and death, it is still up to national governments to initiate action. Peter Gleick aptly commented that “international efforts must be coupled with specific and aggressive new commitments on the part of countries and development organizations.”<sup>680</sup> Absent that national political will, the world will continue to suffer from a global water crisis despite all the U.N.’s formulations, resolutions, millennium goals and affirmations of human rights.

In spite of many voices lamenting the waste of national and international funds involved in all these conferences and meetings as money that could more wisely be spent on the needs of the poor in each country, a closer view generates a perception that all this interaction between countries of the world is preferable to nations operating in isolation from each other. If cynically, one assumes that the funds were not in any event going toward connecting

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<sup>677</sup> In 2013, Kumamoto city in Japan won for groundwater management and the Republic of Moldova took the prize for the provision of safe water and sanitation for all. International Decade for Action: ‘Water for Life’ 2005–2015, Best Practices Award Goes to Japan and the Republic of Moldova (Mar. 22, 2013), [http://www.un.org/waterforlifedecade/pdf/press\\_release\\_2013\\_edition\\_award\\_eng.pdf](http://www.un.org/waterforlifedecade/pdf/press_release_2013_edition_award_eng.pdf).

<sup>678</sup> Richard Matthews, *Solutions to the World Water Crisis Requires International Cooperation*, THE ENERGY COLLECTIVE, Mar. 23, 2013, <http://theenergycollective.com/global-warmingisrael/201896/solutions-world-water-crisis->.

<sup>679</sup> U.N. Charter art. 2, para. 4.

<sup>680</sup> Pacific Institute, *supra* note 139.

villages to a water system, then the amount expended on participation in the United Nations' meetings, summits and so on serves a useful purpose in raising awareness. The challenge is to convert that awareness into determined political will and generate action that will ameliorate the lot of the deprived.

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The multi-faceted water issue demanded some focus on the matter of management and governance and through the 1990s the concepts of Integrated Water Resources Management (IWRM) gained prominence. The literature on water, now so extensive, establishes that IWRM is whatever each author wants it to be. There is a degree of ambiguity to this concept. While it has commanded an impressive amount of interest, IWRM "as a concept has neither been unambiguously defined, nor has the question of its practical implementation been adequately addressed."<sup>681</sup> The importance of water governance was highlighted in the 2009 United Nations World Water Development Report which commented on the water crisis: "This crisis is one of water governance, essentially caused by the ways in which we mismanage water."<sup>682</sup> Issues of water resource management are tied to the notion that solutions for the water crisis will be a great deal more successful if the right framework of governance can be accepted and implemented in communities, particularly in the developing world where corruption is so extensive. At its most constructive, integrated water resources management can be viewed holistically as calling for "the integration of actions affecting drinking water and sanitation supply, agriculture, irrigation, hydropower and other energy production, and maintenance of environmental water flows to protect habitats and sustain groundwater supplies."<sup>683</sup> The research on this subject regrettably provides ample instances where inefficiency in management, compounded by corruption exacerbate both scarcity and inequitable access. The vast population of Western India has suffered from one of the worst droughts in over four decades.<sup>684</sup> The vibrant city of Mumbai, home to India's world-famous Bollywood movie industry, has

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<sup>681</sup> CHARTRES & VARMA, *supra* note 101, at 121.

<sup>682</sup> AGNEW & WOODHOUSE, *supra* note 47, at 17.

<sup>683</sup> Indep. Evaluation Grp., *supra* note 106, at 4.

<sup>684</sup> AFP, *India Offers \$664 Million to States Hit By Drought, Floods* (Mar. 13, 2013), reprinted in *Breaking News: Asia* (Apr. 15, 2013), <http://www.straitstimes.com/breaking-news/asia/story/india-offers-666-million-states-hit>.

faced severe water shortages. Critics have blamed “official ineptitude and corruption for exacerbating the natural water shortage.”<sup>685</sup>

Dr. Ania Grobicki, Executive Secretary of the Global Water Partnership commented that “[d]rought and water scarcity are not only a result of climate change and variability but often poor water resources management.”<sup>686</sup> Water is now so precious a resource and its scarcity so threatening for the world, that careful management of the available quantity has become the mantra of most communities and governments. A vast and very detailed literature has arisen to explain methods of managing water efficiently and sustainably and it does now appear that the governments of the world are paying attention. UN-Water conducted a global survey in 2011 to gauge progress toward sustainable management of water and found that 64% of 125 countries had adopted IWRM plans with 34% reporting advanced implementation.<sup>687</sup>

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Growing environmental concerns about water pollution, water scarcity, inadequate sanitation and water-borne diseases prompted a very vocal and ultimately effective campaign that resulted in the adoption of General Comment No. 15—The Right to Water by the Committee on Economic, Social and Cultural Rights during its 2002 session held in Geneva, Switzerland.<sup>688</sup> In an insightful analysis of General Comment No. 15, authors Salman M.A. Salman and Siobhan McInerney-Lankford concluded that while this formulation does not create new rights, it “extrapolates the normative and practical bases of a human right to water within the fabric of the International Covenant on Economic, Social and Cultural Rights.”<sup>689</sup>

General Comment No. 15 is an inspiring document, setting forth an aspirational standard for the world to reach someday. Regrettably, its eloquent phrasing cannot mask the reality that most countries on this planet operate far below that ideal standard, and therein lies the crux of the reason

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<sup>685</sup> AFP, *Millions of Indians Facing Worst Drought in Decades* (Mar. 06, 2013), reprinted in My Favourite Executive, Singapore Press Holdings (Apr. 15, 2013), <http://www.straittimes.com/breaking-news/asia/story/millions-indias-facing-worst-drought-decades-20130306>.

<sup>686</sup> Waterworld, *Integrated Drought Management Programme Launched*, Mar. 13, 2013, <http://www.waterworld.com/articles/2013/03/integrated-drought-management-programm>.

<sup>687</sup> Press Release, U.N. Water, International Year of Water Cooperation, U.N. Press Release (2013).

<sup>688</sup> General Comment, *supra* note 534.

<sup>689</sup> Salman & McInerney-Lankford, *supra* note 22, at ix.

why we have a global water crisis. It would be worthwhile briefly to explore a few of its numerous suggestions. At the very least, they point the way forward toward progressive alleviation, if only the governments of the world can generate the will to make sufficient effort to meet the targets outlined.

The General Comment declares that “[w]ater is a limited natural resource and a public good fundamental for life and health,” and goes on to affirm that the “human right to water is indispensable for leading a life in human dignity.”<sup>690</sup> The Comment covers various uses of water, domestic and agricultural and emphasizes that “[w]ater should be treated as a social and cultural good, and not primarily as an economic good.”<sup>691</sup> Four crucial elements concerning water adequacy are provided: availability (sufficiency and continuity); quality (hazard-free and healthy); and accessibility, meaning that water must be physically and economically available without discrimination.<sup>692</sup> The Comment also affirms the “right to seek, receive and impart information concerning water issues,” as an elucidation of “information accessibility.”<sup>693</sup>

The right to water is defined as the right of everyone to “sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses.”<sup>694</sup>

Part III of this landmark document places considerable obligations on States to undertake implementation of its proposals and reminds them of the need for expeditious and effective action. Governments are told that the “right to water, like any human right, imposes three types of obligations on States parties: obligations to respect, obligations to protect and obligations to fulfil.”<sup>695</sup> These obligations are comprehensive and encompass almost every possible infraction that might occur to diminish or deprive persons of the enjoyment of the right to water.

Inter alia, the obligation to respect prohibits states from limiting equal access to adequate water, precludes arbitrary interference with traditional water allocations, prevents pollution caused by State activities, and ensures that armed conflict will not result in the punitive destruction of water facilities.<sup>696</sup> The obligation to protect requires governments to control third

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<sup>690</sup> General Comment, *supra* note 534, at 1.

<sup>691</sup> *Id.* at 5.

<sup>692</sup> *Id.*

<sup>693</sup> *Id.* at 6.

<sup>694</sup> *Right to Water*, *supra* note 516, at 4.

<sup>695</sup> General Comment, *supra* note 534, at 9.

<sup>696</sup> *Id.* at 12.

parties who seek to interfere with the right to water. Such parties include individuals, groups, and corporations. In view of the numerous confrontations over water that have erupted between corporate interests and communities in many countries, it is significant to note that the Comment obliges States to adopt “the necessary and effective legislative and other measures to restrain, for example, third parties from denying equal access to adequate water; and polluting and inequitably extracting from water resources, including natural sources, wells and other water distribution systems.”<sup>697</sup> Special protection is accorded to marginalized groups.<sup>698</sup>

The Comment defines the obligation to fulfill as comprising the responsibility to “facilitate, promote and provide.”<sup>699</sup> These clauses require States to be proactive in assisting individuals and communities to enjoy the right to water. States are also enjoined to provide education in hygiene, waste minimization and protection of water sources. The passage of implementing legislation and the adoption of national water strategies and action plans regarding water are also encouraged.<sup>700</sup> These plans have to be grounded in the principles of “accountability, transparency and independence of the judiciary,” essentially reflecting the nexus of good governance and human rights.<sup>701</sup>

Significantly, with respect to those most at risk, the Comment seeks to facilitate “improved and sustainable access to water, particularly in rural and deprived urban areas.”<sup>702</sup> Non-discrimination is emphasized and governments have to pay special attention to those suffering water deprivation including “women, children, minority groups, indigenous peoples, refugees, asylum seekers, internally displaced persons, migrant workers, prisoners and detainees.”<sup>703</sup>

Despite the vehement insistence of some water activists that water must remain a public common resource, traditionally free in terms of market value and immune from capitalist economics, the United Nations conceded in the General Comment to some degree of commodification. Affordability is stressed in the document with encouragement for the utilization by Member States of “appropriate low-cost techniques and technologies”; and

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<sup>697</sup> *Id.* at 9.

<sup>698</sup> *Right to Water*, *supra* note 516, at 4.

<sup>699</sup> General Comment, *supra* note 534, at 10.

<sup>700</sup> *Id.*

<sup>701</sup> *Id.* at 15–16.

<sup>702</sup> *Id.* at 10.

<sup>703</sup> *Id.*

“appropriate pricing policies such as free or low-cost water”; with the possibility of “income supplements.”<sup>704</sup> In a nod to the vociferous arguments of the traditional camp, the Comment insists that any “payment for water services has to be based on the principle of equity, ensuring that these services, whether privately or publicly provided, are affordable for all, including socially disadvantaged groups.”<sup>705</sup> As much of the opposition has over the years highlighted the iniquitous system whereby the poor pay more for water than the rich, the Comment strongly contends that “[e]quity demands that poorer households should not be disproportionately burdened with water expenses as compared to richer households.”<sup>706</sup>

As a core obligation, the Comment also asks States to “adopt relatively low-cost targeted water programmes to protect vulnerable and marginalized groups.”<sup>707</sup> It has long been recognized that any realistic solution with lasting benefits has to target the poorest and most marginalized groups of every society.<sup>708</sup> Capacity to pay has to be considered where there is default of this obligation and “[u]nder no circumstances shall an individual be deprived of the minimum essential level of water.”<sup>709</sup>

This Article makes no pretensions to provide a comprehensive analysis or even summary of the provisions of General Comment No. 15. Suffice it to say that were this United Nations document with all its constructive suggestions to be implemented across the world, the water crisis would in a few years become a matter of history.

Clearly, the delegates who drafted and agreed to this document were intent on seeking compromise, some form of middle ground between the very polarized positions that have in so many countries generated so much friction and tension over the issue of water. Therein lies the real significance of General Comment No. 15. It was accepted and stands as a very important contribution to the international formulations on the issue of water, clarifying and interpreting and expanding on previous documents, some of which form part of international law. However, it is not legally binding. It is not yet part of customary nor indeed of any type of justiciable law. It has status as an

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<sup>704</sup> *Id.*

<sup>705</sup> *Id.*

<sup>706</sup> *Id.*

<sup>707</sup> *Id.* at 13.

<sup>708</sup> See Ned Breslin, *How Can We Create a World Where Everyone Has Access to Water?*, HUFFINGTON POST, Nov. 4, 2013, [http://www.huffingtonpost.com/ned-breslin/how-can-we-create-a-world\\_b\\_3063257.html](http://www.huffingtonpost.com/ned-breslin/how-can-we-create-a-world_b_3063257.html).

<sup>709</sup> General Comment, *supra* note 534, at 18.

advisory and sets a standard. In that vein, it has been extensively referred to by scholars, lawyers and politicians. It is primarily a directional arrow, pointing the world to a more sustainable use and management of the most vital resource that sustains all life on this planet. It concedes to the unfortunate reality that water has to be deemed to have an economic value if it is to be protected. In our modern world an economic mantle has to be thrown over any resource to prevent its waste and its degradation. We have come very late to this realization with respect to water. And when the resource became commodified, it very quickly transmuted into “blue gold.”<sup>710</sup>

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Admitting that a General Comment is essentially an interpretation, Maude Barlow, commented that to “clearly bind the right to water in international law, a binding covenant is needed.”<sup>711</sup>

Meanwhile, the foundational principles for “assessing good practices for water service providers from a human rights perspective,” were elucidated in a 2010 report written by United Nations Independent Expert Catarina de Albuquerque.<sup>712</sup> Her important criteria provided a framework both for the implementation of the right to water but also for all human rights. The principles include: “availability, quality/safety, acceptability, accessibility . . . affordability . . . non-discrimination, participation, accountability, impact, and sustainability.”<sup>713</sup>

Much to the delight of water activists who had campaigned for years, the United Nations in July 2010 finally recognized “access to safe drinking water and sanitation as a human right.”<sup>714</sup> The formal acknowledgment by the U.N. General Assembly of this right remains a significant milestone. The Resolution calls on Member States and international organizations to “provide financial resources, capacity-building and technology transfer . . . in

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<sup>710</sup> See MAUDE BARLOW, *BLUE GOLD: THE GLOBAL WATER CRISIS AND THE COMMODIFICATION OF THE WORLD’S WATER SUPPLY* (2002).

<sup>711</sup> BARLOW, *supra* note 88, at 168.

<sup>712</sup> Jason Morrison & Peter Schulte, United Nations Global Compact & the Pacific Inst., *The Human Right to Water: Emerging Corporate Practice and Stakeholder Expectations*, at 13, THE CEO WATER MANDATE (Nov. 2010), available at [http://ceowatermandate.org/files/wc/Morrison\\_HR.pdf](http://ceowatermandate.org/files/wc/Morrison_HR.pdf).

<sup>713</sup> *Good Practices*, UNITED NATIONS OFFICE OF THE HIGH COMMISSIONER ON HUMAN RIGHTS, <http://www.ohchr.org/EN/Issues/WaterAndSanitation/SRWater/Pages/GoodPractices.aspx>.

<sup>714</sup> See *id.*

order . . . to provide safe, clean, accessible and affordable drinking water and sanitation for all.”<sup>715</sup> The legal nature of this right and its status with respect to other human rights was clarified by the passage in September 2010 of a Resolution by the United Nations Human Rights Council.<sup>716</sup> This consensus Resolution<sup>717</sup> derived the right to safe water and sanitation from the right to an adequate standard of living and thus reaffirmed “its moral foundation.”<sup>718</sup> The right to water is now “legally binding and equal to all other human rights.”<sup>719</sup> Water expert Peter H. Gleick commented that this legally binding resolution shifted the debate from whether there is a right to water to a determination of the precise responsibilities of countries and organizations in this new context.<sup>720</sup> Gleick called it “a tool . . . a weapon to use to meet basic human needs for water, to help meet water challenges.”<sup>721</sup>

The United Nations has also played a significant role in utilizing the calendar to educate the world and draw attention to the water crisis. To give credit to Member States, the General Assembly has played a very important role in educating the world to the realities of the water and sanitation crisis and to prodding governments to take action. Although this accomplishment has been alluded to briefly in an earlier section, it is important here to reiterate the role played by the membership as members of the General Assembly. This body, which represents all the Member States passed Resolution 47/193 on December 22, 1992 for the observance of World Day for Water.<sup>722</sup> The year 2003 was similarly declared the International Year of Freshwater on December 20, 2000.<sup>723</sup> The emphasis on water was extrapolated to an entire decade, 2005–2015, which was deemed the International Decade for Action—Water For Life.<sup>724</sup> The year 2008 was dedicated as the International Year of Sanitation (Resolution 61/192 of 20 December 2004).<sup>725</sup> As we have seen, the General Assembly declared 2013

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<sup>715</sup> United Nations Educational, Scientific and Cultural Organization, *The Right to Water*, G.A. Res. 64/292, ¶ 2, U.N. Doc. A/RES/64/92 (July 28, 2010).

<sup>716</sup> Morrison & Schulte, *supra* note 712, at 13.

<sup>717</sup> *Id.*

<sup>718</sup> Human Rights Council Res. A/HRC/RES/15/9, Human Rights and Access to Safe Drinking Water and Sanitation, 15th Sess., Sept. 24, 2010.

<sup>719</sup> Morrison & Schulte, *supra* note 712, at 13.

<sup>720</sup> Showstack, *supra* note 285.

<sup>721</sup> *Id.*

<sup>722</sup> G.A. Res. 47/193, U.N. Doc. A/RES/47/193 (Dec. 22, 1992).

<sup>723</sup> G.A. Res. 47/196, U.N. Doc. A/RES/55/196 (Dec. 20, 2000).

<sup>724</sup> G.A. Res. 58/217, U.N. Doc. A/RES/58/217 (Dec. 23, 2003).

<sup>725</sup> G.A. Res. 61/192, U.N. Doc. A/RES/61/192 (Dec. 20, 2004).

as the International Year of Water Cooperation.<sup>726</sup> At the very least, it can be said of the United Nations that it has consistently emphasized the water crisis and reminded the world about the “slow and uneven progress” being made.<sup>727</sup> Supporters of the United Nations could, with some justification, argue that absent this international organization, the world would be in far worse shape. That reality alone would appear to justify its existence.

Those of us who have studied the United Nations and analyzed its many formulations and resolutions can on occasion become very critical of the U.N. for the non-implementation of its many promises. There is no doubt that we all want the United Nations to behave like a world government and ameliorate the plight of millions. However, we refuse to give it the power, the money, or the legal authority to achieve its wordy commitments. Perhaps in the spirit of 2013, the year of cooperation in water, it might be productive to think of the United Nations in a different way. This World Organization can, in its many resolutions reflect the conscience of the world, its hopes for improvement, and its aspirations for betterment. The U.N. draws world attention to inequity and injustice, and has made itself the voice of those who suffer around the world. If we consider this role of being the moral conscience of the world as significant, then for the moment the United Nations does live up to all that we will allow it to be.

In the saga of humanity, it is perhaps still too early for most nations to shake off the concepts of national sovereignty that have been so important for most of modern history. The many regional groupings, such as in Europe, have been an important step. But, from an international perspective, these serve mainly to extend the geographic size and economic arena of a version of ‘sovereignty.’ Although in some areas like human rights, national sovereignty is being slowly eroded in favor of a more universalist approach, it has jokingly been frequently suggested that only an alien invasion from outer space will serve very quickly to unify this world.

#### XIX. SOME SOLUTIONS FOR THE GLOBAL WATER CRISIS

The aim of this section is initially to discuss some of the constructive solutions and ideas that have been proposed for alleviation of this problem. Following that, I hope to present a blueprint of principle to chart a more progressive path toward ultimate resolution of this crisis. The ultimate aim is

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<sup>726</sup> G.A. Res. 65/154, U.N. Doc. A/RES/65/154 (Feb. 11, 2011).

<sup>727</sup> *Id.*

to establish that there is a wealth of ideas in the world, ideas that are practical, feasible, realistic and achievable. What we desperately need is the collective will to move forward quickly to reach the desired goal.

A world that goes beyond paying mere lip service to the many international legal commitments that exist would probably not be suffering a global water crisis. A world where equity is articulated in the various United Nations international instruments should not allow almost a billion people to suffer without access to clean water. Nor should such a world tolerate the suffering of over 2 billion people who live without adequate sanitation. So basic and fundamental are these needs that the deprivation that afflicts such vast numbers reflects poorly on all the rest of us who have the comfort of accessing water at the turn of a tap, and sanitation at the push of a flush handle. Ultimately the global water crisis is a very sorry and painful reflection of the amount of injustice that prevails in our world. Mikhail Gorbachev commented in 2010 that a “water apartheid has descended across the world—dividing rich from poor, included from excluded,” adding that efforts to redress this disparity were failing.<sup>728</sup>

On a more positive note, human beings are essentially prone to seeking and finding solutions for all that life inflicts on them. Had we not been problem-solvers, humanity would have gone the way of the dinosaurs a very long time ago. We need to appreciate this unique and significant aspect of human nature and take full advantage of it to resolve a crisis that ought not to be beyond our ability. The vast literature researched for this Article was prolific with ideas for resolution of this crisis. These suggestions spanned the spectrum from philosophical principles to scientific inventions and everything in between. The range and breadth and commonsense of many of these blueprints for resolution and improvement provide an outstanding commentary on the reality that human problems are really never beyond human solutions.

It seems wise to leave the assessment of the technology, management systems, and infrastructure innovations to the experts whose knowledge will be vital for the action required. There is a very significant amount of expertise around the world and the communities in need of water have a fund of experience and know exactly what needs to be done. It is imperative to appreciate that in every village, every district, every region, and every country there are unique needs and that the local people alone can explain

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<sup>728</sup> Mikhail Gorbachev, *The Right to Water*, N.Y. TIMES, July 16, 2010, <http://nytimes.com/2010/07/17/opinion/17iht-edgorbachev.html>.

what is required. It will then be up to the scientific and engineering experts, in tandem with the local communities, to resolve the water crisis.

It would be inappropriate for any of us from the developed world to attempt to impose or inflict our solutions on the people of the developing world without first consulting them and listening with respect and appreciation to their ideas. Absent this initial dialogue, numerous Western water initiatives failed in the past.

One cannot, for instance, overlook the detailed criticism that has explored the negative consequences of the building of vast dams in so many countries. While these dams may have answered some needs, they have created severe environmental problems. One example, dam projects in the Amazon, have generated a very apt critique, to the effect that they “will only help save the world’s lungs at the expense of clogging its arteries.”<sup>729</sup>

Appreciating the environmental havoc wrought by the building of dams, pipelines, and other infrastructure, the Pacific Institute has instead suggested a ‘soft path for water.’<sup>730</sup> This is a strategy to curb waste of water resources and to meet a community’s domestic needs, but to be open to innovations like using reclaimed wastewater to irrigate landscaping and for industry. Advocates of the soft path emphasize an economy of scope, meaning a combined system of decision-making that enables lower cost delivery, decentralized infrastructure and close interaction between the water agency and the consumers.<sup>731</sup>

The wastage of water occurs both because people are negligent in letting taps run, but also because infrastructure in many cities around the world leaks away enormous quantities of water. This happens in the developed world as well as in the developing countries. A regulator’s report for England and Wales reported a daily leakage between 2009 and 2010 of over 3 billion liters per day.<sup>732</sup> Currently, some U.K. water delivery companies are said to be losing as much as 40% of their water to leakage through pipes.<sup>733</sup> According to Christopher Spray, Chair of Water Science and Policy

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<sup>729</sup> Julia Piper and ClimateWire, *Charting a Course for Brazil’s Rivers and Hydropower*, SCI. AM. (Jan. 19, 2012), <http://www.scientificamerican.com/article.cfm?id=charting-course-brazil-hydropower>.

<sup>730</sup> *Issues We Work On: Soft Path for Water*, PACIFIC INSTITUTE, <http://www.pacinst.org/issues/sustainable-water-management-local-to-global/soft-path-for-water/> (last visited Oct. 31, 2013).

<sup>731</sup> *Id.*

<sup>732</sup> Vanessa Barford & Lauren Everitt, *Eight Radical Solutions for the Water Shortage*, BBC NEWS MAGAZINE (Apr. 4, 2012), <http://www.bbc.co.uk/news/magazine-17600062?print=true>.

<sup>733</sup> *Id.*

at UNESCO, the beneficiaries of those leaking pipes were the urban trees, which might otherwise have died.<sup>734</sup>

Nor should we attempt to take advantage of the plight of the poor in the developing nations to create opportunities for our Western businesses and multinational corporations. In the West, we have to understand that these former colonial territories have a deep-rooted apprehension about any foreign actions that have the appearance of economic imperialism. Having been economically pillaged, socially ravaged, and politically oppressed by Western powers for centuries, they are justifiably suspicious of our intentions.

As we have seen, the World Bank almost destroyed its reputation by pursuing the misguided agenda of promoting privatization and concessions to multinational water companies. Hopefully, lending institutions have now learned that in this new century, people are more aware of injustice, less tolerant of it, and increasingly articulate in opposing predatory behavior, whatever its source. There is a vitally important role for the World Bank and the International Monetary Fund to play in assisting developing nations to fulfill these water-related goals. Their priorities in the past have unfortunately led to a virtual demonization of these institutions by the very people they were supposed to be helping. Now, it would seem vital that these two institutions do their utmost to overcome their rather ragged reputation for predatory behavior. One method would be to clearly demonstrate in words and in actions a commitment to the aspirations of the communities they seem so dedicated to serving rather than to any corporate or corrupt local government interests. Given the past, gaining credibility may still be a real challenge. However, it might be wise to remember that despite the source of its investments, it is still called the World Bank. It is not called the Developed World Bank, or the Corporate Bank, the Privatization Bank, or the Western World Bank. Perhaps, all the World Bank needs to do is to develop and act on a philosophy that reflects its very august name.

One possibility might be to consider carefully the types of conditions to be placed on loans to the developing world. Naturally, assurances must be provided that the loans will be repaid but conditionality loaning that disrupts the fragile political, economic, social and traditional systems in poor countries cannot serve anyone's interest in the long run. The World Bank and its sister institutions ought not to be perceived as the vanguard of a new

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<sup>734</sup> *Id.*

form of economic colonialism, but, regrettably, they are. The success of some of the Bank's projects is unfortunately subsumed by the global publicity given to the volatile examples of failure. Hopefully, these funding agencies will someday be regarded in a more positive light as agents of progressive change that answered real needs. The extensive expertise at the command of the Bank can assist without forcing the borrower nation to endure punitive and socially disruptive measures. When the Bank concentrates its vast resources and expertise on promoting the interests of the borrower nation, rather than multinational corporations, everyone benefits. If this becomes the norm for Bank projects, the World Bank could truly become a bank for the world.

The global operations of the Bank could be facilitated if the plague of governmental corruption could be diminished, especially in the developing countries that are most in need of water infrastructure and reform. Unfortunately, corruption is so prevalent throughout the world that its reduction will take significant reserves of will and fortitude. The World Bank and its sister institutions' insistence on accountability and transparency from all participants cannot but become a significant incentive and inducement. Additionally, a reliance on transparency in corporate reporting might protect multinational firms from becoming inveigled into participating in corrupt government practices. The adoption of anti-corruption policies by multinational firms could have a salutary impact in many sectors of the business world,<sup>735</sup> and ensure that local politicians keep their greasy palms inside their own pockets. Instead of shrugging our shoulders in resignation and allowing for the mainstreaming of corruption, we all need to condemn it loudly, to marginalize it and relegate it to the fringe, where hopefully, some day it will wither away.

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Given the aim of determining whether a consensus, constructive approach to the resolution of this crisis is feasible and practical, it would be useful to elucidate a few of the positive suggestions that have been proposed. Given the word limitations of this Article, one can only examine a few of the ideas. However, the wealth of suggestions is a gauge of the extent of international

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<sup>735</sup> See Barbara Kowalczyk-Hoyer, *Transparency in Corporate Reporting: Assessing the World's Largest Companies*, TRANSPARENCY INTERNATIONAL (2012).

concern over the plight of those who are daily enduring a terrible life, deprived of the most fundamental necessity, clean water.

Serious as it is, the global water crisis can be resolved with the tools of law, science, and technology available today. "Most water problems are, in fact, solvable."<sup>736</sup> The extensive research for this Article has clearly demonstrated that there is no dearth of feasible and practical solutions available.

In 2010, a survey of 1,200 leading sustainability experts in 80 countries resulted in a very interesting list of solutions for the water problems.<sup>737</sup> Their ideas provide an action plan of feasible and realistic ideas for the resolution of the water crisis. The suggestions include, encouragement for research and development; education to change consumption and lifestyles; transfer of technologies to poor countries; invention of new water conservation technologies; the recycling of wastewater; improvements in irrigation and agriculture; appropriate pricing of water; development of energy-efficient desalination plants; improvement of water catchment and rain harvesting systems; community-based governance; more protective regulations; holistic management of ecosystems; improvements in infrastructure; reduction of the industrial usage of water; mitigation of the impact of climate change; control of population growth; formulation of international accords to promote progress; measures to deal with pollution; and measures to ensure equitable access.<sup>738</sup>

This plan is interesting but implementation may well be a challenge particularly for the least developed countries, which are among those suffering serious water scarcity and inadequate sanitation. Realistically, these ideas almost all require money and allocations of this type are not very popular with governments. Even in the developed world, water infrastructure is dealt with on a piecemeal basis, with little thought to permanent solutions.<sup>739</sup>

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<sup>736</sup> FISHMAN, *supra* note 1, at 302.

<sup>737</sup> *Experts Name the Top 19 Solutions to the Global Freshwater Crisis*, CIRCLE OF BLUE (May 24, 2010), <http://www.circleofblue.org/waternews/2010/would-experts-name-the-top-19-solutions-to>.

<sup>738</sup> *Id.*

<sup>739</sup> This is why floods these days in North America and Europe create so much havoc in homes and businesses. The United States for instance is said to have one of the most serious infrastructure problems in the developed world. The gridlock in Congress during the administrations of President Barack Obama has precluded adequate vitally needed funding for infrastructure.

So much water is lost through aging infrastructure that just repairing existing systems could lead to substantial improvement. To cite just one example, it was estimated in 2010 that Mexico City was losing as much as 40% of its water through leakage.<sup>740</sup> The consequences were severe for the 50% of Mexicans who survived on an average of four U.S. dollars per day.<sup>741</sup> The poorest of people suffer the worst impact from water shortages, polluted water, and inadequate sanitation.

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There are really ingenious innovations such as the water-conserving methods utilized by indigenous Mayan communities in Guatemala. They have trained themselves with some outside help to harvest fog; in an area of poor rainfall, this fog harvesting system literally wrings “water out of the air.”<sup>742</sup> Similar systems now operate in Chile, Nepal, Yemen, and other countries.<sup>743</sup>

For those naysayers who might argue that it would be much too expensive to provide clean water and adequate sanitation on a universal basis, one could suggest that each day we pay far more in terms of the loss of health and well-being and livelihood for those who are unfortunately, by accident of birthplace, doomed to suffer this most fundamental of deprivations. United Nations Secretary-General Ban Ki-Moon, commenting on the consequences of water scarcity, said, “[S]hortages of water contribute to poverty. They cause social hardship and impede development. They create tensions in conflict-prone regions. Too often, where we need water we find guns.”<sup>744</sup>

Many experts have suggested that the solution to this crisis is as close as the nearest ocean. Desalination, the process of purifying salt water and converting it to fresh water, is already in use in some countries. Saudi Arabia has relied heavily on desalination and accounts for about a quarter of global capacity.<sup>745</sup> While this might appear to be an obvious solution to some, it has also raised environmental concerns. Desalination is expensive,

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<sup>740</sup> *Mexico City's Water Crisis*, *supra* note 177.

<sup>741</sup> *Id.*

<sup>742</sup> *Guatemala Combats Water Shortage*, ALJAZEERA (Mar. 3, 2012), <http://www.aljazeera.com/video/Americas/2012/03/20123394510299643.html>.

<sup>743</sup> *Id.*

<sup>744</sup> Ban Ki-moon, Secretary-General, United Nations, Address as Prepared for Delivery to the Davos World Economic Forum (Jan. 24, 2008) (news release available at <http://www.un.org/apps/news/story.asp?NewsID=25398&Cr=divos&Cr1=#.UnMKGBD3Nic>).

<sup>745</sup> Knight & Bakewell, *supra* note 251, at 20.

although recent innovations have made it economically more feasible. As we shall see, it also creates environmental problems related to energy and to waste product.

A large desalination plant was opened in London, England, in 2010, but it is so expensive to operate that it only runs during periods of drought.<sup>746</sup> However, many countries may find this may be their only option to access water for their populations. Environmentalists objected strenuously to the introduction of desalination of seawater in Barcelona, Spain.<sup>747</sup> Joan Armengol, professor of Ecology at the University of Barcelona, pointed out that desalination plants consume considerable energy, and she commented, "Just as we have a shortage of water, we have a shortage of energy in Spain."<sup>748</sup> However, there has been some success with desalination. Perth, Australia, was compelled to turn to this system in 2007 and regularly generates a third of its water supply by purifying sea water.<sup>749</sup> Perth has utilized wind and solar energy to power the desalination plants.<sup>750</sup> Although this system has been utilized in Israel and in the Persian Gulf,<sup>751</sup> the energy costs are still high and environmental objections about the waste from the plants are justifiable. Once the water has been purified, something has to be done to dispose of the enormous pile of leftover salt and brine. Dumping it back into the ocean could imperil marine life and that poses another threat.<sup>752</sup> These environmental consequences will need to be addressed so that the desalination process becomes much cheaper and the disposal of waste more environmentally sustainable.

The poster child of effective and efficient water solutions has to be the island nation of Singapore. Singapore utilizes a combination of reservoirs, recycling of rainwater that flows into city sewers, desalination, and purification of household waste water specifically for industrial use.<sup>753</sup> This small island state is one of the world's most efficient with respect to water conservation, relying on extensive educational programs, high water taxes

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<sup>746</sup> Barford & Everitt, *supra* note 732.

<sup>747</sup> Abend, *supra* note 309.

<sup>748</sup> *Id.*

<sup>749</sup> See Michael Sullivan, *Australia Turns to Desalination Amid Water Shortage*, NPR (June 18, 2007), <http://www.npr.org/templates/story/story.php?storyID=11134967>.

<sup>750</sup> *Id.*

<sup>751</sup> Hamilton, *supra* note 248.

<sup>752</sup> Barford & Everitt, *supra* note 732.

<sup>753</sup> See generally *Singapore: Water Scarcity Prompts Water Self-Sufficiency*, WWF GLOBAL (Mar. 1, 2012), [http://wwf.panda.org/what\\_we\\_do/footprint/cities/urban\\_solutions/themes/water/?204587](http://wwf.panda.org/what_we_do/footprint/cities/urban_solutions/themes/water/?204587).

and state of the art technology in this all important task.<sup>754</sup> Heavy water usage is penalized via a tiered pricing structure.<sup>755</sup> The result has been a daily per capita consumption in Singapore of only 155 liters,<sup>756</sup> which serves to sustain “one of the highest standards of living on earth.”<sup>757</sup>

Singapore is a working example of what can be achieved globally someday. If we can but find the will to work collectively and with commitment to bringing clean water and adequate sanitation facilities to all people in the world, the consequences cannot but be progressive in all realms of life. Author Alex Prud’homme emphasized that now there is knowledge about human impact on water and information about ways to mitigate that negative impact. “What’s lacking,” wrote Prud’homme, “is the will to do something about it.”<sup>758</sup> He also referred to Albert Einstein’s famous words: “Those who have the privilege to know have the duty to act.”<sup>759</sup> On an optimistic note, Peter H. Gleick commented that “although there is no shortage of global freshwater problems, there is also no shortage of innovative solutions to those problems, if we can only find the commitment and will to implement them more consistently, broadly, and rapidly.”<sup>760</sup>

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Given the many facets and aspects of the water crisis, it is virtually impossible to present a detailed blueprint in an article limited by length constraints. However, it is essential that at this stage, we attempt to move the water issue forward and find pragmatic ways of achieving this. The endless bickering and conflict have served to draw global attention to the problems involved. Might there now be a chance to reach some form of agreed, participatory fulfillment of the promises so that the inequities that cause so much ill health and death, especially for children, can be removed? Having gone through years of confrontation and tension and not yet achieved full global access, it might be timely now to change direction and search for constructive solutions. Although the following ideas cannot claim to be

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<sup>754</sup> Alex Prud’homme, *No Time To Waste*, in *LAST CALL AT THE OASIS*, *supra* note 4, at 79.

<sup>755</sup> *Water Pricing in Singapore*, PUB (Sept. 30, 2013), <http://www.pub.gov.sg/general/Pages/WaterTariff.aspx>.

<sup>756</sup> *Singapore: Water Scarcity Prompts Water Self-Sufficiency*, *supra* note 753.

<sup>757</sup> Hamilton, *supra* note 248.

<sup>758</sup> Prud’homme, *supra* note 754, at 82.

<sup>759</sup> *Id.*

<sup>760</sup> *Id.*

either comprehensive or to provide solutions for every contingency that may arise, at the very least they demonstrate that there exists now a body of principle that can guide us all in this endeavor. The aim of this section of the Article is to elucidate the underlying ideas, aims, and principles that could guide a more detailed blueprint to be produced by the technical experts, scientists, engineers, and others who can combine their expert knowledge and global experience to appreciate what works and what does not. The approach is holistic, participatory, aimed at harmony rather than acrimony, intended to be inclusive rather than exclusive and hopefully will reduce the numbers of the deprived to zero.

Our first priority in creating this blueprint of principles is to lay the ethical foundation for the fair and equitable use of water. While emphasizing the priority of those in the developing world who have no access, this principle would also include a much-improved system for the developed world. Our ethical vision was eloquently articulated by Dr. Gro Harlem Brundtland, Director-General of the World Health Organization, who said: "A safe water supply and adequate sanitation to protect health are among the basic human rights. Ensuring their availability would contribute immeasurably to health and productivity for development."<sup>761</sup> These words are universally applicable.

While environmental rights were initially deemed aspirational rather than legally binding, they have been progressing—albeit slowly—towards the justiciable status held by the first generation human rights, which are civil and political. One principle of an ethical blueprint would be to move forward in that progressive direction at a more rapid pace. Not only would such a process of advancement provide a quicker resolution to the water crisis, but it could galvanize governments to act more decisively to meet the Millennium Goals. If environmental rights can compel governments not just to mouth platitudes but to act on binding commitments and deadlines, that would hopefully resolve this crisis. The evolution of human rights must include an emphasis on accountability. Absent that, there is no incentive for political leaders to fulfill their promises.

The intensive research for this Article leads to the conclusion that water in every society ought to remain a public source if the attendant human right is to be fulfilled at any time. Although as we have seen, some scholars have found it possible for private ownership and universal access in human rights terms to co-exist, I am not convinced that this can occur, given the required

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<sup>761</sup> KHOSLA & PEARL, *supra* note 137, at 2 (statement of Dr. Gro Harlem Brundtland).

profit-making priorities of any private enterprise and the many incidents in Bolivia and other countries in the recent past. Robert Sandford aptly commented that “markets are excellent servants but poor masters.”<sup>762</sup> Although private enterprise has generated so much global economic growth, there is historical and traditional reverence for water that cannot be wrenched out of the hearts of people across the globe. Water is spiritually perceived in some ancient societies as a direct gift from the Gods. It has aptly been termed the “lubricant of our lives.”<sup>763</sup> Its transference to inevitably wealthy private interests, particularly external multi-national corporations can only result—as has happened—in nationalistic, almost xenophobic outbursts that cannot be productive either for the community or for the governance of water. As the Pacific Institute aptly concluded, “privatization is not the bright line dividing success and failure in municipal water systems.”<sup>764</sup> Privatization has frequently resulted in significant cost increases for the consumer and this, in poor countries, has created additional burdens. When there have been disconnections from supply for those who have not paid their water bills, the anger and sense of injustice can become exacerbated and this has led to violence on occasion. There is, as we shall see later, an important role for private industries to play, but ownership of water sources should not be part of their remit.

While remaining under public ownership, it is necessary to protect and safeguard water for future generations. Gone are the days when wastage of water did not matter. Every drop is now valuable and this resource should not be simply eternally consigned to the realm of free bounty to be used at will. Wastage has to be seen as more than mere carelessness. It has to be perceived as economically and socially irresponsible and as an infraction.<sup>765</sup> I would go farther and deem it negligence. While the law may never catch up with such concepts, public opinion can generate a sense of guilt about the misuse of water that is seriously needed in many parts of the world.

A mind-change is also required in public perceptions of water. The present attitudes were forged over centuries when water was a free resource. This led to a strange all-too-human combination of reverence and negligence toward water. If now, the world can view water with the same awe as it

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<sup>762</sup> SANDFORD, *supra* note 188, at 33.

<sup>763</sup> FISHMAN, *supra* note 1, at 297.

<sup>764</sup> *Issues We Work On: Water Privatization*, PACIFIC INSTITUTE, <http://www.pacinst.org/issues/sustainable-water-management-local-to-global/water-privatization/> (last visited Oct. 31, 2013).

<sup>765</sup> See generally SANDFORD, *supra* note 188, at 200.

perceives gold or diamonds, this necessary mental and psychological adjustment might improve the situation. With respect to the quantity of water required, the World Health Organization indicated that each person requires daily between 50 and 100 liters of water for basic needs.<sup>766</sup> This is why it would be timely to place a charge on water, not merely on its delivery but on the resource itself. Every commercial and residential user should install water meters. The United Nations Development Programme has suggested that the cost of water should not exceed 3% of household income.<sup>767</sup> To induce careful usage, each customer could utilize an initial amount of water at a greatly reduced price. As water use increases, the price per unit should increase as well. Both commercial and residential customers should be treated equitably with no write-offs or such inducements to business because these only increase suspicion of collusion between governments and private enterprises. Transparency in water management has to be the key to access to and delivery and safeguarding of water supplies.

The funds garnered by municipalities from water taxes ought to be directed back into water-related and sanitation improvements and pollution clean-up and control. From the public relations perspective, it is imperative that people are made to see that their water tax funds a better environmental future.

Although Israel's water issues with respect to its Palestinian neighbors are highly controversial, its internal advancements in terms of water conservation provide interesting guidelines for the rest of the world. The Government of Thailand paid close attention to Israel's allocation of 80% of treated waste water for irrigation, 90% usage of drip irrigation in agriculture, removal of government subsidies and charges for water use<sup>768</sup>—all ideas that could be replicated with economic and environmental benefits in other societies.

An ancillary principle that is useful in this blueprint that aims at new attitudes as much as it emphasizes new practices borrows from the wording of General Comment No. 15 which states that the "right to water contains both freedoms and entitlements."<sup>769</sup> Comment No. 15 explores these ideas:

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<sup>766</sup> *The Human Right to Water and the MDGs*, in THE HUMAN RIGHT TO WATER AND SANITATION (2012), [http://www.un.org/waterforlifedecade/human\\_right\\_to\\_water.shtml](http://www.un.org/waterforlifedecade/human_right_to_water.shtml).

<sup>767</sup> *Id.*

<sup>768</sup> *Water Secrets From Israel*, BANGKOK POST (Mar. 11, 2011), <http://www.bangkokpost.com/learning/learning-from-news/226167/water-secrets-from-israel>.

<sup>769</sup> General Comment, *supra* note 534.

“The freedoms include the right to maintain access to existing water supplies . . . and the right to be free from interference, such as the right to be free from arbitrary disconnections or contamination of water supplies.”<sup>770</sup> Comment No. 15 elucidates the entitlements as including “the right to a system of water supply and management that provides equality of opportunity for people to enjoy the right to water.”<sup>771</sup>

All too frequently, water becomes a problem because of poor governance, corrupt officials, inadequate management structures, lack of established structures for the daily running and maintenance of infrastructure, and the absence of fair processes to handle complaints. These are all areas where the developed world could help developing nations, provided of course, that the assistance is given with due respect for the way of life of the recipients. Our emphasis has to be on our attitude. A patronizing approach is no longer acceptable. Condescension only breeds resentment. Collaborative, inclusive governance is the key to providing meaningful aid to reforming water delivery systems. Dr. Richard Leakey, Board Chair of TI-Kenya eloquently explained the need: “Improving governance in water services is not just about government systems and capacities.”<sup>772</sup> Dr. Leakey added:

[i]t is about a range of non-state agents and their interaction with the government. It is about engaging civil society and establishing a functioning social contract between the government and its citizens to bring about effective basic services. And it is ultimately about the progressive achievement of agreed rights to water.<sup>773</sup>

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The private sector has a vital role to play in the delivery of water supplies and should be encouraged to participate with a fair return on capital investment, a more transparent and publicly accountable process of construction and other projects. There are great opportunities for business to become a part of the solution to this problem while revitalizing an image of

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<sup>770</sup> *Id.*

<sup>771</sup> *Id.*

<sup>772</sup> *Keep the Tap Flowing: Strengthen Transparency, Accountability and Participation mechanisms to Improve Access to Water*, TRANSPARENCY INTERNATIONAL KENYA (Dec. 7, 2011), [http://www.transparency.org/news/pressrelease/20111207\\_improve\\_access\\_to\\_water](http://www.transparency.org/news/pressrelease/20111207_improve_access_to_water).

<sup>773</sup> *Id.*

public service and making a fair profit. The research for this Article indicated a realization on the part of some multinational and national corporations that in the market place, reputation is as important as profit. The initiative of the private sector could play a very significant role in the production of innovative water conserving and water cleaning technologies. Businesses are already researching in the field of crops that consume less water. Many countries will require infrastructure to connect thousands of people to running water and sewage. There are extensive opportunities in the recycling of water, using it for industry, agriculture and for urban landscaping. The restoration of rivers, lakes, ponds, and wetlands will require the innovative skills of business combined with the ingenuity of scientists and inventors.<sup>774</sup> A harmonious approach linking public interests and private initiatives could work, provided the ultimate goal of community betterment is at the forefront of concern.

In the past, corporate entities have been demonized as a major contributor to the “problem.” If instead, with firm ground rules, we include the corporate world as part of the solution,<sup>775</sup> everyone benefits. As Chartres and Varma have pointed out, “[a]lthough water does fall from the sky as a free good, it can be a very costly exercise to build the necessary infrastructure (dams, canals, pipelines, pumping stations, boreholes, water purification plants, and so on) to deliver it to users and to maintain such infrastructure for years to come.”<sup>776</sup> There is definitely an important role for the private sector. However, as Charles Fishman explained:

While it’s important that companies are leaping into the water business, while it’s impressive that they are providing leadership and pursuing innovation and even a vision for the future, it’s also vital not to let businesses get so far ahead that we cede the future of water to commercial interests.<sup>777</sup>

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<sup>774</sup> Stakeholder Briefing Notes, U.N. Econ. & Soc. Council, U.N. World Water Assessment Programme, Division of Water Sciences, [http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/02\\_WWAP\\_BN\\_Finance\\_WEB.pdf](http://www.unesco.org/new/fileadmin/MULTIMEDIA/HQ/SC/pdf/02_WWAP_BN_Finance_WEB.pdf).

<sup>775</sup> With apologies to the Rocky Mountain Institute, from its Guiding Principles that states: “We view the corporate world, which environmental groups often dismiss as ‘the problem,’ as an essential part of the solution.” *Guiding Principles*, ROCKY MOUNTAIN INSTITUTES, <http://www.rmi.org/Guiding%20Principles> (last visited Jan. 17, 2014).

<sup>776</sup> CHARTRES & VARMA, *supra* note 101, at 157.

<sup>777</sup> FISHMAN, *supra* note 1, at 142.

A sense of balance is required to utilize but not be overwhelmed by business priorities because, after all, water is not an ordinary commodity. As the elixir of life, it plays a very special and unique role in the world.

The answer lies in careful regulation which has to be carried out by governments at every level, municipal, provincial and federal. Hopefully, monitoring of bureaucrats will alleviate the ills caused by corruption. If corporations refuse to accede to corruption, then bureaucrats have no opportunity to line their pockets. The production of standardized regulations applicable universally with acknowledgement of local context and conditions can have a salutary impact. The Global Water and Wastewater Quality Regulations 2012 is the first complete roadmap to regulatory standards and frameworks across the world, providing relevant data for drinking water and wastewater.<sup>778</sup> This important document “will be pithy reading for water technology companies, monitoring equipment providers, policy makers and water utilities, and contractors and investors.”<sup>779</sup>

Indian environmentalist Vandana Shiva once commented that “[w]hen you function in an ecological paradigm you value water but you don’t price it. Because it is in fact priceless. In a market paradigm you price water but you don’t value it.”<sup>780</sup> The comments are indicative of the polarization created by the public versus private conflicts that erupted in so many places, notably, Cochabamba, Bolivia. With the benefit of hindsight, now a pragmatic approach might suggest a paradigm in which water is valued and priced: valued through extensive, individual and community efforts at conservation and preservation; priced to ensure that sufficient access is available universally to implement its status as a human right, but also to ensure that this precious resource is respected and not wasted. This would probably answer those who have insisted on converting water into a commodity and removing heavy subsidies. They have complained that absent that reclassification, there has been overuse, with no motivation for efficiency.<sup>781</sup>

Regardless of the system to be followed—and this will vary from community to community, as there can be no one type fits all solution—the

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<sup>778</sup> *Regulations and Better Enforcement Will Boost Water Market Growth*, GLOBAL WATER INTELLIGENCE (Oct. 13, 2011), <http://www.globalwaterintel.com/regulations-and-better-enforcement-will-boost-water-market-growth/>.

<sup>779</sup> *Id.*

<sup>780</sup> Interview by Nic Paget-Clarke, *supra* note 577.

<sup>781</sup> See Clare Davidson, *How Can Water Be Fairly Distributed?*, BBC NEWS, Feb. 2, 2009, <http://news.bbc.co.uk/2/hi/business/7773298.stm>.

needs of the poor must be a priority, even if it means providing them with a quota of free water. If their usage extends beyond that, then they should pay for the use. Simply to maintain the traditional notion of water as a free communal right, available to all, will only prolong the present mess afflicting most of the world, where self-centered priorities have led to over-exploitation, pollution, and degradation of the resource. For those able to pay, water should be metered and its usage tiered to encourage conservation. This would reverse the current situation prevalent in many countries where the poor pay far more both in fact and proportionally to their income than do the rich. Belgium provides a feasible solution for this particular injustice. The Water Code established a Social Fund for Water, to assist low income earners to pay their water bills, which is sustained by taxes on water consumption to assist low income earners to pay their water bills.<sup>782</sup> There is also a progressive pricing plan and a refund for the poorest of the sanitation tax.<sup>783</sup> Another regional tax provides a fund to assist developing countries with water projects.<sup>784</sup>

Extensive efforts will also have to be made to pressure political leaders into paying more than lip service to the resolution of the water and sanitation crises. "The allocation of scarce resources is a political problem that must consequently be dealt with at the political level."<sup>785</sup> Ultimately, it is up to the governments to lead the way: to legislate and regulate the participants, engage the community, organize national and international funding, oversee the building of infrastructure, establish equitable and fair pricing and charges, and put in place effective and efficient systems for the future management of water systems. When Governments are loath to perform any or all of these tasks, it has to be up to the people to push them in the right direction.

There are no people more susceptible and more sensitive to their public persona than politicians. In the world's most populous democracy, India, the importance of water to the public was duly noted by electioneering candidates. As Indian journalist Afshan Yasmeen wryly noted: "[n]ever has drinking water been such an important part of political manifestos. With the demand going up exponentially every summer, the election season has seen

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<sup>782</sup> See "Belgium" in UNESCO, *supra* note 516, at 10.

<sup>783</sup> *Id.*

<sup>784</sup> *Id.*

<sup>785</sup> BOURQUAIN, *supra* note 632, at 6.

this basic necessity pitch-forked into the top slot in the list of promises.<sup>786</sup> Indeed some candidates distributed water to arid areas in tankers displaying the political party symbols along with an appeal for votes.<sup>787</sup>

This new millennium has already demonstrated the impact and importance of “people power.” Clearly, there is now a strong desire to insist on leaders being accountable. Dictators just do not seem to inspire the same degree of terror they once did. Egypt, Libya, and Syria are prime examples of this new trend. Young people with a grievance have gathered by the thousands in public squares and made their voice heard. Overcoming decades of fear of oppressive establishments, people are now clamoring to have a voice, to see an end to corruption, to witness the demise of tyranny and to gain a measure of economic stability. There is a new emphasis on democratic values even in countries that have never known the formal processes of democratic government. There is a compulsion, especially among the young, to participate and to make a difference. This is so encouraging to behold. In this new millennium, people are not as accepting of oppression as they were in the twentieth century. Government has to seem to be listening to the people if it wants to survive. This articulation has become very pronounced in Africa where the immense and intense suffering of water deprived people is no longer viewed as tolerable. Nelson Gomonda, Pan Africa Manager for WaterAid, suggested that “[i]f African leaders are sincere about stopping millions of needless deaths, they must follow their consciences and deliver on the promises they have made.”<sup>788</sup>

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There is a tangible link between access to water in the developing world and security from terrorism in the developed world. Although that subject could be better explored in a book, it is useful here to touch on the topic briefly to explain that some of the frustration and rage that afflicts many of the so-called politically unstable societies, springs from inequitable access to water and other necessities of life. In 2009, Abdulrahman Al Eryani, Yemeni Minister of Water and Environment, pointed out that the water crisis

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<sup>786</sup> Afshan Yasmeen, *Water is the New Carrot*, HINDU (May 4, 2013), <http://www.thehindu.com/news/cities/Bangalore/water-is-the-new-carrot/article4677684.ece>.

<sup>787</sup> *Id.*

<sup>788</sup> *Voices on the Ground in Africa Demand Governments Walk the Talk*, FRESHWATER ACTION NETWORK, <http://www.freshwateraction.net/content/voices-ground-africa-demand-governments-walk-talk-santiation> (last visited Jan. 17, 2014).

and the rise of militancy are related perils, because much of the militancy in his country was essentially “a conflict over resources.”<sup>789</sup> Researchers from Sanaa University in Yemen estimated that between 70% and 80% of rural conflicts in that war-torn land were related to water.<sup>790</sup> Those regions most prone to aridity, drought and serious water scarcity also suffer from excruciating poverty, malnutrition and disease and also seem to generate some of the world’s most violent conflicts. The violence in Sudan, Afghanistan, Chad, Ethiopia, Pakistan, and Somalia<sup>791</sup> is regularly reported on our television screens. Katherine E. Bliss, Director, Project on Global Water Policy for the Center for Strategic and International Studies, testified before the Tom Lantos Human Rights Commission of the United States Congress in 2011 to emphasize the violence that targeted women who had to trek long distances for water collection.<sup>792</sup> According to Bliss, in Somalia, armed gangs took control and limited public access to water sources.<sup>793</sup> The terrible tragedy of Somalia—its descent into lawless piracy—is fundamentally an environmental problem.<sup>794</sup>

Water also becomes a victim of violent conflict. During the 1994 genocide in Rwanda, the perpetrators threw the butchered bodies of hundreds of men, women, and children into water sources. An environmental crisis accompanied the genocide as water sources became severely polluted.<sup>795</sup>

In a very real sense, if we in the developed world want to restrict and curb and hopefully even decimate terrorism, then we must provide proactive, productive and progressive solutions for issues like the water crisis. The period since 9/11 has established that every terrorist killed or captured is quickly replaced by another five or ten or more. This war against terrorism could literally go on forever, unless we in the developed world drastically rethink our strategies. If, for example, we retain our military strength but pair it with far greater emphasis on economic and ecological advancements

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<sup>789</sup> Laura Kasinoff, *At Heart of Yemen’s Conflicts: Water Crisis*, CHRISTIAN SCI. MONITOR (Nov. 5, 2009), <http://www.csmonitor.com/World/Middle-East/2009/1105/p06s13-wome.html>.

<sup>790</sup> *Id.*

<sup>791</sup> Jeffrey D. Sachs, *Crisis in the Drylands*, SCI. AM. (Jan. 17, 2008), <http://www.scientificamerican.com/article.cfm?id=crisis-in-the-drylands>.

<sup>792</sup> Realizing the Right to Safe Water and Sanitation: hearing before the Tom Lantos Human Rights Commission, 112th Cong. (Mar. 3, 2011) (statement of Katherine E. Bliss, Director, Project on Global Water Policy, Center for Strategic and International Studies).

<sup>793</sup> *Id.*

<sup>794</sup> See Rane K.L. Panjabi, *The Pirates of Somalia: Opportunistic Predators of Environmental Prey?*, 34 WM. & MARY ENVTL. L. & POL’Y REV. 377–491 (2010).

<sup>795</sup> See Donnelly et al., *supra* note 76.

in such societies, we can demonstrate that our priorities are in tandem with bettering less-developed countries. Ultimately, the developing world's environmental security will become the developed world's political security. Developing countries will understand that we in the developed world welcome their success and do not view it as threatening. We in the developed world need to work really hard to convince the developing world that we are not interested in exploiting them, but in working with them to uplift all of humanity. We have to get past their long-standing perception of Westerners as predatory economic colonialists. Naysayers may argue that this is naïve and not feasible. However, the more self-centered and self-absorbed western policies have not yielded positive results. They have only served to exacerbate the rage and hatred against the developed world; increased the sense of injustice; fuelled the grievances grounded in inequity and prolonged terrorism, guerrilla war, and fear and instability in our world. While the developed world must look to its own interests, it cannot simultaneously prattle about a dedication to a globalized world and yet behave in an egocentric localized manner. That is the ultimate hypocrisy and the rich nations have to understand very urgently that the poor nations are no longer willing to be exploited, extorted, used, or abused.

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The nexus between water deprivation and poverty is self-evident. In almost every developing country in the world, the poor have the least access to clean water and adequate sanitation and they pay the most for any access. When there are floods, their slum dwellings are the first to be washed away; when there is drought, they cannot afford to pay the higher prices for water to drink. In urban and rural areas the poor suffer. The story of water weaves a saga of everyday injustice and daily deprivation. Lacking clean water, the poor fall ill and often they die miserably because they cannot afford healthcare. It is imperative that a foundational principle of any blueprint toward resolution of the water crisis pay primary attention to the needs of the poor to ensure that they have fair—even free—access to a reasonable amount of clean water and do not have to walk hours or carry back-breaking loads just to obtain drinking water.

As women and girls have been shown to suffer the most from the water crisis, it is only fair that their concerns, fears and interests be primary in the minds of those who seek to implement solutions. Women need to be part of the decision-making in every aspect of this process of resolution. This

principle, still so short on implementation, was articulated in the Agenda 21 document that accompanied the 1992 United Nations Conference on Environment and Development held at Rio de Janeiro, Brazil. The Earth Summit at Rio called for women's participation at every level of planning with respect to water supply and sanitation.<sup>796</sup> The importance of women in any water issues has also been acknowledged at the 2001 International Conference on Freshwater, held at Bonn, Germany. At this Conference delegates believed that "water policies and water management systems should be gender-sensitive."<sup>797</sup>

As the providers of water in almost every household, women are keenly tuned to its quality and quantity and the first to notice water problems. India's prominent environmental activist, Vandana Shiva said of women: "They are the canary of the eco-crisis."<sup>798</sup> As the primary domestic users of water, women have a vested interest in ensuring that the family has access to a clean, sanitary source; that drinking water is safe; that family members do not fall ill from contaminated water; that food preparation, laundry, house-cleaning, and other such tasks are enabled with clean water. The role of women is pivotal and should be respected and their input sought and heard. Any encouragement given to women to participate cannot but change the male/female dynamic in many of those traditional societies. An indirect but very important consequence of resolving the water crisis is the liberation of women, especially in rural communities, from the oppression of centuries-old but now largely irrelevant notions and attitudes. Clearly, women around the world are ready to embrace this change. Sughran Bibi, a resident of Jungle Barali, part of district Vehari in Pakistan, articulated this optimistic sentiment when she expressed her belief that "if people collectively struggle for the solution of problems, they can achieve any goal."<sup>799</sup>

It is also important that hygiene be incorporated into school curriculums universally and that it be stressed in primary, middle, and high school. Stressing hygiene in adult educational seminars in various communities, especially in rural areas and in urban slums, will inevitably cut down on the amount of disease and hopefully decrease the depressing statistic that

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<sup>796</sup> KHOSLA & PEARL, *supra* note 137, at 6.

<sup>797</sup> *Id.* at 4.

<sup>798</sup> Interview by Nic Paget-Clarke, *supra* note 577.

<sup>799</sup> *South Asian People's Perspective on Sanitation: Synthesis Review*, WATERAID, FANSA, AND WSSCC (2001), available at <http://www.wateraid.org/~media/Publications/south-asian-perception-sanitation.pdf>.

attributes 80% of all sickness in the world to unsafe water and sanitation.<sup>800</sup> As the majority of the world's poor are women, all these projects improve their lives and the well-being of their children.

Professor Anna Tibaijuka, the Minister of Land Housing and Habitation for Tanzania serves as Chair of the Water Supply and Sanitation Collaborative Council. She commented that money alone would not solve the problem and explained that “poor sanitation and hygiene is not poverty, it is a cultural behavior,” and hoped to introduce hygiene education into the core curriculum.<sup>801</sup> Awareness of the significance of hygiene provides not merely a cleaner human body and environment, but it also gives to communities the ability to discriminate between safe and unsafe sources of water. The poor in particular need to know when it is necessary to stand up to those water vendors who seek to exploit their ignorance or to cheat them with contaminated water that can cause illness and death.

It is not just that there must be equal and fair access to water, there has also to be equitable participation in decisions taken about water management. In many parts of the developing world, women work not just in the home but are also running farms. Where men are forced to migrate to urban centers in search of paid work, women manage the family property and many scholars have found they get short shrift from male-dominated village councils when decisions are made about water and sanitation. Chartres and Varma have justifiably pointed out that “women are involved in food production and play a large role in agriculture and as users of water.”<sup>802</sup> It is only appropriate that women are provided with the opportunity to present their ideas not merely for the domestic use of water but for its agricultural use as well. That way the entire community can benefit from their experience and expertise.

The water crisis will not be resolved until humanity undergoes a mental change in approach and attitude to this most precious of resources. Many of the world's religions revere the gift of water and incorporate water into customary practices, rituals and festivals. However, in total contradiction to this overt reverence is humankind's wanton negligence in dumping sewage and industrial and agricultural waste into freshwater and causing toxic pollution that has virtually destroyed ecosystems in many parts of the world. We need to learn to value water as the life-giving resource that it is; to work

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<sup>800</sup> KHOSLA & PEARL, *supra* note 137, at 4.

<sup>801</sup> WSSCC Chair and Executive Director Meet the Press in Tanzania, *Discuss Global Sanitation Fund and New Safe Water Initiative*, WATER SUPPLY & SANITATION COLLABORATIVE COUNCIL (Jan. 28, 2013), <http://www.wsscc.org/print/5157>.

<sup>802</sup> CHARTRES & VARMA, *supra* note 101, at 202.

collectively to protect it; to ensure that we save and conserve every precious drop; and to dedicate ourselves and our communities to ensuring that every member of society becomes “water-conscious” in daily actions. The prime need is to educate young people so that future generations will not repeat our terrible mistakes. But “[e]ducation will not be successful if it is only conducted in the classroom. It must be integrated into all forms of popular culture and entertainment and become the responsibility of every member of the community.”<sup>803</sup>

## XX. CONCLUSION

When in 2010, the United Nations General Assembly decided that 2013 would be the International Year of Water Cooperation,<sup>804</sup> it expressed its concern about the slow and uneven progress being made in achieving the target of halving the number of people without access to clean drinking water and basic sanitation. The General Assembly also explained the importance that a year of international cooperation could play in this matter.<sup>805</sup> Within that context, hopefully this Article has elucidated some selected aspects of this vast global crisis, presented illustrative examples and demonstrated that the time for polarized positions has past. All the bickering has only generated more suspicion, defensiveness and some really unnecessary posturing. As we have seen by analyzing some international instruments, there is sufficient backing in international law and principle for timely resolution of this crisis. There is obviously support from the very articulate non-governmental organizations and community groups that are working hard around the world to solve this crisis, one village at a time. It is timely now for the world to actually cooperate and act quickly and with commitment to ameliorate the plight of the millions who suffer daily because they do not have either clean water or basic sanitation. The time for recrimination, blame and controversy has now to give way to a joint mobilization of the world’s best minds and hands and resources to bring an end to this crisis that shames us all, especially those of us who have never suffered the indignity and misfortune of being its victims.

The aim of this Article was to determine the scope of the crisis and gauge whether solutions to the world’s water crisis could be urgently implemented.

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<sup>803</sup> Pereira et al., *supra* note 189, at 253.

<sup>804</sup> G.A. Res. 65/154, U.N. Doc. A/RES/65/154 (Dec. 20, 2010).

<sup>805</sup> *Id.*

The intensive research into this very complex and multi-faceted subject has proven that there are as many available solutions as there are problems with respect to the water crisis. There is no dearth of ideas; the world's scientists have invented a range of mechanisms and have come up with many feasible and innovative methods to resolve the problem. These innovative ideas provide a variety of interesting solutions from crops that require less water to improved types of irrigation; from efficient treatment of sewage that generates energy to safer methods of cleaning polluted water. The number of these new ideas cannot but lead to the realization that where there is a will, there is definitely a way.

There is no intent in this Article to comment with approval or disapproval of the various technologies, devices and methodologies for improving water delivery or the systems for water and sewer management. That should remain the domain of the engineers, hydrologists, and technical and scientific experts. It is clear that there is a very impressive array of ideas and fascinating inventions that are feasible, pragmatic and financially practical if the world could only find the collective will to utilize them and apply them. The vast number of methods used to access and conserve and clean water testify to the marvels of innovation that flow from human minds.

The water crisis serves as a mirror reflecting some of the worst features of human society: its carelessness, its greed, its neglect, and its obliviousness about future generations. It remains to be seen whether or not the evidence of acute human suffering can galvanize a global conscience to act effectively and with speed to resolve this crisis. If we can resolve that globalization in the twenty-first century is only credible if its benefits are universally applicable, then perhaps we can together utilize the existing technology, the local know-how, the business expertise, and the scores of other forms of relevant knowledge to bring an end to this terrible tragic crisis that is daily killing so many people. Dedication to some or all of the principles studied in this Article would provide the ethical foundation to promote a sense of collective conscience and collaborative conscientiousness about this crisis.

The businesses of the world—many of them now more mindful of the importance of their corporate reputation—have the talent and the expertise to assist in this global process while acquiring a fair profit within the boundaries of sensitivity to human rights and environmental sustainability. The governments of this world, well aware of the need to pay more than lip service to democracy, are increasingly realizing that tyranny and corruption destroy the leadership both nationally and internationally. While anomalous governments like North Korea's may continue for some brief time, the fact is

that tyrannous countries are perceived as oddities in a world where globalized media, the internet, and social networks provide linkages between people that never existed in the past. With all this technology, we are all cooperating in many realms undreamed of in the past. What is now needed is global cooperation on the issue of water and sanitation, and what an achievement it would be if this era could take credit for resolving this tragic problem.

So the hope, through this lengthy research was to determine whether this serious deprivation of the most essential ingredient for human life could become a problem of the past. The answer is a cautious and tentative yes. What is needed is not the tools; we have those. We also have the energy. If we can afford to send astronauts into outer space, many nations can certainly afford to provide clean water to their populations. It is, after all, a matter of priorities.

What has been lacking lamentably is the will to attack the problem with gusto and get it resolved. Numerous authors studied for this project wrote about the need for the political will to act and move resoundingly and with speed to deal with this crisis. In a nod to their collective wisdom, this Article endorses their conclusion and articulates it as the most important element.

There are many forms of injustice prevalent in our world today, many egregious violations of rights in every sphere, political, economic, and social. The cumulative picture is of a very depressing world situation. That could be one perspective. On the other hand, because of the inventions and innovations of our era, our collective awareness of individual and group suffering has grown to a level unimagined in the past. People no longer suffer in silence and there are ways now, never dreamed about in the past, to make any voice heard and any plea for justice disseminated across the globe. If this collective awareness can transcend further and be enhanced into a greater collective conscience, then there are no limits to what we might yet achieve. For the first time in history, the internet and social media have managed to create a globalized society that can respond instantaneously to crises in faraway places. Never in history has an individual with a justifiable complaint had as much reach as occurs today. And so an inequity that burdens a community can quickly galvanize a nation and even the entire world.

Resolution of the water crisis and the sanitation problem are not beyond human capacity. The science and technology exist now, the evidence of human suffering caused by deprivation of water is visible for anyone who wants to explore this subject. The need now is to galvanize the conscience of

the world to force our establishments and governing structures at every level, municipal, provincial, federal, and even international to act decisively and to make this a priority. There can be no argument against the idea that clean water is essential for all life on this planet. There is therefore no priority of greater importance. We need to use the collective conscience of the world to promote action and to reject any excuses or delays. Koichiro Matsuura, Director-General of UNESCO, emphasized the need to appreciate that we are trustees for a water resource that has to be preserved for the future. He added: “We have moved beyond the need for declarations and statements. The priority now is for action.”<sup>806</sup>

There has been far too much bickering that has blocked and often prevented constructive action of this crisis. The controversies have so dominated the issue that the vast human tragedy that affects millions of deprived people every day of their lives has been overlooked. As we have seen, the bickering has been on so many planes: between private and public ownership; between countries sharing water sources; and among communities when water is exploited by one entity resulting in loss to another. It is imperative that the world move to a more harmonious, less confrontational position geared to saving this vital resource. The Office of the High Commissioner for Human Rights articulated the situation clearly and coherently: “Steps must be taken to ensure that the sufficiency, safety, affordability and accessibility of water are protected from interference as well as ensuring that everyone will enjoy the right in the shortest possible time.”<sup>807</sup> All these forms of confrontation have served to misdirect humanity from the main goal, which must be to rectify the situation immediately for those who have no clean water and inadequate sanitary facilities. Their daily suffering is a terrible reflection on all of us who have the luxury of taps and flushes and immediate access to clean water. Because many of them are too poor, too ill, or too ground down by the tribulations of life, it is surely up to us to become their voice and to articulate their vital needs. Journalist William Wheeler’s words about the inequitable situation in Haiti can easily be applied to the entire world: “The gap between the water rich and the water poor is often the line between life and death.”<sup>808</sup>

For far too long, this crisis about a vital necessity of life has generated polarized positions, self-justificatory pronouncements, angry denunciations,

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<sup>806</sup> UNESCO and the Human Right to Water, *supra* note 516, at 6 (citing Matsuura, *supra* note 674).

<sup>807</sup> Office of the High Commissioner for Human Rights, *supra* note 650.

<sup>808</sup> Wheeler, *supra* note 11.

and endless arguing and posturing by participants from all sides. It would be timely now to get past this negativity that has delayed resolution for so long and feel instead a collective sense of guilt that people are daily getting ill and often dying because of our neglect. One can only hope that a renewed sense of responsibility and commitment might galvanize all of us to do whatever we can to end this terrible crisis. Although this may sound harsh to some, it is imperative that we appreciate that any one of us, but for the grace of birthplace and economic status, could be a victim of that tragedy. Even more compelling, if so many people, especially children were dying from political conflict, we might call it a genocide, a political crime. Because they die instead from global neglect of their need for water—an environmental issue—their passing is not deemed criminal. Death from political warfare or death from environmental neglect is still death. In the case of children, such loss is more than tragic. Annually, through this crisis we lose 1.5 million children.<sup>809</sup> This entire crisis is a terrible commentary on a world that can establish stations in space but will not ameliorate the living conditions of these millions of people on Earth.

It might be timely now to redirect our massive collective global energy to a more constructive and productive end, namely the resolution of this crisis. That resolution would require participation by all actors who can contribute: the public sector for its regulations, laws, and oversight; the private sector for its inventions, research and efficiency; scientists and professors for their research and their ideas; communities from the village level upward to regional entities for their vast experience and on-site knowledge; non-governmental organizations for their passion and dedication and successful fund-raising; the United Nations for its articulation in words—albeit endless words—of the principles to guide our path. Indeed, the United Nations has to play a pivotal role in alleviating the suffering and finding ways to resolve this water crisis. UNESCO-IHE Rector, Andras Szollosi-Nagy predicted that in the future water would function as a peace-builder rather than as a primary source of conflict. Hopefully, the Rector's words will inspire constructive solutions: "Part of the U.N.'s efforts in upcoming years will be to try and turn potential conflict surrounding water scarcity into avenues of cooperation."<sup>810</sup> U.N. Secretary-General Ban Ki-moon emphasized the relevance of 2013 as the year for international dedication to water

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<sup>809</sup> Palaniappan et al., *supra* note 110, at 61.

<sup>810</sup> *Kick-Off International Year of Water Cooperation*, UNSECO-IHE INSTITUTION FOR WATER EDUCATION (Feb. 11, 2013), <https://www.unesco-ihe.org/news/kick-international-year-water-cooperation>.

cooperation. “Water is central to the well-being of people and the planet,” he said, adding “We must work together to protect and carefully manage this fragile, finite resource.”<sup>811</sup>

Everyone can be an active participant and gain from being on the team. On the practical side, this is environmentally a great gain for the planet. Pragmatically, this venture could provide thousands of jobs for a world still reeling from a recent economic crisis. For any naysayers who might wonder whether this is all not just a dream and quite unrealistic, one could suggest that every achievement in the history of humanity started as a dream. From a dream it became an ideal. From ideal it progressed to become an idea and then to an innovation or invention and ultimately to reality. Any student of history cannot but be aware of the contribution that dreamers and idealists have made to the story of humanity.

This is not a problem that we can go on shelving on some international “to-do” list. While it may be laudable that we have Millennium Goals and pat ourselves on the back when we advance toward those aims, is it not a pathetic reflection on all of us that universal access to this essential ingredient of life—water—has to be part of our agenda for future years?

If a more active international conscience develops on this issue, we might be in a position to do more than simply to stress the terrible numeric toll of illness and death caused by this problem. If we can publicize to a wide audience, and particularly to the younger people of our world, this terrible deprivation that is killing thousands every day, their energetic conscience might just induce and force the establishments to find the will to act. It is the young who will hopefully make this a better world and rectify so much injustice that earlier generations enabled or tolerated. It was encouraging to see the websites dedicated to informing young people about the water crisis. One can only laud the teachers who have found so important a way to contribute to educating those who will run our world in the future.

Mahatma Gandhi, a leader in the liberation of India from British rule, was a dedicated environmentalist, believing firmly that Nature should be asked to provide for humanity’s need, but not for its greed. Giving us the ultimate resolution for the global water crisis for a twenty-first century he did not live to see, Gandhi said that “the difference between what we do and what we are capable of doing would suffice to solve most of the world’s problems.”<sup>812</sup>

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<sup>811</sup> *World Water Day 2013: Water Sharing Key to Avoiding Water Wars*, WATERWORLD (Mar. 22, 2013), <http://www.waterworld.com/articles/2013/03/world-water-day-2013-water-sharing-avoiding-water-wars.html>.

<sup>812</sup> U.N. DEV. PROGRAMME, *supra* note 365, at 5 (quoting Mahatma Gandhi).

This Article has been a plea for a more inclusive as opposed to an exclusivist approach to resolution of the water crisis. It is so important to remember that this crisis results in a daily toll of human misery, illness and death that is unnecessary and cruel for its victims. That grim reality bears repeating and it should never be overlooked or forgotten. Because they are unable to do much to alleviate their suffering, it is up to us, all of us collectively and harmoniously, to work to resolve this issue in every part of the world. By placing the victims at the forefront of our concern, hopefully we subsume any thoughts of self-centered water usage; of opportunistic profiteering; of endless bickering and unhelpful recrimination. Victims of the water crisis are dying every day while the world mouths platitudes about their lot, pays lip service to their needs, and documents its resolve to help in international formulations that are meaningless unless they are acted upon with resolution and speed. Perhaps now, in this young century, we can dispense with the acrimony, promote greater harmony, and hopefully do our best to ensure that access to water as a human need and a human right becomes a universal human reality.