

WATER, PEACE, AND WAR: CONFRONTING THE GLOBAL WATER CRISIS

Brahma Chellaney

The inaugural issue of Asia Pacific Peace Studies journal features a selection of publications and public initiatives sponsored by the Asia Pacific Peace Studies Institute (APPSI) in the three years since its inception in 2013. One of the first events APPSI co-hosted (with JPRI and the Asia Society Northern California) was a talk by Dr. Brahma Chellaney on his latest book, Water, Peace, and War: Confronting the Global Water Crisis. In the present context of continuing draught in California and reports of dropping water tables all over the world, APPSI considers Water, Peace, and War essential reading. We are grateful to Dr. Chellaney for granting us permission to publish the following article, which is adapted from the introduction and first chapter of his important book.¹

Water wars are no longer just the stuff of Hollywood melodramas. With water stress spreading across much of the world, the next flash point could well be water. The battles of yesterday were fought over land, including empire-building colonies. Those of today are over energy. But the battles of tomorrow are likely to be over the most precious of all natural resources: water.

Water is a sustainer of life and an enabler of development; yet it has already become an overexploited resource, with the resultant shortages, degradation, and competition triggering inter-country and intra-state disputes. This, in turn, is straining environmental sustainability, sharpening territorial feuds in water-rich regions, and threatening to slow overall global economic growth. What is common between Tibet, the Golan Heights, the traditional Kurdish homeland (which straddles the Tigris-Euphrates River Basin), Kashmir, and the Fergana Valley of Central Asia? They are all strategically located water-rich regions racked by separatist unrest or territorial disputes. Experience has shown that water scarcity occurring in combination with other sources of tensions—including territorial disputes, environmental degradation, poverty, and weak or absent regional institutions—easily stokes conflict.

Brahma Chellaney, Ph.D., is a professor of strategic studies at the Center for Policy Research in New Delhi, fellow of the Robert Bosch Academy in Berlin, and affiliate with the International Centre for the Study of Radicalization at King's College London. The author of nine books and dozens of scholarly articles, Dr. Chellaney is also a policy advisor to the government of India and a global public intellectual whose commentaries have been featured in the *Japan Times*, *Le Monde*, *New York Times*, *South China Morning Post*, *The Guardian*, *Times of India*, and many other prominent publications.

Water wars—in a political, diplomatic, or economic sense—are already being waged between riparian neighbors in several regions, fueling a cycle of bitter recrimination, exacerbating water challenges, and fostering mistrust that impedes broader regional cooperation and integration. Without any shots being fired, rising costs continue to be exacted. This shows that water wars are not only a future peril, but a little-publicized reality already confronting the international community. In fact, in a silent hydrological war, the resources of transnational rivers, aquifers, and lakes have become the targets of rival appropriation, with the tools of increasing competition ranging from hydroengineering works to cross-border support for proxies.

Driving the rival appropriation plans and water nationalism is the notion that sharing waters is a zero-sum game. The danger that the current or emerging riparian battles may slide into armed conflict looms large on the international horizon, given the extent of the water crisis confronting humanity—a crisis that threatens to aggravate the already-grave food situation and slow down the rapid expansion of energy supplies. The international community is on the cusp of a new era in which serious water shortages, if unaddressed, will likely impinge on peace, social stability, and rapid economic modernization. A report reflecting the joint judgment of U.S. intelligence agencies has warned that the use of water as a weapon of war or a tool of terrorism will become more likely over the next decade in some regions, with some states using shared waters to exert leverage over their neighbors and to secure regional influence. Water threatens to become the world's next major security threat.

Securing a larger portion of the shared water resources in a region has already become a flash point in inter-country relationships. There is often little incentive to conserve or protect supplies for users beyond national borders, unless there are specific water-sharing arrangements in place. Like arms races, “dam racing” has emerged as a geopolitical concern, especially in Asia, where the world's fastest economic growth is being accompanied by the world's fastest increase in military spending and the world's fiercest competition for natural resources, especially water and energy. As riparian neighbors in several regions compete to appropriate the resources of shared rivers by building dams, reservoirs, barrages, irrigation networks, and other structures, the relationship between upstream and downstream states are often characterized by mutual distrust and discord.²

Signs of Water Stresses: Past and Present

Water scarcity and declining water quality, meanwhile, are reaching alarming proportions in several parts of the world, as illustrated by the

drying up of the Colorado, Yellow, and Indus river deltas; the polluted waterways in South Africa; and water rationing in regions like California and northern China.

In history, too, societies faced water quality and quantity challenges owing to overuse or contamination of resources. The drying up of local water sources indeed led to profound moves, such as the abandonment of the Mughal Empire's new capital, Fatehpur Sikri ("the City of Victory") in India. This royal city of palaces and imposing public buildings, built with brilliant red sandstone in a blend of Hindu and Islamic architectural styles, was largely completed in 1573 with little regard for the sustained availability of water resources. Just before it was abandoned in 1585, it was described by English traveler Ralph Fitch as "considerably larger than London and more populous." Now a World Heritage site, Fatehpur Sikri represents one of the greatest accomplishments of Mughal architecture, along with the famed Taj Mahal, located barely forty-five kilometers away.

In this century, Sanaa in Yemen may become the first capital city to run out of water, with its groundwater reserves officially projected to last only up to 2025 at the current rate of consumption—a prospect that could turn the now-bustling city of 2 million residents into a ghost town like Fatehpur Sikri. Sanaa, established in the sixth century BCE, relies entirely on subterranean water resources, but its population has quadrupled since the 1980s, even as subsidized diesel fuel has encouraged unregulated pumping of groundwater. Groundwater extraction rates in Sanaa are four times higher than natural replenishment. Sanaa's impending water catastrophe could engulf large parts of Yemen, where water is already a key instigator of conflict.³

Sanaa, however, is not the only city that faces the specter of using up all its water resources. Abu Dhabi, capital of the oil-rich United Arab Emirates, says it is likely to exhaust its groundwater reserves by mid-century, while the Pakistani city of Quetta is expected to run out of water even earlier unless additional supplies are diverted to it from elsewhere. Tripoli, the Libyan capital, and other northern Mediterranean cities such as Benghazi, Sirte, and Misrata in Libya now rely on "fossil" (ancient) groundwater transported from the Sahara Desert in the deep south by the so-called Great Manmade River Project (GMRP)—a showpiece of Colonel Muammar el-Qaddafi's forty-two-year rule that the now-slain dictator pompously described as "the eighth wonder of the world." But water consumption is now increasing so fast in the northern cities that Libya risks fully depleting the fossil waters that had slowly accumulated in underground strata over many thousands of years.

Even in the United States, several large cities risk running out of water, including Los Angeles, Las Vegas, and Phoenix. Atlanta's use of Lake Lanier is the cause of a protracted water dispute between Georgia, Alabama, and Florida. In the towns along Europe's southern

shores, from Greece to the tip of Portugal, water rationing has become the norm. These developments show that water stress, although more widespread and intense in the developing world, now afflicts parts of the West. Scarcity of freshwater is an increasingly nagging issue, for example, in the arid regions of Spain and in one-third of the United States, which in 2012 was gripped by a drought unparalleled in scale for more than half a century.

In California, the Southwest, and Texas, water withdrawals are already greater than the renewable water supply, which means that tomorrow's resources are being tapped to meet today's needs. The arid West has remained the fastest-growing region in the United States for most of the period since 1970, and the pressures on water resources are "changing virtually every aspect of municipal, industrial, and agricultural water practice." The unregulated exploitation of the freshwater resources of the Great Lakes, whose basin is home to more than 40 million Americans and Canadians, has also raised deep concerns.⁴

But when entire countries are racked by water distress—with the effects fueling increased food prices and spurring greater resource competition—political and social convulsions may become unavoidable. One common factor in the popular uprisings of 2011 that engulfed a series of North African and Middle Eastern states was the popular anger over an issue directly tied to the regional water crisis—rising food prices. These states share one ominous link: they all fall below the international water-poverty line, defined as annual availability of less than 1,000 cubic meters per head. Two of the states hit by political unrest—the petrodollar-rich Kuwait and Bahrain—actually rank among the world's five poorest states in aggregate internal water resources.

Historically, the depletion or degradation of water resources and the ensuing impacts on food production and the environment caused ecological meltdown and the fall of some civilizations. Land and water degradation resulting from intensive agriculture can lead to salinization and a sharp decline in the productivity of soils. There are several historical examples of societies fatally undermining their ecological security. The early Sumerian civilization, which emerged in the lower reaches of the Tigris and Euphrates rivers about 4000 BCE, was brought down by the deterioration of water quality through soil erosion and salinization, leading to greatly diminished wheat and barley yields. In the case of Central America's Mayan civilization, which thrived for a millennium or so before going into decline around 800 CE, reckless deforestation promoted land and water degradation and undermined agriculture, setting the stage for its downfall.⁵

Resource Acquisition as a Geopolitical Driver

Historically, access to resources has also been a critical factor in war and peace. From the rise of Portugal in the fifteenth century to the rise of the United States in the twentieth century, resources have served as a key determinant of foreign, defense, and trade policies. As brought out by Paul Kennedy, Pax Britannica was made possible by a nimble navy that secured vital commodities from resource-rich lands overseas. Paradoxically, it was Britain's failure to gain preeminence in Europe, where it faced other major powers like Russia, Germany, and France and where no state was strong enough to impose its will, that motivated it to concentrate on distant lands. That is how Pax Britannica was established.⁶

More broadly, gaining access to resources has been a major driver of armed interventions and wars in history, including the European colonial conquests in Asia, Africa, and the Americas and many of the wars of the nineteenth and twentieth centuries. Mercantilism was an early modern European economic theory and system that actively supported the establishment of colonies to supply materials and provide markets so as to relieve home countries of dependence on other nations. There are many other examples in history of how attempts to gain control over the resources of others have led to interventions and fierce wars. Many believe the U.S. invasion and occupation of Iraq in 2003 was more about controlling large oil reserves there than about noble principles like freedom.

When a country's resource supplies are blocked by a hostile state, it can go to war. Take the 1941 Pearl Harbor attack. Although it took the United States by surprise, the attack was triggered at least in part by the U.S.-British-Dutch oil embargo against Japan, which was then relying on imports largely from the United States to meet its oil needs. The oil embargo indeed marked an escalation of the economic squeeze of Japan through denial of essential resources in a U.S.-led campaign that began in 1939 with partial bans on supplies of scrap metal and gasoline for aircraft. As economic historian Niall Ferguson has written, "Western powers had no desire to relinquish their mastery over Asia's peoples and resources. Even when they were comprehensively beaten by Japanese forces in 1942, the Europeans and Americans alike fought back with the aim of restoring the old Western dominance" in Asia. The United States, in fact, has signaled since 1941 that its security begins not off the coast of California but at the western rim of the Pacific Ocean and beyond.⁷

The reemergence of economic giants in the East has sharply accelerated the global resource hunt, changing the pattern that prevailed for long after the rise of Western powers. The new economic powerhouses are competing for resources not only against the old economic giants but also against each other. For Japan, whose ruinous decision to

go to war with America in 1941 appeared designed to secure peace on its terms, the more recent use of rare-earth exports by China as a trade weapon against Japan has served as a bruising reminder of its dearth of natural resources and thus of its continuing vulnerability. A rare-earth embargo against Tokyo became China's weapon of first resort in response to the brief Japanese detention of a Chinese fishing-trawler captain in September 2010.

China, which dominates the global production and supply of these minerals that are critical to the manufacture of a vast array of high-tech products, persisted with its unannounced embargo against Japan for about seven weeks while continuing to blithely claim the opposite in public—that no export restriction had been imposed. Yet its own subsequently released trade data showed that its rare-earth metal shipments to Japan fell to zero in October 2010, and to nearly zero for rare-earth oxides, which are more processed chemical compounds.

That embargo was followed by China's reduction of rare-earth export quotas to all countries in early 2011, prompting the United States, the European Union, and Japan to file a World Trade Organization complaint alleging that Beijing was using its rare-earth monopoly as a political and economic weapon. China's move, however, provided other major economies an advance notice to find ways to reduce their dependence on imports of Chinese rare-earth minerals so as to offset Beijing's leverage. Indeed, the Chinese actions set in motion efforts by others to develop new international sources of supply and break China's chokehold on the market.⁸

Acquisition and control of resources is a key goal of Chinese policies. In securing overseas supplies of fuel and minerals to meet the soaring demand of its cities and factories, China is emulating what dominant powers have done for more than two centuries. In fact, the world's most assertive policies today to gain control of strategic resources are arguably being pursued by China, which employs aid and other diplomatic tools to secure commodity deals while placing its state-owned corporate behemoths at the vanguard of such an outreach. In the case of iron ore and some other important minerals, China is relying on greater imports to help conserve its own reserves.

While going into overdrive overseas to corner energy resources, metals, and other raw materials, China at home is aiming to control transnational river outflows by accelerating what already has been for three decades the world's largest dam-building program. Such a focus has resulted in water becoming a new divide in its relations with several of its neighbors, including Russia, Kazakhstan, Vietnam, Burma, and India.⁹

Its broader resource strategy seems aimed at gaining a long-term strategic advantage that its competitors would find hard to neutralize. By buying hydrocarbon and mineral-ore reserves in distant lands at a

time when the planet is running short of natural resources and by building a capacity at home to manipulate cross-border river flows through dams, reservoirs, and other diversions, China has embraced an overtly mercantilist approach to lock up long-term supplies as a vital strategic interest. Its far-flung assets and growing resource imports actually serve to rationalize its focus on building a more powerful navy and playing a maritime role far from its shores.

China is just one key example of a wider resource-gaining drive which suggests that, in contrast to Samuel Huntington's theory that civilizations will increasingly clash along cultural and religious fault lines, wars in this millennium are likely to be fought more over resources than over ideologies, as states battle to control, or secure access to, dwindling supplies of commodities.¹⁰

Water and Economic Security

Water helps to sustain and expand the modern economies and preserve the ecosystems on which human civilization depends. Water powered the industrial revolution—through the steam engine, the water turbine, and water-intensive manufacturing technologies—and helped disprove the “Malthusian catastrophe” thesis, which contended that population growth would swamp the earth's agricultural production capacity, leading to famine and a return to subsistence-level conditions. Thomas Malthus, an English economist and demographer familiar with England's history of plagues, famines, and resource scarcities, contended at the end of the eighteenth century that available food supply would dictate human population size because food production can only increase arithmetically ($3 + 3 + 3 = 9$) while population would grow geometrically ($3 \times 3 \times 3 = 27$).

His dark thesis was turned on its head by the scientific advances ushered in by the industrial revolution, the transport revolution, the green revolution, and the biotech revolution. With a declining percentage of human society engaged in agriculture, the world has managed to produce increasing quantities of food, thanks to intensive use of water and fertilizers and new far varieties and techniques.

Yet, with water use having grown at more than twice the rate of population increase in the past one hundred years, water shortages threaten to crimp future economic growth, even as they sharpen current regional hydro-politics and challenge human ability to innovate and live in harmony with nature. Food security, for example, is emerging as a major challenge by itself, largely due to water constraints. High levels of fertilizer application have actually caused water pollution and eutrophication—a process where waterways receive a heavy concentration of nutrients like phosphates and nitrates, resulting in excessive algae

growth. Crop-yield growth has slowed globally since the late 1980s, although rising yields are critical to food security.¹¹

Despite having averted the Malthusian catastrophe, the world faces varied resource constraints that have resurrected the warning issued by a nongovernmental think tank, the Club of Rome, in its contentious 1972 book, *The Limits of Growth*. The book concluded—on the basis of computer models developed at MIT in an era where, with the advent of the first microprocessor, computers commanded reverential respect—that if high rates of consumption, population growth, and resource degradation and depletion persisted, “the limits of growth on this planet will be reached sometime within the next 100 years. The most probable result will be a rather sudden and uncontrolled decline in both population and industrial capacity.” Although decades later that conclusion still sounds alarmist, the world admittedly faces the imperative to gradually shift to more sustainable development.¹²

The conventional wisdom that market forces would come to the rescue by finding a way out from the scarcity of any natural resource proved true in much of the twentieth century as discovery of new sources of supply and technological innovations helped to largely stabilize resource prices, even though international commodity prices began climbing from the early 1970s. The high price volatility in the twenty-first century, however, points to the emerging strains on resource systems due to rapidly rising consumption levels, environmental degradation, and other factors, thus increasing the risks of unprecedented resource-related shocks in the future. Demand for many resources is rising faster than the available supply, reflected in the geographical spread of water shortages and the increasing prices of commodities like energy, grains, steel, and metals.¹³

Water, as a key to sustainable livelihoods and development, presents a unique challenge. Not only is water the most fundamental of finite resources, but it also has no substitutes for most uses and is expensive to transport over long distances. Whereas countries can scour the world for oil, liquefied natural gas, mineral ores, and metals to keep their economic machines humming, sufficient water cannot be secured through long-distance international trade deals. The only option water-poor countries have is to sustainably optimize their water resources and, when it involves transboundary basins, to collaborate with co-riparian states on holistic resource management. If they have sufficient, sustainable foreign-exchange reserves, they can, of course, try to alleviate their water distress by importing, rather than producing, water-intensive products, ranging from grains and meat to industrial goods like paper, fabric, and plastic. Yet few states have addressed their water situations by such means.

For one thing, many nations are reluctant to take on political and financial risks by becoming dependent on other states for basic products,

including food, which often may be cheaper to grow domestically than to import. Paradoxically, some water-distressed nations are major international food exporters. For another, in terms of water use per dollar of economic output, many industries are very thirsty, underscoring the link between water resources and economic advancement. The true level of water consumption by any industry can be assessed only by examining the embedded water—the real value of how much water has been used to create a product or service. Although grain farming and power generation are the two most water-intensive sectors in terms of direct water withdrawals, a study of the American economy has found that most water use in the United States—60 percent—is indirect, via supply chains, with 96 percent of sectors utilizing more water indirectly than directly. In this light, the growing freshwater shortages across much of the world pose major socioeconomic and security challenges.¹⁴

Justice Dimensions of the Global Water Crisis

Water is also central to the realization of a fundamental right enshrined in the 1948 Universal Declaration of Human Rights: “Everyone has the right to a standard of living adequate for the health and well-being of himself and his family.” In fact, the United Nations General Assembly and the UN Human Rights Council in 2010 separately recognized the right to safe drinking water and sanitation as a human right central to a decent life.¹⁵

At least half of the eight Millennium Development Goals adopted by world leaders in 2000 are linked to water, including eradicating poverty and hunger; reducing child mortality; combating HIV/AIDS, malaria, and other diseases; and ensuring environmental sustainability. For instance, poverty alleviation simply is not possible without the availability of minimally adequate water supplies. Nor can food shortages be remedied without local farmers being able to access sufficient water supplies to grow crops. Significantly, people with better access to water “tend to have lower levels of undernourishment. If water is a key ingredient to food security, lack of it can be a major cause of famine and undernourishment, especially in areas where people depend on local agriculture for food and income.” Containing disease and child mortality similarly demands improved access to clean drinking water and to sanitation.¹⁶

Access to clean freshwater must be treated as a universal human right to ensure the health and well-being of citizens. Almost four-fifths of all countries actually recognize the right to water. Yet, despite many countries defining national access targets, about 1.5 billion people in the world still lack ready access to potable water, and 2.4 billion people have no water-sanitation services. Those denied basic water supplies

are forced to lead qualitatively diminished lives, with little prospect of pulling themselves out of poverty.¹⁷

The deteriorating quality of water—polluted by industrial wastes, agricultural runoff, and sewage discharges—has aggravated the water crisis, making it harder in many nations to provide the basic right denied to many. In the developing world, nearly two-thirds of the wastewater is discharged, with little or no treatment, into rivers and other watercourses. Such discharge seriously compounds resource pollution and public health problems. With more than a million tons of wastewater being dumped daily into the world's waterways, diseases caused by the use of contaminated water are on the rise.

More than half of the world's major rivers are polluted, imperiling the health and livelihood of those for whom these waterways are the lifeblood. Roughly 3.5 million people die every year from waterborne diseases, such as cholera—an acute intestinal infection caused by ingestion of contaminated water or food—and schistosomiasis (caused by contact with freshwater containing flatworm eggs). The United Nations estimates that a child dies every eight seconds from one of the diseases associated with lack of clean water. And according to the World Health Organization, thirty-five new waterborne disease agents were discovered between 1972 and 1999 alone; some long-dormant agents have also resurfaced with a vengeance.¹⁸

All this shows that water-resource degradation and depletion constitutes first and foremost a humanitarian crisis. Water indeed is the common denominator in the health, development, and environmental challenges facing the world. The water-pollution scourge and growing hydrologic variability arising from the disruption of natural water flows due to river fragmentation and other anthropogenic factors have seriously affected fluvial ecosystems. That, in turn, has impinged on traditional agriculture and grazing, devastated fisheries, and marginalized rural communities dependent on those waterways.

Through various initiatives, the United Nations has sought to increase international awareness of water-related challenges and the attendant need to find innovative and sustainable solutions. Yet the initiatives have yielded modest results. For example, the UN General Assembly since 1993 has dedicated March 22 of each year as World Water Day. The United Nations also designated 2005-2015 as the International Decade of Action, with the theme "Water for Life," to help encourage the international community to meet the targets on freshwater and sanitation already agreed upon. Little traction, however, was secured to realize the water-specific Millennium Development Goals by the agreed 2015 deadline, including the reduction by half of the proportion of global population "without sustained access to safe drinking water and basic sanitation." More than one-fifth of the global population still lacks ready access to potable water. No less shocking is the fact that more people

today own or use a mobile phone than have access to water-sanitation services.¹⁹

Redefining Security Challenges for the Twentieth-first Century

The twenty-first century will be a defining epoch for how humanity manages and addresses its grave water challenges. Ensuring adequate freshwater availability to underpin continued progress has become critical to the future well being of human civilization.

The growth of water stress and insecurity is an unambiguous reminder of the rise of nontraditional security challenges. In a world characterized by extraordinary technological, economic, and geopolitical transformation since the 1980s, international security challenges have also fundamentally changed. Princeton University professor Richard H. Ullman presciently foresaw in the early 1980s that “nonmilitary tasks are likely to grow ever more difficult to accomplish and dangerous to neglect.” Alleviating water scarcity and insecurity is now one such critical task.²⁰

Water indeed is where the old security issues of freedom of fluvial navigation, security of sea lanes of communication, and prevention of ocean piracy intersect with new security challenges, such as framing international rules on shared watercourses, regulating the building of large storage dams on transnational rivers, and containing the international effects of deteriorating freshwater quality and the degradation of fluvial, coastal, and marine ecosystems.

With interstate river and lake basins home to two-fifths of the global population and covering 47 percent of the world’s land surface, the leitmotif of riparian relations ought to be interdependence, not competitive hydroengineering projects and strident assertions of national sovereignty. Whenever any upriver state has sought to unilaterally exploit its riparian advantage through a new water-diversion project, it has created water tensions in the region. Examples of such contemporary schemes, intended to meet new water needs upstream, include China’s building of giant dams on the international rivers originating in its ethnic-minority homelands and Turkey’s Southeastern Anatolia Project, which covers nine of its provinces in the Tigris-Euphrates Basin (a program referred to as GAP, the Turkish acronym for Giineydogu Anadolu Projesi). As illustrated by India’s Farakka Barrage—a water impoundment completed four decades ago to flush silt and protect the port of Calcutta—even projects to serve narrow purposes can be controversial and trigger an interriparian dispute that may take many years to resolve or continue to fester.

Despite the promotion of cooperation on the environment and natural-resource management taking center stage in global diplomacy,

international water cooperation still faces major challenges, including managing disputes over the sharing of transnational water resources, building institutionalized cooperation and collaboration, and dealing with limited compliance with international norms and limited funding support for basin-level initiatives. If anything, there is increased mistrust and divisiveness at the regional and international levels. The international community's ability to avert water wars in the coming decades will depend on its "collective capacity to anticipate tensions and to find the technical and institutional solutions to manage emerging conflicts."²¹

Yet, even as some states exploit their riparian advantage to capture resources through new projects and thereby present a *fait accompli*, it has proven difficult to stop such moves or to establish genuinely cooperative institutions at a time when the majority of countries are chasing limited water resources to meet their growing needs. In an international system pivoted on national security, not collective security, the assertive pursuit of relative national gain is common, even at the expense of the planetary interest." The *doctrine of prior appropriation*, under which the first appropriator (user) of river waters gains a priority right in customary international law, actually serves as an invitation to resource capture, especially by the more powerful. Resource capture, in turn, helps build greater political leverage over co-riparian states.

To be sure, water has long been used as a tool of political bargaining between rival states. The history of averting conflicts over freshwater resources actually dates as far back as 2500 BCE, when the two Sumerian city-states of Lagash and Umma in the region now called southern Iraq signed a treaty to end their war over the resources of the Tigris River." More than 3,600 treaties related to water resources have been concluded since 805 CE, according to the Food and Agricultural Organization of the United Nations.

The United Nations proudly asserts that more than two hundred international water agreements or memorandums of understanding have been signed in the period after World War II, with "only 37 cases of reported violence between states over water."²² Given that global water resources have started coming under intense pressure only in recent times, the reported occurrence of thirty-seven cases of interstate water violence since 1946 is scarcely a comforting statistic. The cases of violence involved festering water disputes, while the vast majority of accords or agreements-in-principle signed in the post-World War II period seek to address one or more of a narrow range of transboundary issues, including flood control, hydropower development, hydrological data sharing, joint research, irrigation, watercourse protection, storage, use of river islands, and interim arrangements. Moreover, can we ignore the fact that the number of treaties that actually share out basin waters

and set up meaningful water institutions or joint water management remains disappointingly very small? In most of the UN-listed water agreements, water allocation—the most contentious and conflictive issue—has been dispensed with or not spelled out in a manner that would help obviate disputes or conflicts.

In fact, a clearly spelled-out sharing formula figures in very few treaties that cover transboundary basin resources. Even in the accords that do specify sharing quantities, water allocations have been rigidly set, with little room to adjust to hydrological variations and changing basin dynamics, thus raising concerns about their durability under rapid-growth or climate-change conditions. Water-quality obligations, moreover, have been left out of most agreements, although degradation and contamination of shared resources are increasingly becoming important transnational concerns. Multinational basins, at best, have bilateral accords, because only in the exception do water-related agreements rope in all riparian neighbors, thus ruling out the pursuit of integrated basin management.²³

To compound matters, most existing water agreements are toothless. The bulk of them lack enforcement and conflict-resolution mechanisms, or even elementary monitoring provisions. A growing number of new agreements, however, tend to incorporate at least some elements of water-quality control, information sharing, monitoring, and conflict resolution in their provisions. But few of them are genuine water-sharing treaties.

The plain truth is that most existing accords hardly stand out as examples worthy of emulation in transnational basins lacking any institutional arrangements. Lumping all pacts, provisional accords, and memorandums of understanding together under a single heading of water agreements simply distorts reality by presenting an inflated picture of cooperation. In fact, some agreements stand out as examples of asymmetrical cooperation dictated and driven by the strongest, as in the Nile Basin.

Add to this picture the weak, underdeveloped international legal framework for transnational river basins; there is a dearth of comprehensive and well-accepted international water laws. The norms in relation to internationally shared aquifers are even weaker, even though groundwater has emerged as a critical transboundary resource subject to competitive overexploitation. More fundamentally, the 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses—which took more than a quarter century to develop but whose entry-into-force is still not within sight—has become a symbol of both the international community's desire for rules to govern common waters and its failure thus far to put its money where its mouth is.

Better water management is integral to building a more harmonious and sustainable world. Water security, after all, is essential for economic, food, and environmental security; public health; national well-being; regional peace; and international stability. It is past time the international community recognized the centrality of water among global challenges and focused attention on this prime problem that holds the key to dealing with other pressing issues.

NOTES

¹ This article draws on Brahma Chellaney, *Water, Peace, and War: Confronting the Global Water Crisis* (Lanham, MD: Rowman & Littlefield Publishers, 2013), xv-xvi, xxiv, 1-5, 7, 17-18, 24-26, 38-40, 42-44. The accompanying notes have been condensed, and section headings slightly revised to connect the excerpted passages. To see full citations and, more importantly, peruse Professor Chellaney's recommendations on how to build robust international water norms and rules as well as multilateral institutions to alleviate conflicts, we at APPSI urge readers to acquire and study the entire book.

² According to Citigroup Global Markets, water—the world's most essential yet today's most underappreciated commodity—could eventually, as an asset class, overtake other resources that remain in great demand, such as oil, copper, iron, and agricultural commodities. Citigroup Global Markets, *Global Themes Strategy*, July 20, 2011, 18-24. On water as the world's next major security threat, see the following source. U.S. National Intelligence, *Global Water Security*, Intelligence Community Assessment ICA 2012-08, February 2, 2012 (Washington, DC: Office of the Director of National Intelligence, March 22, 2012), 4.

³ Christopher Boucek, "Yemen: Avoiding a Downward Spiral," Carnegie Papers, No. 102 (Washington, DC: Carnegie Institute for International Peace, September 2009), 6.

⁴ On Libya's depletion of "fossil waters," Food and Agriculture Organization, *Irrigation in Africa in Figures—Aquastat Survey 2005, Water Report 29* (Rome: FAO, 2006), sec. "Libyan Arab Jamahiriya." On water stress in the American southwest, see Sharlene Leurig, *The Ripple Effect: Water Risk in the Municipal Bond Market* (Boston: Ceres and New York: Water Asset Management), 44-46; Tim P. Barnett and David W. Pierce, "When Will Lake Mead Go Dry?" *Water Research* 44 (2008), doi: 10.1029/2007WR006704; Natural Resources Defense Council, *Climate Change, Water, and Risk: Current Water Demands Are Not Sustainable* (New York: NDRC, July 2010), 4; Randy Stapilus, *The Water Gates: Water Rights, Water Wars in the 50 States* (Carlton, OR: Ridenbaugh Press, 2010); Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Penguin, 1993); National Research Council of the National Academies, *Water Reuse: Potential for Expanding the Nation's Water Supply through Reuse of Municipal Wastewater* (Washington, DC: National Academies Press, 2012), 4.

⁵ For example, Jared Diamond, *How Societies Choose to Fail or Succeed* (New York: Viking, 2011), 157-177.

⁶ Paul M. Kennedy, *The Rise and Fall of the Great Powers: Economic Change and Military Conflict, 1500-2000* (New York: Vintage, 1989), 143-157.

⁷ Niall Ferguson, *The War of the World: Twentieth-Century Conflict and the Descent of the West* (New York: Penguin, 2006), xix.

⁸ In keeping with the historical lessons about the centrality of adequate resource availability in powering a country's rise, China has cultivated cozy ties with countries that can supply raw materials for its rapidly growing economy, regardless of their human-rights record. Sudan, Zimbabwe, Iran, North Korea, and Burma, among others, have all enjoyed, to some degree or other, Chinese political protection at the United Nations Security Council, where Beijing wields veto power. China's rapidly growing trade and investment in Africa, for example, has been spurred by its ravenous need for hydrocarbons and mineral ores. State-run Chinese companies, flush with cash from their country's economic boom that has generated unparalleled and still-growing foreign exchange reserves, have been encouraged by the government to enter the oil, gas, and mining sectors in Africa, where Chinese investments in infrastructure, real estate, and manufacturing are often designed—in the old colonial style—to facilitate resource extraction, processing, and shipment. China indeed is now widely seen by Africans as the new colonial power on their continent, with the influx of Chinese investors, traders, and laborers stoking tensions over the external control of Africa's natural resources.

⁹ Brahma Chellaney, *Water: Asia's New Battleground* (Washington, DC: Georgetown University Press, 2011), 61-67.

¹⁰ Samuel P. Huntington, "The Clash of Civilizations?" *Foreign Affairs* 72, no. 3 (Summer 1993): 22-49; Samuel P. Huntington, *Clash of Civilizations and the Remaking of World Order* (New York: Simon & Schuster, 1998).

¹¹ Food and Agriculture Organization, *FAO Statistical Yearbook 2012* (Rome: FAO, 2012).

¹² Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, and William W. Behrens III, *The Limits to Growth: A Report for the Club of Rome's Project on the Predicament of Mankind* (New York: Universe Books, 1972), "Conclusions." *The Limits to Growth* was published barely four years after another book, *The Population Bomb*, predicted that population growth would outstrip food production, leaving "hundreds of millions of people" to starve to death as early as the 1970s. John R. Ehrlich, *The Population Bomb* (Cutchogue, NY: Buccaneer Books, 1968).

¹³ Richard Dobbs, Jeremy Oppenheim, Fraser Thompson, Marcel Brinkman, and Marc Zornes, *Resource Revolution: Meeting the World's Energy, Materials, Food, and Water Needs* (McKinsey Global Institute and McKinsey Sustainability & Resource Productivity Practice, November 2011), 1-4.

¹⁴ Michael Blackhurst, Chris Hendrickson, and Jordi Vidal, "Direct and Indirect Water Withdrawals for U.S. Industrial Sectors," *Environmental Science & Technology* 44/6 (2010): 20126-130, doi: 10.1021/es903147k.

¹⁵ Article 25 of the Universal Declaration of Human Rights. United Nations, *The Universal Declaration of Human Rights*, adopted by the UN General Assembly on December 10, 1948, <http://www.un.org/en/documents/udhr>.

¹⁶ Food and Agriculture Organization (FAO) of the United Nations, *Water at a Glance*, <http://goo.gl/19tCz>. The Millennium Development Goals (MDGs) are eight goals that were to be achieved by 2015. Water and sanitation targets fall in Goal 7, "Ensure Environmental Sustainability." The MDGs were drawn from the Millennium Declaration that was adopted by 189 nations, and signed by 147 heads of state or government, during the UN Millennium Summit in September 2000.

¹⁷ UN-Water and World Health Organization, *GLAAS 2012 Report: The Challenging of Extending and Sustaining Services* (New York: United Nations, April 2012).

¹⁸ World Health Organization, *Emerging Issues in Water and Infectious Diseases* (Paris: WHO, 2003).

¹⁹ World Bank and infoDev, *Maximizing Mobile* (Washington, DC: World Bank, July 2012); United Nations, *Managing Water under Uncertainty and Risk*.

²⁰ Richard Ullman, "Redefining Security," *International Security* 8/1 (Summer 1983): 153.

²¹ Mikhail Gorbachev and Jean-Michel Severino, "Climate Change Raises Threat of Water Wars," *Japan Times*, June 9, 2007.

²² United Nations, *UN-Water Factsheet* (New York, NY: UN Department of Economic and Social Affairs, 2009).

²³ Meredith A. Giordano and Aaron T. Wolf, "Transboundary Water Treaties," Science and Issues, *Water Encyclopedia*, <http://goo.gV5Wkq8>.