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The Global Water Crisis: a Question of Governance¹

“Just as states have fought over oil, water has played a role in international conflicts. Water resources have been military and political goals. Water resources have been used as weapons of war. Water systems and infrastructure, such as dams and supply canals, have been targets of war. And inequities in the distribution, use and consequences of water management and use have been a source of tension and dispute.”

- Dr. Peter Gleick²

Introduction

At the interface of economics, politics and environmental protection efforts, the management and distribution of water resources has been said to be one of the greatest global challenges of the 21st century. Indeed, there is a widespread conception in the media and popular culture that fresh water supplies will be the source of fundamental conflicts between and within states as they become scarcer. Currently, most conflicts associated with water are intrastate as opposed to international. Scarcity of and inadequate access to water are exacerbated by external pressures such as demographic growth, urbanisation, expansion of economic activities, and climate change. These sources of stress pose severe risks for the livelihood and economic security of many segments of society, especially in the developing world, which in turn generates tensions. Given the vital necessity of water for a wide array of human activities from basic survival to economic development, the discourse on water tends to be sensationalised by the media and appropriated by lobby groups that defend specific conceptions of water.

Debates over water boil down to questions of governance: will there be enough water to satisfy the basic needs related to human activity in a fair and equitable way? Who bears the responsibility for securing access to safe water resources? What are the implications, and for whom, of increased water stress and lack of access to water? This paper argues that while there is growing potential for conflict over water as stress on the resource builds, there are also increased opportunities for cooperation and better water management at national and international levels. Clear linkages can be established between inadequate access to water and conflict, suggesting that appropriate public policy could help alleviate the burden of scarcity.

¹ The views expressed in this paper are solely those of the authors, and do not reflect the positions and policies of the Department of Foreign Affairs and International Trade.

² P. H. Gleick (2005), *Freshwater and Foreign Policy: New Challenges*, Oakland, p. 97.

The first part of this paper explores debates on scarcity, arguing that scarcity is largely intertwined with the goals and usage patterns of different actors, the distribution of water resources, and the prioritisation of needs on the local, national and global levels. In the second part, the implications of increasing water stress and lack of access to water will be discussed. This section argues that while water represents a potential (if often exaggerated) source of conflict, it also presents significant opportunities for cooperation between different stakeholders. In conclusion, the paper reaffirms that issues of scarcity, allocation and access with regard to water are primarily questions of governance with clear policy-making implications.

A. Will there be enough water?

The debate on scarcity heavily depends on different actors' goals and usage patterns, the distribution of water, and the prioritisation of needs on the local, national and global levels.

Malthus' Spectre?

Although named *earth*, our planet is covered with water. The vast majority of this water is saltwater (97.5%), which is of limited use for sustaining human life. The remainder (2.5%) is fresh water, though almost all (99.6%) of this total is inaccessible as it constitutes either glaciers or is found in deep aquifers beyond current reach. The balance represents water that is available for human use in the form of rivers, lakes, reservoirs and shallow aquifers. Critically, this water is renewable: it is permanently replenished through precipitation by the water cycle. Thus, when considering the question of whether the world is running out of water, the 2006 *Human Development Report* concludes: "Not in any meaningful sense."³ It argues that a Malthusian perspective is not appropriate when considering the issue of global water supplies – a position that underpins this paper.⁴

The uses of fresh water

Beyond the scarcity debate, water remains a valuable commodity because of its multiple and fundamental uses. The best way of analysing this issue is to examine the three classical sectors of water use in any given national context: the agricultural, industrial and domestic sectors.

The agricultural sector uses water mainly to produce food. Agriculture (which includes crops, livestock and aquaculture) is the means through which most humans are fed. Most of agriculture is rain-fed, though about 15% of the water used in agriculture is

³ UNDP (2006), *Human Development Report Executive Summary*, p. 25.

⁴ Thomas Robert Malthus (1766-1834) was an English economist and demographer famous for his theories on population growth. He essentially argued that populations will expand unsustainably and overtake the food supply available to them, thus facing a difficult period of readjustment (http://www.bbc.co.uk/history/historic_figures/malthus_thomas.shtml).

used for irrigation. Irrigation is a strategic asset, as it allows farmers to grow crops where there might otherwise not be enough rain to sustain them and is associated with lower rates of poverty in some countries.⁵ Longer-term trends suggest that, given competing pressures on limited water resources, agriculture is losing out to water use by the industrial and domestic sectors. This is closely linked to rapid urbanisation.

The industrial sector principally uses water in the manufacturing process for washing and cooling purposes. It is increasingly used to cool power plants. Most water used for industrial purposes (approximately 96%) is used at least once, and then returned to local waterways as effluent. As such, the industrial sector's activities often contaminate water resources with waste and thus diminish the total supply. Yet industry's use of water is often more efficient – in an economic sense – than that of agriculture. Industrial use of water maximizes economic output as it is used to produce higher value goods. In China, for instance, planners have found that a given quantity of water used in industry can be up to 70 times more valuable than if it were used in agriculture.⁶

The third sector of interest is the domestic one, which accounts for household and municipal uses of water, as well as commerce and public services' consumption of water. This sector accounts for the direct uses of water by people for personal consumption and sanitation needs. Rapid urbanisation is contributing to water scarcity and stress in cities around the world, a problem that is set to increase in the future (today, nearly half of all people call the city home). The rapid growth of cities creates significant pressure on the limited water resources in their vicinity. Cities are also the location where demand for water from the three sectors tends to intersect, as industry is often based in cities and agriculture is practised in areas on the outskirts of cities. Likewise, cities tend to concentrate wastewater: discharges from industry as well as human waste add stress on local water resources.

While not listed as a traditional user of water, the environment must be considered as a prominent water user, given that the sustainability of ecosystems is dependent on water. Without adequate water supplies, ecosystems deteriorate.⁷ A manifestation of this is found in rivers or wetlands drying up, or in the extinction of local water-dependent fauna and flora. The degradation of ecosystems in turn negatively affects human populations, for example by reducing local water supplies and available food levels. While the needs of specific ecosystems vary, humans cannot simply disregard the water needs of the environment as it provides goods and services of immense value.

Figure 1 illustrates the percentages of water use by the three traditional sectors for high-income countries, low- and middle-income countries, as well as a global average.⁸

⁵ UNDP, *Op. Cit.*, p. 30.

⁶ World Resources Institute (2000), *EarthTrends: Will there be enough water?* p. 4.

⁷ The EU estimates that ecosystems on Earth provide nearly 26,000 billion euros' worth of goods and services. World Water Council (2008), *Water and Nature*.

⁸ UNESCO (2003), *World Water Assessment Report I: Executive Summary*, p. 19.

	Agriculture	Industrial	Domestic
High-income countries	30	59	11
Low- and middle-income countries	82	10	8
World	70	22	8

Water Scarcity

Water scarcity is a contemporary reality. It is officially defined as the point at which the total demand of all users (including the environment) cannot fully be satisfied. Water scarcity is also a relative phenomenon. Considered as a question of supply and demand, water scarcity can be caused by a drop in supply (for instance, by damming a river, subjecting a river to heavy pollution) or by a surge in demand (for example, rapid urbanisation increases pressure on limited supplies in the vicinity of cities). Thomas Homer-Dixon also points to a third cause of scarcity, which he calls structural. This refers to situations where water access for specific groups of users changes, to the profit of some and the detriment of others.⁹ Finally, scarcity, while mostly a quantitative issue, can equally have a qualitative dimension. For example, if water is severely contaminated, it may become unsuitable for consumption or other uses.

If we continue using the analogy of supply and demand to understand water scarcity, we find factors that decrease supply and others that increase demand. The primary factor increasing demand will be growing populations, as enlarged populations both create additional water needs and reduce available supplies. Increasing wealth in certain segments of societies also generates additional competition between water uses. Presently, there are about 6 billion humans on earth, though experts predict the planet's population will reach 8.9 billion by 2050. These people will need water for domestic, agricultural and industrial purposes. During the 20th century, the earth's human population grew threefold but its water consumption rose by a factor of 6, representing both a gross increase as well as a per capita increase. The per capita increase is linked to a raise in the quality of life and standards of living during that century: better lifestyles and standards of living require more water to sustain. In particular, changes in patterns of food consumption that come with increased wealth and choice provided by modern society also contributed to the per capita increase in water usage. Affluent, western-style diets tend to emphasise the consumption of meat, which requires more water to produce than other staples.¹⁰

Increased population will also lead to a decrease in the supply of water, in the form of pollution. All three water use sectors create pollution, which may contaminate remaining supplies. Intensive agricultural practices can contaminate groundwater

⁹ I. Van der Molen & A. Hildering (2005), "Water: cause for conflict or cooperation?," *Journal on Science and World Affairs*, p. 135.

¹⁰ A FAO study demonstrates that 1kg of fresh bovine meat requires 15m³ of water. The same amount of cereals (1kg) requires 1.5m³.

supplies via nitrogen leaching.¹¹ The use of pesticides can also result in water contamination, either in rivers or aquifers. Industrial waste is a necessary by-product of many manufacturing processes, but runs the risk of reducing overall water resources, as industry returns a very high proportion (96%) of the water it uses back to its sources. In both developed and developing countries, much of this water is returned untreated. The domestic sector's pollution stems primarily from the production of human waste, which is also often returned untreated. The result is clear: greater populations lead to more pollution and thus less water, especially if the effects of effluents are not treated appropriately.

Climate change is another phenomenon that will affect global water supplies. At present however, its precise consequences are unknown, though some experts have ventured predictions that precipitation will increase over the latitudes of 30°N and 30°S. In contrast, the tropical and sub-tropical regions will likely receive less and increasingly irregular precipitation, affecting all three classical sectors of water use. Extreme weather events are also likely to become more common. The impact of climate change on water supplies – while still uncertain – must thus be closely considered as it is precisely this uncertainty that will pose the greatest challenges for water governance.

The portrait of water scarcity in the world today is therefore a grim one. Water experts define scarcity as a situation where a person does not have access to 1700m³/year of water. Presently, 700 million people in 43 countries live in situations of water stress. By 2025, this number will rise to 3 billion people. The situation therefore appears to be one of increasing competition for scarcer water resources. It is in the light of these figures, as well as the combination of longer-term trends of increased demand and lowered supply, that some have declared the world to be experiencing a water crisis, one that will intensify greatly over the coming years.

From water scarcity to water access

Yet the problem is not merely one of supply scarcity or stress, but one of inadequate access to improved water supplies. The 2006 Human Development Report is unambiguous: “Scarcity is a product of public policies.”¹² In other words, access to water is compromised by suboptimal governance systems. Indeed, the 2nd World Water Development Report adds that “the capacity of countries to provide water supply and sanitation for all ... depends to a large extent on their ability to establish sound and effective governance systems.”¹³ The issues of access to water or water scarcity are therefore intimately linked to wider aspects of public policy, including poverty reduction, infrastructure construction and maintenance, the legal status of certain social groups, and the role of the private sector in delivering basic services. The list goes on and on. Ultimately, good water governance will succeed in distributing water equitably between all users and sectors, as well as ensuring that environmental needs are also met.

¹¹ Nitrogen leaching refers to the process whereby excess nitrogen (for instance nitrogen used in chemical fertilizers for agricultural purposes) seeps into the soil and contaminates groundwater supplies.

¹² UNDP, *Op. Cit.*, p. 10.

¹³ UNESCO (2006), *World Water Development Report II: Executive Summary*, p.7.

Failures or weaknesses in the governance process may result in compromised access to water. Mali, for instance, is a landlocked country in Northern Africa. Though desert and arid to semi-arid conditions are the main features of its northern and central regions, it has abundant water resources in the south. The per capita volume of water available to each Malian is 10,000m³ – a very large amount. Mali’s main problem is that this water is not necessarily conveniently located for its population – also dispersed irregularly – to access it readily. Indeed, only 0.2% of its water resources have been tapped: a clear example of where underdevelopment (especially of its water infrastructure) prevents higher proportions of people from gaining access to water resources. In addition, inconsistent national water-pricing policies have discouraged private investment in the Malian water sector. Thus Mali faces challenges in developing strategies to exploit its water resources more effectively, while also trying to attract private investment to address the gap in infrastructure needs.

The basic needs in water, according to the World Health Organisation, are 50-100L per person per day. 25L per person per day is required to sustain life, but this is not sufficient to cover basic hygiene and consumption needs. North Americans living in residential areas consume on average 600L per day and Europeans use between 250L and 350L. This starkly contrasts with the 10L to 20L used per inhabitant in Sub-Saharan Africa.¹⁴ Currently, 1.1 billion people lack access to adequate water sources and 2.6 billion lack access to adequate sanitation systems.¹⁵ Coverage rates are lowest in Sub-Saharan Africa, while the largest populations without access to improved water are in Asia.

Figure 2 compares the percentage of the world’s available freshwater resources against distribution of the world’s population.¹⁶

¹⁴ UNESCO (2006), “Challenges for Well-being and Development”, *World Water Development Report II*, p. 46.

¹⁵ Improved water refers to “water technologies more likely to provide safe drinking water than those characterised as unimproved.” Improved water sources include: water delivered to a dwelling via pipes, a public tap or standpipe, a protected dug well or spring. By contrast, unimproved water sources include: unprotected dug well and spring, tanker-truck, surface water (from rivers, streams, ponds, etc.). Similarly, improved sanitation alludes to “sanitation facilities more likely to prevent contact with human excreta than unimproved facilities.” Improved sanitation facilities include: a flush latrine to piped sewer system, a septic tank, a pit latrine with slab. Unimproved facilities include: flush latrines to elsewhere than a piped sewer system, pit latrines without a slab or open pit, a bucket, the bushes. Taken from MDG metaindicators.

¹⁶ UNESCO (2003), *Op. Cit.*, p. 9.

Figure 2: Estimated distribution of world population compared to the availability of freshwater resources

	Percentage of the world's population	Percentage of the world's available freshwater resources
North and Central America	8	15
South America	6	26
Europe	13	8
Africa	13	11
Asia	60	36
Australia and Oceania	<1	5

Worldwide Attempts at Water Governance

There are ongoing international efforts to establish a framework for managing the issue of water. First and foremost, the United Nations system includes 23 agencies that deal with water in some respect. For instance, the UN Development Programme (UNDP) considers water as it relates to development. UNESCO runs the World Water Assessment Programme, which in its own words: “monitors water issues in order to provide recommendations, develop case studies, enhance assessment capacity at a national level and inform the decision-making process.”¹⁷ The *World Water Development Report* is its flagship report that discusses the state of water resources and their use. It draws upon the knowledge and expertise of the 23 UN agencies involved with water management.

The United Nations system is also involved through the Millennium Development Goals (MDGs). These goals were set at the UN Millennium Summit, and are meant to address the developmental needs of the world's poorest. There are 8 MDGs, each of which revolves around a general theme. Each theme includes a number of specific targets. Goal 7, on *Ensuring Environmental Sustainability*, includes water. One of its objectives is to “halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.”

The World Water Council is another leading organisation in the field of water. It was created at the behest of the UNDP and the World Bank in 1996. It is an international multi-stakeholder platform best known for its World Water Forums, which are held every three years. At the last forum, held in Mexico in 2006, the onus was placed on governments to manage water resources, implying greater investment in infrastructure to ensure access and distribution to entire populations. This represents a clear recognition that water scarcity is indeed a question of governance.

¹⁷ WWAP: <http://www.unesco.org/water/wwap/>.

B. Growing water stress and inadequate access to water: what are the implications?

While the word “crisis” is often overused in public policy debates, the implications of inadequate and inequitable access to water are so severe that the term is far from an overstatement.

Negative impacts on development and equality

While water stress and scarcity affects industrial and large-scale agricultural users of water, above all the global water crisis impacts poor people using water to meet basic personal and domestic needs. Two thirds of the 1.1 billion people with inadequate access to water live in the developing world on less than \$2.00 per day”. The remaining third live on less than US\$1.00 a day. Increasing water stress and inadequate access to water endanger livelihoods, food security and especially public health. Almost half of all developing country citizens suffer from health problems caused by poor water and sanitation. Indeed, unclean water and inadequate sanitation have killed more people over the past 100 years than any other cause. Every year, 1.8 million children die from diarrhoea due to contamination of drinking water, while 3,900 children die each day because of dirty water, poor hygiene and lack of basic sanitation.

The negative development effects of the global water crisis are compounded as lack of access to water exacerbates social inequalities. As the United Nations High Commissioner for Human Rights points out, poor and marginalised populations, including children, women, indigenous groups, displaced persons, and those living in slums and remote villages, suffer the most from inadequate access to water. It disproportionately affects women’s wellbeing, as women and girls in many parts of the South are required to spend multiple hours every day collecting and carrying water. This often results in gender gaps in school attendance and employment opportunities.

Ironically but perhaps unsurprisingly, some of the world’s poorest pay the highest prices worldwide for water. While 90% of water utilities in poor countries do not charge retail users enough to cover operations and basic maintenance, the residents of slums in Manila, Jakarta and Nairobi pay more for water than consumers in London and New York. Yet, access to water is not a priority for many donors and developing country governments. The low priority accorded to water is reflected in insufficient budgetary allocations, with developing countries typically spending less than 0.5% of GDP on water and sanitation. The UNDP estimates that expenditure of at least 1% of GDP would be required in order to meet the MDGs. Most developing country governments also fail to include investment in water and sanitation in the first round of their national poverty reduction strategies. On the donor side, aid for water and sanitation has fallen in real terms over the past ten years. Today, the sector attracts less than 5% of development assistance; support for water and sanitation must double in order to make the interlinked MDGs on water and sanitation obtainable. However, improving access to water is not simply a question of financial resources. Countries such as Sri Lanka and Viet Nam have been far more successful in providing their citizens with access to water than would be expected on the basis of income alone. As the 2006 *Human Development Report*

underscores, “income matters, but public policy shapes the conversion of income into human development.”¹⁸

One reason access to water has struggled to attract the necessary attention from donors and developing country governments is the difficulty of measuring the massive economic waste caused by poor access to water and sanitation. Recent research on the subject confirms that countries facing inadequate access to water experience major losses through higher health care costs, lower productivity and significant labour diversions. In Sub-Saharan Africa, these losses amount to over \$28 billion, surpassing the annual aid flows and debt relief to the region.¹⁹ Some bilateral donors such as the United Kingdom have recognised the need to make water a priority. CIDA has made environmental sustainability one of its five priorities; freshwater supply and sanitation is a component of this goal.

Increased risk of conflict

The severe implications of water stress and inadequate access to water and sanitation translate into greater risk of conflict, particularly in the developing world. Thomas Homer-Dixon identifies five main types of violent conflict related to environmental scarcity: (i) conflict arising as a direct result of local environmental degradation; (ii) ethnically-charged conflict arising from migration and social divisions associated with scarcity; (iii) civil unrest caused by scarcity; (iv) inter-state wars induced by scarcity; and (v) North-South conflicts over responsibility for mitigating and compensating for international environmental degradation.²⁰ Homer-Dixon argues that the fourth type of conflict, international wars caused by resource scarcity, is the least probable.

Conflicts over water certainly have the potential to spread internationally, as two in every five people live in water basins shared by multiple countries, while more than 200 major river systems are shared by two or more countries. However, water scarcity and inadequate access to water typically result in a much higher risk of local instability and conflict, such as the protests and riots that destabilised Bolivia from 1998-2000 (see Annex). In these cases, conflict is often rooted not in resource scarcity, but in perceived injustice in the distribution of a resource such as water.²¹ Increasingly, national conflicts over water are taking on urban/rural dimensions, as expanding cities and industries increase pressure on water resources in the countryside.

Whether international, national or local, conflicts are rarely mono-causal. While water scarcity is unlikely to spark conflict on its own, tension over dwindling supplies and unequal access to them may serve as one of a number of factors that lead to conflict.

¹⁸ *Ibid.*

¹⁹ UNDP (2006) *Op. Cit.*, p. 15.

²⁰ T. F. Homer-Dixon (1999), *Environment, Scarcity, and Violence*, Princeton: Princeton University Press, and I. van der Molen and A. Hildering (2005), “Water: Cause for conflict or co-operation?”, *Journal on Science and World Affairs* 1.2, p. 135.

²¹ P. Richards (2004), *No Peace, No War: An Anthropology of Contemporary Armed Conflicts*, Athens, Ohio: Ohio University Press.

At the same time, inadequate access to water may hamper peace-building efforts. For example, poor access to water is a critical problem in many parts of Afghanistan, which compounds the severity of land conflicts, encourages farmers to cultivate opium poppy (a drought-resistant crop), and undermines efforts to promote peace and development.

Increased opportunities to cooperate

While the risk of conflict over water is often exaggerated by pundits warning of the coming “water wars”, the impacts of climate change stand to heighten the potential for violence. It is therefore important to maximise the many opportunities for cooperation in the governance of water resources. Opportunities to cooperate involve not only national governments concerned to protect their own water resources, but also the private sector, civil society groups, and development actors including donors.

At present, many cross-border water management institutions are weak, heightening the risk of conflict. Yet, there are several strong examples of effective international cooperation to govern shared water resources, including the Canada-U.S. Boundary Waters Treaty Act and the International Joint Commission (IJC). Signed in 1909 between the U.S. and Great Britain (on behalf of Canada), the Boundary Waters Treaty Act established the IJC with the mandate to prevent and resolve water disputes via quasi-judicial, investigative, advisory, administrative and arbitral functions. The IJC has gradually developed a reputation as an impartial, objective actor, and has consequently been able to achieve a high level of consensus in more than 100 cases it has resolved.²² In the Middle East, remarkably successful cooperation in the management of water resources between Jordan, Israel and the Palestinian Authority may serve as a foundation for cooperation on other contentious issues in the Palestinian-Israeli peace process. This experience reflects researchers’ observation that “highly cooperative” approaches to transboundary water management often involve more than two countries.²³ (See annex 1 for additional case studies on cooperation and conflict surrounding water).

The privatisation of water has historically been a flashpoint for conflict. However, valuable opportunities exist for cooperation between the public and private sectors to avert conflict by providing clean, reliable and affordable water. For example, the private sector may play a leading role in popularising new irrigation technologies that protect water resources by increasing the “crop per drop” ratio. Yet it is important not to overstate the potential of public-private partnerships. Public financing and governance remains key, particularly as many public-private water partnerships have historically turned a blind eye to the needs of the poorest.²⁴ It is essential to move beyond dichotomies and rigid positions on the role of the private sector in water provision if cooperation opportunities are to be maximised. Many thoughtful water advocates

²² UNAC (2007), *A Human Right to Water: Summary Report*, Ottawa: UNAC, p. 14.

²³ A. T. Wolf, S. B. Yoffe and M. Giordano (2003), “International waters: Identifying basins at risk”, *Water Policy* 5.1.

²⁴ P. H. Gleick *et al* (2002), *The New Economy of Water: the Risks and Benefits of Globalization and Privatization of Fresh Water*, Oakland: Pacific Institute for Studies in Development, Environment and Security.

contend that arguments about privatisation are now simply a distraction that detracts attention from more pressing debates on public utility reform, transparency and regulation. Furthermore, debates on privatisation have often obscured the fact that while 90% of water delivered through networks in the developing world is publicly supplied, the vast majority of impoverished people are already getting their water from private “water freelancers”, as their communities are not connected to the public systems.

In addition to public-private partnerships, there are also extensive untapped opportunities for improved cooperation between donors and developing country governments. The need for greater cooperation is evidenced by the fact that while by some calculations, we are on track to meet the MDG on water because of strong progress in China and India, in Sub-Saharan Africa, the targets will not be met until 2040. Furthermore, progress in China and India has not been sustainable, but has resulted in water stress owing to practices such as the rapid depletion of groundwater supplies. The UNDP suggests that US\$10 billion is needed to close the gap between current and target trends for the interlinked MDGs on water and sanitation. While this is certainly a significant investment, it is important to place the figure in context: US\$10 billion is equivalent to less than five days of global military spending, or less than half of what wealthy countries spend annually on mineral water.

With 23 different UN bodies dealing with water and sanitation in some form, there is no shortage of international agencies to promote cooperation on water. However, “nationally owned” water strategies that link national poverty reduction strategy plans and global action plans are in short supply. Should these strategies be created, there is the potential for extremely high rates of return on investments in water and sanitation: the UNDP calculates that each dollar spent in the sector creates another US\$8 in increased productivity and costs averted. An unresolved point of contention is the level at which investments should be made. Although small infrastructure investments appear to yield the highest returns, developing country governments and donors have typically favoured large-scale schemes.²⁵ Beyond infrastructure investments, donors have a critical role to play in supporting improved regulation efforts, targeted subsidy programs, and attainable targets (e.g., that no household should have to spend more than 3% of its income on water). To promote more effective governance of water resources, it will also be important to support adaptation strategies, and bolster customary approaches to managing water resources.

Efforts to resolve the global water crisis are intertwined with increasingly influential national and international debates on water, including the debate on recognising water as a human right. Currently, interpretations of what a possible right would entail vary greatly, and there is no consensus among states on the existence, scope or content of a human right to water. Recently the debate has focused on access to safe drinking water and water for other basic personal and domestic needs, rather than water for uses in other sectors such as agriculture, and has involved not only states and international organisations, but also a diverse range of scholars, advocates and NGOs with a wide variety of views on the existence and nature of a human right to water.

²⁵ International Water Management Institute (2007), *Water for food, water for life*, London: Earthscan.

Conclusion

To sum up, the importance of fresh water to human life is undeniable and at the heart of many contemporary freshwater polemics. The oft-mentioned water crisis refers to the combination of increasing demand for fresh water resources by larger populations with more water-expensive lifestyles and dwindling supplies. While environmental processes such as climate change may exacerbate water scarcity, governance processes and public policies are the principle contemporary factors affecting access to adequate supplies of water for industrial, agricultural and domestic uses. Inadequate access to water threatens two major objectives of many countries, namely promoting development and achieving social equality. Substantive research demonstrates that it is the poor who suffer the most from inadequate water access.

As with any important natural resource, the lack of fresh water can raise tensions and lead to conflicts. These disagreements can take place between states or between competing users within a single state, though in both cases one must recognize that conflicts are rarely mono-causal. However, water stress and scarcity can also compel actors to cooperate in the search of solutions. As in the case of conflict, cooperation can take place on many levels, among riparian states or between the private and public sectors. Ongoing developments in international affairs point to a renewed focus on issues related to fresh water governance, including human rights aspects, which will present legal and practical challenges to future governments and public actors.

ANNEX 1: Case Studies

Case study 1: Cooperation

The International Joint Commission

The International Joint Commission (IJC) is a bilateral body that was created jointly by Canada and the United States by the adoption of the 1909 Boundary Waters Treaty (BWT). Its purpose is “to help prevent and resolve disputes relating to the use and quality of boundary waters and to advise Canada and the United States on related questions.”²⁶ The IJC may be called upon by governments to authorise the use of water resources in a certain way. It may investigate cases of water or even air pollution and issue recommendations to both governments.

A major aspect of the Commission’s work relates to the Great Lakes. There have been a number of important agreements between Canada and the US with respect to the state of the Great Lakes, such as the 1972 Great Lakes Water Quality Agreement. Further agreements came in 1978 and 1987, calling upon the Commission to review action plans to promote water quality in the Great Lakes. Other issues the IJC has tackled include dam-building on the Kootenay, Osoyoos and Columbia Rivers, and overseeing the Rainy Lake system. The IJC represents an institutionalisation of the Canada-US relationship as it pertains to water issues and, as such, embodies the potential that cooperation holds for states sharing water resources.

Case study 2: Conflict

The Euphrates Basin

The Tigris and Euphrates Rivers originate in eastern Turkey and flow in a south-eastern direction through Syria and Iraq before emptying into the Persian Gulf. The relationship between the three states over these rivers was one of “varying degrees of hydropolitical tension” throughout the 1960s.²⁷ Turkey and Syria unilaterally built dams on the Euphrates in the 1960s and early 1970s. Turkey constructed the Keban Dam from 1965 to 1973 and Syria built the Tabqa Dam from 1968 to 1973. As the dams’ reservoirs began to fill in 1973, the downstream flow of the Euphrates diminished significantly.

In 1974, Iraq protested this development, asking Syria to allow more water to flow downstream from its dam. In 1975, Iraq claimed that the flow had dropped even further, and requested the intervention of the Arab League. A spiral of mutual recriminations and hostile statements ensued, leading Syria to close its airspace to Iraq in May of that year. Both countries reportedly moved troops to their borders. *In extremis* mediation by Saudi Arabia managed to halt the escalating situation a month later. An agreement was reached between the two riparian states, though its terms were not made public.

²⁶ International Joint Commission: http://www.ijc.org/en/background/biogr_commiss.htm.

²⁷ OSU transboundary water project: <http://www.transboundarywaters.orst.edu/>.

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