





# A looming crisis



While most of the world focuses ever more on climate change and ways and means of controlling the build-up of greenhouse gases, a less celebrated but potentially just as important issue is evolving in the realm of water resources (Figure 1.1). The two issues are not unrelated. Behind both lie the twin factors of a burgeoning world population and rapidly developing economies.

Despite repeated efforts and resolutions by the international community, from G8 summits to the World Water Forum, aimed at improving water supply and sanitation around the world, we are losing ground. There are now more people without safe water and sound sanitation than there were at the turn of the century. The poorer countries are suffering most, and everywhere it is the poor, the young and the old that are most vulnerable. Growing millions of urban poor have no access to safe, centrally supplied water and are forced to use polluted surface or ground water, or else pay over the odds for water from commercial tankers. More than a third of the world population (over two billion people) presently live in countries suffering moderate to severe water stress (less than 1700 m<sup>3</sup> per person) and three-quarters of them live in regions classified as 'water scarce', with

less than 1000 m<sup>3</sup> per person – that is, below the global average (see Figure 2.1). By 2025, between half and two-thirds of the world population is likely to suffer water stress, perhaps as many as four or five billion out of a world population of eight billion. Nearly 2.5 billion could be in water-scarce regions. Africa is likely to be particularly badly hit as populations grow. By 2025 the number living in water stress or scarcity could increase more than threefold to 700 million, of whom nearly two-thirds will be suffering water scarcity.

## Factors behind reduced water resources

The main driving factor behind the reduction in available water resources per head of population is population growth. Climate change is an important factor, but not in terms of total global per capita resources. Actually, it is likely to increase global resources rather than decrease them. Global riverflow, which is the basic yardstick for water resources, is likely to increase by between two and three per cent by 2020, which means

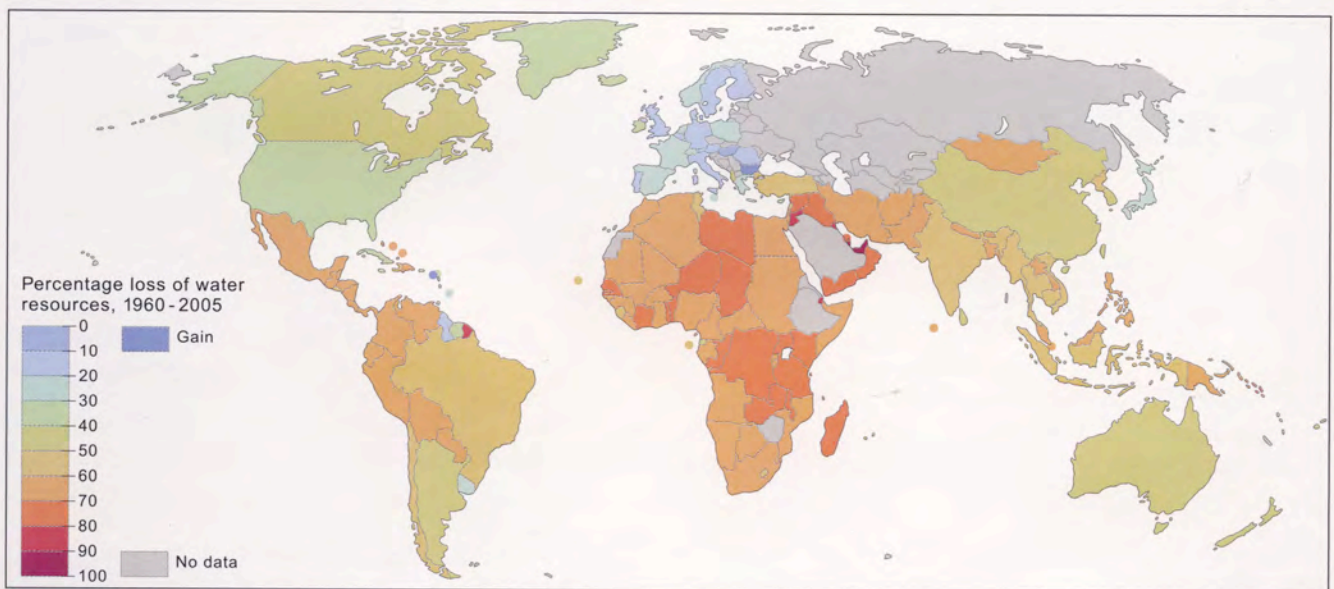


Figure 1.1 Decline in per capita water resources since 1960



## Key issues

- 3.6 million people die each year from water-borne disease, of which 2.2 million are in the Least Economically Developed Countries where 90 per cent are children under the age of 5 years.
- A baby dies from water-related disease in the developing world every 20 seconds, some 4500 a day.
- Half the population of developing countries are exposed to polluted water. Many are forced to drink polluted water, buy water expensively from truckers or else drink none at all.
- 40 per cent of the world population, 2.6 billion people, have no access to basic sanitation, rising to nearly 50 per cent in Asia and 70 per cent in Africa.
- Over 1.1 billion people, 17 per cent of the world population, have no access to safe drinking water, including 300 million people in sub-Saharan Africa.
- Population growth and increasing demand is set to reduce global per capita water resources by more than a third in the coming 50 years.
- A third of the world population presently live in countries suffering moderate to severe water stress and this is likely to rise to two-thirds of a much larger population by 2025.
- Poorer countries are the most vulnerable to water stress. Many suffer from harsh climates, unreliable rainfall, poor governance and corruption, and rapid population growth, plus a lack of expertise, technology and finance to overcome problems. The growing urban poor, the old and the very young are worst affected.
- 1 in 10 rivers now run dry for part of the year, some due to climate change, many due to overuse.
- In the Himalayas and Tibetan Plateau, glaciers and ice caps whose seasonal meltwaters are essential to the welfare of 40 per cent of the world population are melting at an accelerated rate.
- Climate change will cause a major redistribution of global water resources – in general regions now short of water will get less, and regions that currently have plenty of water will get more.
- Water wars are in prospect. Shared water resources are a source of conflict: two-thirds of rivers in Africa and Asia cross national frontiers. So do many aquifers.
- Agriculture is the largest water user in the world, consuming some 70 per cent of available resources, much of it in inefficient irrigation. Ten countries use more than 40 per cent of their water resources for irrigation.
- Commercialization, privatization and globalization of water have been detrimental in a number of developing countries, with conflicts between profit motive and service provision, and clashes between multinational companies, national governments and the people. Financial crises are now rapidly transmitted around the world affecting water and sanitation provision.
- World trade is encouraging some countries to use substantial portions of their water resources to produce goods for export. This is not always done in the most efficient manner or without a detrimental impact on domestic supplies.
- Unsustainable groundwater mining – using more than is being replenished – is on the increase. By 2000, Libya and Saudi Arabia were already using considerably more water than their annually renewed resources.
- Rising acts of terrorism now add new fears for water security.

around 800–1200 km<sup>3</sup> a year extra resources in a total global riverflow of 34–41,000. Computer models suggest global riverflow could rise by four per cent over the first half of the century and it could reach six or seven per cent by 2100, i.e. 2000–2800 extra cubic kilometres.

The problems with climate change lie elsewhere: in changing the distribution of resources around the world;

changing the timing, variability and reliability of rainfall; increasing the occurrence of extremes – floods, droughts and intense storms; melting the glaciers; affecting water quality and acid rain; and through its indirect effects like sea-level rise, the impacts on agricultural crops and changing patterns of disease. All of which are likely to affect the poorer countries more.



This really shows the fallacy of placing too much emphasis on *average* resources. Just as water is not evenly distributed across the land, so uneven growth in population and the uneven effects of climate change are set to make matters worse. Most of the extra resources will be in middle to high latitudes, roughly polewards of 45°. The subtropics and the desert margins will suffer the worst reductions in rainfall. Essentially, the water-rich will get richer, the water-poor will get poorer.

One reason why the CIA took a great interest in computer models from the early days in the late 1980s was the prospect of civil strife and large-scale international migrations being fomented by drought and shortages of food and water. Early models suggested the grain harvest in North America could be reduced by up to 20 per cent, which would drastically reduce the amount available for the food aid on which much of Africa depends. Former British ambassador to the UN, Sir Crispin Tickell (1977, 1991) saw the threats in the Least Economically Developed Countries very clearly. These threats are likely to spill over to developed countries as migrants try to seek asylum. Indeed, the boatloads of migrants entering Europe from North Africa may be the first sign of this. To this may be added flood migrants as tropical storms hit harder.

More subtle changes are already under way in regions that rely on glacier meltwaters for supplies. Virtually all mountain glaciers are melting, as are the polar ice sheets. Melting glaciers provide extra water for a while, until the ice is gone. The glaciers and ice caps in the Himalayas are generally melting more rapidly at present, though their demise is not quite as imminent as the notorious vanishing date of '2035' cited in the IPCC (2007) report, which was exposed as totally unfounded shortly after it was presented to the 2009 Copenhagen climate conference. Even less likely is the suggestion made on America's ABC television in 2008 by Indian glaciologist Syed Hasnain, the originator of the meltdown theory, that the Ganges would run dry by the middle of the century as a result. The ice bodies in the region constitute the largest mass of ice outside the polar regions – some glaciers are several hundreds of metres thick and they lie at altitudes of many kilometres. Professor Julian Dowdeswell, director of the Scott Polar Research Institute, has pointed out that the average Himalayan glacier is around 300 m thick, which means a melt rate of 5 m a year would take 60 years for it to melt completely. It could take hundreds of years at present rates of melting for all the ice to disappear,

and there is no guarantee that rates will be maintained; they have fluctuated widely over the past hundred years (Figure 12.2). Nevertheless, many rivers around the world, where the glaciers are thinner and at lower altitudes, are likely to suffer from reduced meltwaters. Glacier meltwaters could run out within decades for some Andean communities.

## A question of quality as well as quantity

The effects of global warming on water quality are also likely to be very significant, yet they have been receiving far less attention. Higher water temperatures have important chemical and biological consequences. The water will expel oxygen. Fish and other aquatic creatures can die through lack of oxygen. Higher rates of evaporation and longer, more severe drought periods will reduce river levels, slow down the flow and reduce natural aeration at rapids and waterfalls. The result is less natural self-cleaning in the rivers. At the same time, lower flows mean there is less freshwater to dilute polluted wastewater that is discharged into the rivers. In the early 1990s, during the worst multi-year drought of the twentieth century in south-east England, flow in many rivers was essentially maintained by untreated wastewater and sewage: the National Rivers Authority designated 44 rivers as endangered and suspended permits for discharges into the rivers. Warmer water encourages bacteria to multiply and decompose organic waste, enriching the water with nitrogen and phosphorus. Algae proliferate in the enriched water, killing other vegetation by using up the oxygen and reducing light levels. Toxic algal blooms are an increasing menace on reservoirs. To this may be added increasingly acid rain as it flushes more CO<sub>2</sub> from the air, which has already been blamed for acidifying the ocean.

The quality of water is an increasing problem, even without considering the effects of climate change and warmer rivers and lakes. Some 450 km<sup>3</sup> of wastewater are released into the world's rivers and lakes every year without treatment. This is more than one per cent of all the annual riverflow in the world. It takes 6000 km<sup>3</sup> of clean water to dilute it to a safe level, but much of it is reused before it reaches that status, and this is the source of many diseases. Even before the water is ingested by humans, the damage to river ecology and wildlife is immense.



Dire predictions made in the 1970s by the Russian hydrologist, M.I. Lvovich, that all the world's rivers would be useless by 2000 because of mounting pollution, have mercifully not materialized. This is in large part due to improved environmental regulation, especially in the developed countries. In Lvovich's Eastern Europe, matters have only progressed since the demise of the Soviet system in 1990, followed by the accession of many of the countries to the European Union making them subject to its environmental legislation. But the process is not yet complete there by any means.

Africa and Southern Asia are now the worst problem areas. Half the population of developing countries are exposed to polluted water. Many are forced to drink polluted water, buy water expensively from truckers or else drink none at all. Under ten per cent of the population in Ethiopia, Eritrea and the Congo have access to proper sanitation facilities (Figure 1.3). Nelson Mandela told a salutary story when he accepted the IGU Planet and Humanity Award in Durban in 2002. He had been asked by a rich American businessman to what he could most effectively donate money to help the young – perhaps school computers? Mandela replied that the greatest need was proper washing and sanitation facilities in schools. Contracting diarrhoea from unwashed hands was the prime cause of lost school days and the main obstacle to education. A report by WaterAid in 2009 called for attention to be given to diarrhoea for another reason. It kills more children than HIV/Aids, TB and malaria put together yet it receives a fraction of the funds.

The emerging powers of India and China are also still well behind the G8 nations. The map highlights two critical problems: most poor nations have inadequate provision and the worst provision is in the tropical regions. The combination of higher temperatures and poor sanitation in tropical regions is a leading threat to public health (see *Water-related infectious diseases* in Chapter 5).

There are well-founded fears that Southern Asia will be beset by rampant river pollution over the coming decades as populations grow, the poor migrate to the cities (often to insanitary shanty town slums) and countries with emerging economies industrialize. India and China are in the forefront. The Yamuna River, which is Delhi's main source of water, is beset with sewage, rubbish and industrial waste. In 2006 it had 100,000 times more faecal coliform than the safe limit. One billion tonnes of untreated wastewater are dumped in the Ganges

every day. A typical sample of water from the River Ganges contains 60,000 faecal coliform bacteria in every 100 ml of water. Over 400 million people depend on the river. Many bathe in it in the belief that it has unusual self-cleansing powers: in the largest religious festival in the world, the Pitcher Festival or Kumbh Mela, up to 50 million people attend the bathing ceremonies. Serious action may be about to be taken. The Ganga Sena (Army for the Protection of the Ganges) has over 10,000 student activists. In 2009, hundreds of students staged a demonstration in Varanasi distributing pamphlets and cleaning the ghats – the terraces of funeral pyres beside the river. The World Bank is now making a loan of \$1 billion for a five-year clean-up programme on the river beginning in 2010. However, previous attempts, like the 1985 Ganges Action Plan, have come to little: less than 40 per cent of the Action Plan targets were met and there was considerable backsliding afterwards.

Lakes and rivers in China are heavily polluted, particularly from industry. China has the fourth-largest water resources in the world, but over 60 per cent of its 660 cities suffer from water shortages and 110 suffer severe shortages. Pollution plays a large part in this: three-quarters of rivers flowing through urban areas are unfit for drinking or fishing and around a third are unfit for agriculture or industry. Nearly 700 million people drink water contaminated by human or animal waste. During the 2008 Beijing Olympics factories were closed or moved out of town. Even so, the government could only guarantee safe drinking water for the Olympic village, not the whole city. In 2007, China's third largest reservoir at Wuxi City in central China was covered with toxic blue-green algae. In 2006, the Hong Kong based Fountain Set Holdings, one of the largest cotton textile companies in the world, was releasing 22,000 tonnes a day of untreated wastewater contaminated with dye into the local river from its factory in Guangdong, turning the river red. It was fined \$1 million and has now installed a treatment plant, but this was not an isolated incident. One way that Chinese companies have kept exports competitively cheap over the last two or three decades has been to dump wastewater into the environment, despite the breach of national environmental legislation: treatment costs an extra 13 cents per tonne. Some companies have been falsifying their record books and officials have colluded with illegal activities. River pollution is said to deprive over 300 million Chinese of clean drinking water.



## Water and the natural environment

Protecting the environment is vital for protecting water resources, and *vice versa*. But this requires some entrenched attitudes to change, from governments and multinational companies to peasant farmers. Just as many in developing countries regard protecting the environment as a kind of western fashion that only rich nations can afford – having gained many of their own riches from unfettered exploitation in the past – so some also regard economizing on water use as something of a luxury that they cannot afford. This is especially the case where economies are dominated by the demands of agriculture, like India. Globally, around 86 per cent of all water withdrawals are used in agriculture. As populations grow, so more water will be needed for agriculture. Better informed farmers and more efficient irrigation systems are needed. Overuse of water for irrigation is not just a waste of water, it can destroy soils and poison rivers with salts, pesticides and fertilizers.

The link between land and water, between river basin and rivers, needs wider recognition. Conservation, preservation and restoration are concepts that all humankind needs to embrace, not just to maintain biodiversity and a healthy environment, but also to protect and conserve water resources for our own use and for future generations. This is the essence of ‘water sustainability’. Education has a vital role to play here. So too does what is termed ‘capacity building’ – training local people to solve water problems themselves.

Technological innovation has solved many problems in the past. Dams are the time-honoured solution, but like most technical solutions they have their drawbacks, especially the megadams now being built. But science and technology are rapidly expanding the suite of options. Developed countries may have the resources to overcome technical issues, but what about the developing world and what might mounting hunger, financial and social tensions, migration and conflicts do? Is increasing globalization a help or a hindrance? Is water too fundamental a social need to be in private hands? Is there, indeed, such a thing as a human right to water?

Over-pumping of groundwater and pollution of groundwater, especially by fertilizers and pesticides from agriculture, are growing problems around the world. Much of the western USA, including the grainlands of the Great Plains, is suffering from falling water tables. If this

leads to falling crop yields in the coming decades, this will have serious ramifications well beyond the USA, as this is one of the last remaining sources of food aid for the world. Large tracts of both China and India are in a similar situation. It is a leading reason behind grand plans for diverting rivers from one side of the country to the other in both countries. Many Middle Eastern countries are exploiting groundwater that has lain there for thousands of years. It is not being replenished in the present climate. They are using more than 100 per cent of their natural water resources, and it is ultimately unsustainable. Jordan and Yemen are pumping 30 per cent more water from their groundwater than is being recharged by rainfall and Israel is exceeding its renewable supplies by 15 per cent. This led Israel to sign a 20-year agreement with Turkey for the supply of 50 million m<sup>3</sup> of water from the River Manavgat in return for armaments in 2004. Libya has completed the grandest of diversion plans to bring ‘fossil’ groundwater from the central Sahara to the Mediterranean coastlands. Algeria has similar plans. But how long will such schemes and overdrafts last and what environmental damage will ensue?

From the tropical rainforests to the desert margins, destruction of land resources and wild habitats by agriculture, poor husbandry or pure commercial greed is also destroying water resources and aggravating flooding. The world’s wetlands have been decimated over the last half century. Most have been drained for agriculture, and some in the real or imagined belief that they are the source of disease. The result is less storage on floodplains for stormwater, so floods are worse downstream and more of the water that the wetlands might have released after the storm to bolster river levels has passed by uselessly as floodwaters. Reappraisal of flood controls after the disastrous floods on the Mississippi in 1993 has led to a programme to re-establish riparian wetlands in the headwaters. The Netherlands is now actively recreating wetlands for the same reason. Similar arguments surround deforestation. By and large, forests decrease flood hazard, although they do also reduce water resources by lowering riverflow across the board. Deforestation and poor agricultural husbandry also exacerbate soil erosion, which is reaching critical levels in many parts of the world. Soil erosion is not simply a loss for agriculture. The International Rivers Network estimates that severe soil erosion affects 80 per cent of the land surrounding the Three Gorges reservoir on the Yangtze River, much of it due to tree-felling for fuel and building materials.



This is causing 530 million tonnes of silt a year to enter the reservoir, reducing its water-holding capacity and affecting water quality for the towns along its banks.

The authorities in northern China are battling against environmental degradation caused by uncontrolled grazing, over-zealous irrigation, deforestation and over-pumping of groundwater. Desertification is spreading through northern and north-western China largely as a result. Water tables are falling and the desert is expanding by over 2500 km<sup>2</sup> a year in northern China.

## The Millennium Development Goals

The Millennium Development Goals set by the UN Millennium Declaration in 2000 include halving the number of people without access to safe water and sanitation by 2015 (Figures 1.2 and 1.3). Unfortunately, at the time of writing we are already two-thirds of the way there in time and way short on the numbers. International aid to developing countries has fallen well short of the promises. And

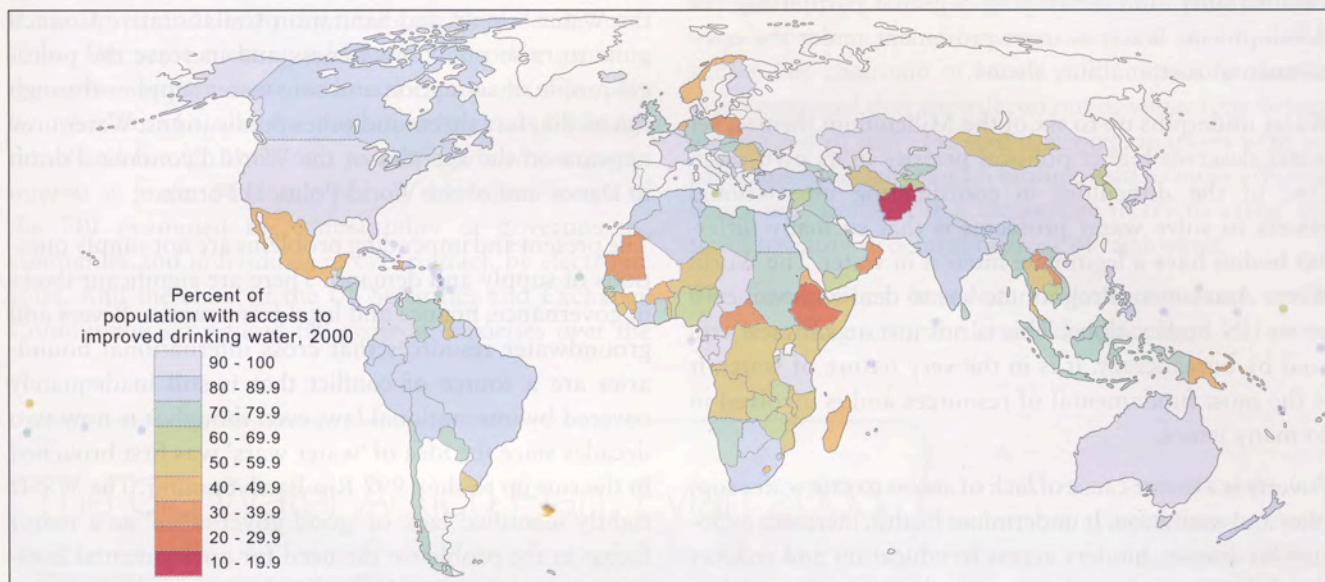


Figure 1.2 Access to safe drinking water when the UN Millennium Goals were set

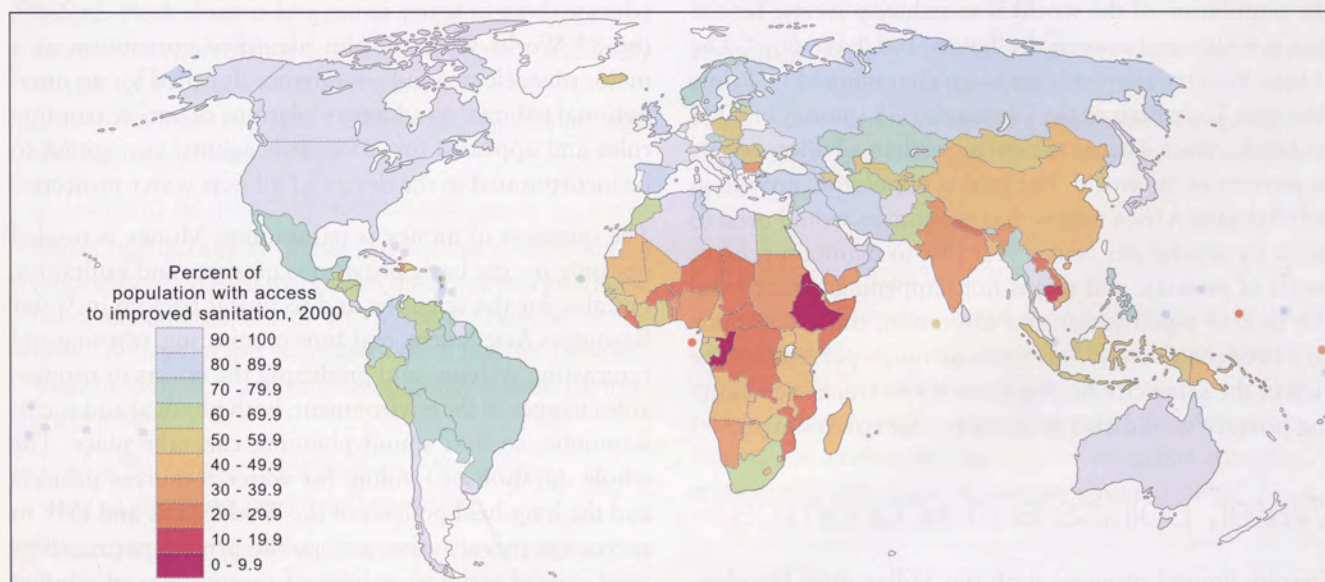


Figure 1.3 Access to safe sanitation when the UN Millennium Goals were set



the prospects seem bleaker following the credit crunch of 2008–9. Delivery of the Millennium Goals is frustrated by the twin forces of reduced international aid and growing populations. India is a clear example of the latter. In 2004–5, safe water and sanitation were provided for 325,000 more people, but over the last 20 years the population has been growing at up to 1.75m a year, four to five times the rate of growth in the provision of water services.

It is also regrettable that the MDG aims with respect to water were only sub-themes of the eight main themes: poverty and hunger, primary education, gender equality, child mortality, maternal health, diseases, environmental sustainability, and developing a global partnership for development. Water is most prominent under the environmental sustainability theme.

Water underpins up to six of the Millennium themes, yet water deserves higher political priority in its own right. One of the difficulties in coordinating international efforts to solve water problems is that so many different bodies have a legitimate interest in water. The World Water Assessment Programme has to deal with some 30 or so UN bodies alone. This is not just an obstacle created by bureaucracy. It is in the very nature of water. It is the most fundamental of resources and is involved in so many issues.

Poverty is a major cause of lack of access to safe water supplies and sanitation. It undermines health, increases exposure to disease, hinders access to education and reduces the ability to work, and so poverty breeds poverty. A key to improving water supply and sanitation for most of the population of the world is to reduce poverty. Yet the gap is widening between the 'haves' and 'have-nots'. The 'Make Poverty History' campaign championed by Prime Minister Tony Blair at the Gleneagles G8 summit in 2005 had little effect. There are now more than a billion people in poverty in the world. The rate of population growth in sub-Saharan Africa means that economies would need to grow by several per cent a year just to maintain present levels of poverty, and this is not happening. Apart from the lack of piped water and sanitation, the urban poor pay between five and ten times as much per litre as the rich in the same city buying from water truckers. Reducing poverty would also be good for the environment.

## Water, politics and economics

Despite limited progress with the Millennium Development Goals, water has moved up the political agenda

over the past decade or so. The World Water Assessment Programme, established by the UN in 2001, and the five meetings of the World Water Forum since 1997 have played a major role in informing politicians and the public of an impending crisis in water resources and its causes. The UN World Water Development Reports that the WWAP presents at the Forums are extremely valuable and highly influential, most notably in leading to the launch of the UN Water for Life decade 2005–2015, which aims to facilitate the Millennium Goals. The 2002 World Summit on Sustainable Development (WSSD) in Johannesburg also produced a number of useful initiatives. The WASH campaign launched at the WSSD by the Water Supply and Sanitation Collaborative Council aims to raise public awareness and increase the political profile of sanitation and safe water supplies through the media, fact sheets and other publications. Water now appears on the agendas of the World Economic Forum in Davos and of the World Political Forum.

The present and impending problems are not simply questions of supply and demand. There are significant issues in governance, finance and legal frameworks. Rivers and groundwater resources that cross international boundaries are a source of conflict that is still inadequately covered by international law, even though it is now two decades since the idea of 'water wars' was first broached in the run-up to the 1992 Rio Earth Summit. The WSSD rightly identified lack of 'good governance' as a major factor in the problems: the need for governmental institutions to plan for and supply adequate and affordable facilities for all their citizens, as well as to inform them, educate them in water issues and consult them. In 2009, the 5<sup>th</sup> World Water Forum identified corruption as a major obstacle to good governance. It called for an international tribunal to address violations of anti-corruption rules and appealed for safeguards against corruption to be incorporated in the design of all new water projects.

The question of money is paramount. Money is needed not only for the basic provisions of water and sanitation, but also for the scientific and technical backup in Water Resources Assessment, real-time monitoring, warning and forecasting systems, and predicting the effects of foreseeable changes in the environment, both physical and socio-economic, so that sound planning can take place. The whole question of funding for water resources projects and the long-held policies of the World Bank and IMF to encourage privatization and public-private partnerships need careful scrutiny in light of recent cases of conflict of interest between profit-making and service provision.





At the G8 summit in May 2003, appropriately held at Evian, the richest nations made a number of potentially valuable resolutions on both governance and finance in their Water Action Plan (see *The G8 Action Plan*). The subsequent appearance of water on the agendas of the World Economic and Political Forums is helping to implement some of these issues.

The World Economic Forum is particularly valuable because it engages large private companies as well as governments. At the 2008 Davos meeting, the UN Secretary-General shared the chair of a debate on the growing portion of world population living in regions of water stress up to 2025 with the heads of Nestlé and Coca-Cola. The same meeting addressed two other growing concerns: security from industrial espionage, especially by cyber attacks, and the impact of buy-outs by hedge funds and foreign sovereign wealth funds whose prime interest is profit. No less a person than the director of the FBI examined the vulnerability of governments, companies and individuals to cyber attack by electronic spies. And the chair of the US Securities and Exchange Commission scrutinised the growing anxieties over the

powerful role of hedge funds in global markets, accompanied by a number of major industrialists. These issues are of real concern to all countries with privatized water industries.

The perspective was widened at the 2009 Davos meeting to water in the context of fuel and food. A session on an integrated approach to energy, food and water security included a call for world leaders to establish a Natural Resource Security Council to cover food and water that can match the UN Security Council for War and Peace in its authority. A world authority such as this is needed to coordinate strategy to improve the efficiency of food supply chains: some 40 per cent of food production is lost or spoiled between the farm and the consumer. The chairman of Nestlé said at the time that he was 'convinced that we will run out of water long before we run out of fuel'. He said that open markets with no subsidies, especially not on biofuel, lead to more efficient water use, and that it is imperative to try to arrest the trend towards structural overuse of freshwater.

The connections between food, energy and water are becoming critical. Irrigated agriculture currently

## The G8 Water Action Plan, Evian 2003

### *1 Promoting good governance:*

Assisting countries that commit to prioritize water and sanitation as part of their sustainability strategy, especially as part of the eradication of poverty – helping with integrated management and developing institutional, legal and regulatory frameworks.

### *2 Utilising all financial resources:*

Giving high priority in Official Development Aid to sound proposals as catalyst to mobilise other monetary sources, direct encouragement of International Financial Institutions, and providing technical assistance to domestic financial provision and promoting public-private partnerships (PPPs).

### *3 Building infrastructure by empowering local authorities and communities:*

Help build systems, PPPs, community-based approaches and improved technologies at household level.

### *4 Strengthening monitoring, assessment and research:*

Encourage sharing of information from UN and other systems, including the websites established by the 3rd World Water Forum Ministerial Conference, and supporting research and collaboration on aspects of the water cycle.

### *5 Reinforcing the engagement of international organizations:*

Improving coordination within the UN Organization, and between institutions, like the World Bank, the Bretton Woods institutions and regional development banks. Proposals by the World Panel on Financing Water Infrastructure include funding and insuring risk mitigation schemes, and increasing flexibility in the rules covering loans.



produces nearly half of the food in the world by value. It is the main source of over-pumping of groundwater and falling water tables. Feeding a world population that is 50 per cent larger than now by mid-century will require at least 50 per cent more water unless there is a major shift in technology. It could take even more as people in the emerging economies, like China and India, change their diets and consume more meat, and invest in washing machines. To this may be added biofuel. It is estimated that just supplying five per cent of current energy from biofuel will double water consumption. But this is assuming the current approach and technology, which is changing: the British government for one has revised its plans for expanding biofuel use. Of more concern is biofuel crops taking up land that is supplying food crops.

One issue that caused considerable controversy at the World Economic Forum in 2009 and which has been hotly debated for some time among water policymakers is whether access to water should be a basic human right or simply a 'need'. These two small words hold the key to the difference between public and private in the water industry. If it is a human right, then governments should shoulder the responsibility of securing and subsidizing supplies. The majority of stakeholders at the 5th World Water Forum were strongly pro the right to water, despite two decades of World Bank support for privatization. At Davos 2009, it was argued that governments should provide people with up to 25 litres a day for drinking and hygiene, and that anything above this amount should be chargeable. Some argued that pricing water is necessary to restrain use. Only by attaching a price to water can a system of trading permits be established like those being implemented to constrain carbon

emissions. Farmers could then sell unused permits to other farmers and so hopefully reduce overall water consumption. However, the issue of pricing remains problematic: it may be necessary economically and to achieve sustainability, but it can also be politically risky in many countries. There is a compromise move developing among water providers towards pricing for 'sustainable recovery' of costs rather than full recovery, which was identified at the 2009 World Water Forum in Istanbul.

Davos 2010 had yet broader issues in mind following the 'great recession'. The theme was no less than: 'Improve the state of the world: rethink, redesign, rebuild.' The primary aim was to seek ways of creating more financial stability in the world to prevent a recurrence of the near meltdown of international finance that marred 2009 and has led to severe and continuing impacts on the water industry, including deferred refurbishment of old infrastructure, job losses and problems raising loans. Davos alone can only produce ideas. The G8, or more effectively the G20, which includes India and China, is the only place where there is any hope of an effective redesign of global financial systems ever being achieved.

## Conclusion

The threats to water sustainability are huge. Political awareness of the issues is increasing. Plans are proliferating. Technologies are advancing. But obstacles are also persistent and new ones are arising. The greatest threats are manmade. Will the fine words and good intentions prevail?

## Further reading

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