

The water crisis: how has it come to this?

Arguably the strongest message to emerge from the International Year of Freshwater is that the global water crisis will reach unprecedented levels in the years ahead if nothing is done to rectify the current ‘inertia at the leadership level.’

This is the sobering prediction of the *World Water Development Report – Water for People, Water for Life* published by UNESCO this year on behalf of 24 United Nations agencies. The report predicts ‘growing per capita scarcity of water in many parts of the developing world’ because of population growth, pollution and expected climate change.

Water supplies are falling while the demand per capita is dramatically growing at an unsustainable rate. Over the next 20 years, the average supply of water is expected to drop worldwide by one-third,’ notes UNESCO Director-General Koïchiro Matsuura. ‘No region will be spared from the impact of this crisis which touches every facet of life, from the health of children to the ability of nations to secure food for their citizens’.

So, how has it come to this? Simply because, despite widely available evidence of the crisis, political commitment to reverse these trends has been lacking. A string of international conferences over the past 25 years has focused on a great variety of water issues including ways to provide the basic water supply and sanitation services required in the years to come. Several targets have been set to improve



Above: Boats stranded in what used to be a deep-water port in south-west Kazakhstan. The Aral Sea has shrunk to about half its original size and what remains is heavily polluted, an ecological disaster (see also p.14)
Opposite page: Cultivating plants in the desert

water management but ‘hardly any’, says the report, ‘have been met. Inertia at leadership level and a world population not fully aware of the scale of the problem means we fail to take the needed timely corrective actions’.

Many countries and territories already in crisis

The report ranks over 180 countries and territories in terms of the amount of renewable water resources available per capita, meaning all of the water circulating on the surface, in the soil or deeper underground (*see table for both ends of the scale*).

By the middle of this century, at worst 7 billion people in 60 countries will be faced with water scarcity and at best 2 billion in 48 countries, depending on factors like population growth and policy-making. Climate change will account for an estimated 20% of this increase in global water scarcity. Humid areas will probably see more rain, whereas precipitation is expected to decrease and become more erratic in many drought-prone regions and even some tropical and sub-tropical regions. Water quality too will worsen with rising pollution levels and water temperatures.

The water crisis ‘is set to worsen despite continuing debate over the very existence of such a crisis’. One litre of wastewater pollutes about eight litres of freshwater. There is an estimated 12 000 km³ of polluted water worldwide, which is more than the total amount contained in the world’s ten largest river basins at any given moment. If pollution keeps pace with population growth, the world will effectively lose 18 000 km³ of freshwater by 2050 – almost nine times the total amount countries currently use each year for irrigation, which is by far the largest consumer of the resource. Irrigation currently accounts for 70% of all water withdrawals worldwide.

Using treated wastewater could ease the water crisis. Farmers already use this resource for about 10% of irrigated land in developing countries and could use more (*see overleaf Tips for improving water availability*).

In terms of water quality, the poor continue to be the worst affected, ‘with 50% of the population in developing countries exposed to polluted water sources.’ Asian rivers are the most polluted in the world, with three times as many bacteria from human waste as the global average. Moreover, these rivers contain 20 times more lead than those of industrialized countries.

‘The future of many parts of the world looks bleak,’ says the report, in reference to projected population growth

which will continue to be a driving factor in the water crisis. Per capita water supplies decreased by a third between 1970 and 1990, according to the report. Even though birth rates are slowing down, the world's population should still reach about 9.3 billion by 2050.

‘Water consumption has almost doubled in the last 50 years. Meanwhile, water quality continues to worsen [...]. Every day, 6000 people, mostly children under the age of five, die from diarrhoeal diseases,’ says the report. ‘These statistics illustrate the enormity of the problems facing the world with respect to its water resources and the startling disparities that exist in its utilization.’

‘Globally, the challenge lies in raising the political will to implement water-related commitments. Water professionals need a better understanding of the broader social, economic and political context, while politicians need to be better informed about water resource issues. Otherwise, water will continue to be an area for political rhetoric and lofty promises instead of sorely needed actions.’

Health and economics

The overriding problem of the 21st century is that of water quality and management. ‘More than 2.2 million people die each year from diseases related to contaminated drinking water and poor sanitation. Water vector-borne diseases also take a heavy toll: about one million people die from malaria each year and more than 200 million suffer from schistosomiasis. Yet these terrible losses, with the waste and suffering they represent, are preventable.’

The international community pledged through the UN Millennium Development Goals (2000) and at the World Summit on Sustainable Development (Johannesburg, 2002) to halve the proportion of people without access to safe drinking water and basic sanitation by 2015. To achieve these targets, an additional 1.5 billion people will require improved access to water supply (by 2015). This means providing services for another 100 million people each year (274,000/day) from 2000 to 2015.

‘The challenge for sanitation is more daunting. An additional 1.9 billion people will need improved access, which means another 125 million each year (or 342 000/day) from 2000 to 2015. The report explains that cultural factors further complicate the logistic and financial difficulties in providing adequate sanitation.

The two extremes in terms of water availability

The 20 water-richest countries and territories* (in m ³ per person per year)	
French Guiana	812,121
Iceland.....	609,319
Guyana	316,689
Suriname	292,566
Congo	275, 679
Papua New Guinea	166,563
Gabon	133,333
Solomon Islands	100,000
Canada	94,353
New Zealand	86,554
Norway	85,478
Belize	82,102
Liberia	79,643
Peru	74,756
Bolivia	74,743
Laos	63,184
Paraguay	61,135
Chile	60,614
Equatorial Guinea	56,893
Panama	51,814

The 20 water-poorest countries and territories (in m ³ per person per year)	
Kuwait	10
Gaza Strip	52
United Arab Emirates	58
Bahamas	66
Qatar	94
Maldives	103
Libyan Arab Jamahiriya	113
Saudi Arabia	118
Malta	129
Singapore	149
Jordan	179
Bahrain	181
Yemen	223
Israel	276
Barbados	307
Oman	388
Djibouti	475
Algeria	478
Tunisia	482
Burundi	566

* Excluding Greenland (10,767,857 m³) and Alaska (1,563,168 m³)

World Water Development Report – Water for People, Water for Life (2003)

Were current levels of investment to be maintained, all regions in the world could reach or come close to both goals, with the exception of sub-Saharan Africa. But ‘in absolute terms, the investment needs of Asia outstrip those of Africa, Latin America and the Caribbean combined.’ It is estimated that the first interventions would cost about US\$ 12.6 billion.

Questions remain as to the source of this investment. ‘Financing the Millennium Development Goals will probably be one of the most important challenges that the international community will have to face over the next 15 years’. The report outlines debates over water pricing and privatization.

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Tips for improving water availability

Did you know that you can bolster nature's capacity for replenishing groundwater simply by letting water seep through a river bank? Or by injecting water underground through boreholes? These are two examples of tried and true methods which have demonstrated their sustainability over time.

The water injection method is currently used in major cities like Berlin (Germany) where two-thirds of drinking water is bank-infiltrated. And the same process utilized in Berlin* with state-of-the-art monitoring is commonly used in rural India and southern Africa. In these parts, hand-dug pits and dams are used to collect floodwater or seasonal river flow and store it safely from evaporation in the form of groundwater which can later be pumped for use. These simple, low-cost structures can ease water scarcity in arid areas of developing countries through the storage of infrequent excess water.

Soil acts as a natural filter of particles in water, breaking down impurities like pharmaceuticals. In addition to being purified during its passage through the soil, water also leaches beneficial nutrients, thereby improving its quality. Aquifers even have the capacity to inactivate harmful micro-organisms like viruses, a prowess which is the object of intensive research. Thanks to the natural biological, chemical and physical processes occurring underground, treated reclaimed wastewater can be used safely for mostly non-potable purposes, a great asset for arid zones in particular where water is scarce.

Within a project launched with its partners in 2002, the UNESCO-IHP has published a brochure on how to replenish groundwater, entitled *Managing Aquifer Recharge*: <http://unesdoc.unesco.org/images/0012/001278/127843e.pdf>

You will find details of methods employed specifically in the drier regions of the world in a booklet UNESCO is currently preparing with the International Association of Hydrogeologists on *Wise Strategies for Recharge Enhancement in Arid and Semi-arid Areas*. The booklet is available at: <http://unesdoc.unesco.org/images/0014/001438/143819e.pdf>

* www.kompetenz-wasser.de

'Although it is considered essential to involve the private sector in water resource management, it should be seen as a financial catalyst – not so much as a precondition – for project development [...]. Control of the assets and the resource should remain in the hands of the government and users.'

Any privatization or water-pricing scheme must include mechanisms to protect the poor. 'A disturbing fact is that poor people with the most limited access to water supply have to pay significantly more for water.' In Delhi (India), for example, vendors charge the poor US\$ 4.89 per m³, whereas families with piped connections pay just US\$ 0.01, according to a survey published in the report. In Vientiane

(Lao PDR), vendors charge US\$ 14.68 per m³, compared to municipal tariffs of US\$ 0.11.

Hunger unlikely to be halved before 2030...

About 25 000 people die every day from hunger. An estimated 815 million people suffer from malnutrition: 777 million in developing countries, 27 million in countries in transition and 11 million in industrialized countries. The absolute number of malnourished people is dropping at a much slower rate, despite the fact that 'food production is satisfying the market demand at historically low prices'.

The international community has pledged through the Millennium Development Goals to halve the proportion of people suffering from hunger by 2015. However, by factoring in a distinction between rain-fed and irrigated crops (a distinction not made in previous estimates), the report is able to present more precise projections concerning the water required to feed the world today and in the future: it concludes that the target may not be achieved before 2030. According to these new calculations, another 45 million ha will be irrigated by 2030 in 93 developing countries, where most of the population growth will take place. About 60% of all land that could be irrigated will be in use. This will require a 14% increase in irrigation water.

Of the 170 countries and territories surveyed, 20 are already using more than 40% of their renewable water resources for irrigation, 'a threshold used to flag the level at which countries are forced to make difficult choices between their agricultural and urban water supply sectors'. Most of these are Arab states. Another 16 countries use more than 20%, 'which can indicate impending water scarcity. By 2030, South Asia will have reached the 40% level on average and the Near East and North Africa not less than 58%.'

By contrast, sub-Saharan Africa, Latin America and East Asia are likely to remain far below the critical threshold. These regions will see the bulk of agricultural expansion in the next 30 years.

Pastures and crops take up 37% of the Earth's land area. Irrigation is extremely inefficient – close to 60% of the water used is wasted. This will only improve by an estimated total of 4%. Moreover, About 10% of the world's irrigated lands have been damaged by waterlogging and salinization because of poor drainage and irrigation practices. There is a tremendous need to improve the financing of better technology and to promote better management practices.

...even though food security is growing

On a more positive note, food security is improving globally. Per capita food consumption in developing countries rose from 2054 kcal per day in 1965 to 2681 kcal per day in 1998.

Average grain yields doubled between 1962 and 1996, from 1.4 to 2.8 tons/ha/crop. This means that less than half the amount of arable land is now required to grow the same amount of grain. 'By 2030, it is expected that 80% of the increase in crop production will come from higher yields, increased multiple cropping and shorter fallow periods.'

'Towards 2050, the world could enjoy access to food for all,' notes the report. 'The fact that 815 million are presently ravaged by chronic undernourishment is not due to a lack of capacity to produce the required food but to global and national social, economic and political contexts that permit, and sometimes cause, unacceptable levels of poverty to perpetuate.'

We are nonchalantly destroying ecosystems

By 2025, it is predicted that water withdrawal will increase by 50% in developing countries and by 18% in developed countries.

The report describes a vicious circle unleashed by growing water demand. By depleting and polluting rivers, lakes and wetlands, we are destroying ecosystems which play an essential role in filtering and assuring freshwater resources. In the USA, 40% of water bodies assessed in 1998 were not deemed fit for recreational use due to nutrient, metal and agricultural pollution. Furthermore only five out of 55 rivers in Europe are considered pristine, according to the report and, in Asia, all rivers running through cities are badly polluted. Some 60% of the world's 227 largest rivers are severely fragmented by dams, diversions and canals leading to the degradation of ecosystems.

Turning to the animal life of inland waters, the report claims that 24% of mammals and 12% of birds are threatened with extinction. Only about 10% of the world's fish species, the majority from inland waters, have been studied in detail, yet one-third are at risk. Up to 80 known fish species have become extinct since the late 19th century.

When cities become life-threatening

'When infrastructure and services are lacking, urban areas lacking water infrastructure are among the world's most life threatening environments'. According to a survey of 116 cities, urban areas in Africa are the worst served, with only 18% of households connected to sewers, followed by Asia where the connection rate is just over 40%.

'The poor of these cities are the first victims of sanitation-related disease, flooding and even a rising rate of water-borne disease like malaria, which is now among the main causes of illness and death in many urban areas'. In South Asia, for example, the *Anopheles stephensi* mosquito has actually adapted its breeding habits around the ubiquitous rooftop water storage tanks.

'From a public health perspective, it is better to provide a whole city's population with safe supplies to taps within 50 m of their home than to provide only the richest 20% of households with water piped to their home.'

The report outlines several reasons as to why cities and towns should take priority over rural areas when choices must be made. Firstly, the unit costs of the required infrastructure are lower because urban areas provide significant economies of scale and proximity. Secondly, many cities have a more prosperous economic base than rural areas, providing greater possibilities for raising revenues for water provision. Thirdly, 'urban areas concentrate not only people and enterprises but also their wastes.'

Industrial countries produce 80% of hazardous wastes

Today, industry accounts for 22% of total water use in the world: 59% in high-income countries and 8% in low-income countries. The report predicts that this average will reach 24% by 2025 when industry will be using an estimated 1170 km³/year of water. Every year, 300–500 million tons of heavy metals, solvents, toxic sludge and other wastes accumulate in water resources from industry. More than 80% of the world's hazardous waste is produced in the USA and other industrial countries.

The pros and cons of tapping the hydropower potential

Hydropower is the most important and widely used renewable source of energy, providing about 19% of total electricity production. Industrialized countries are exploiting about 70% of their electricity potential, compared to 15% in developing countries. Canada is the largest producer, followed by the USA and Brazil. Untapped hydro-resources are still abundant in Latin America, India and China.

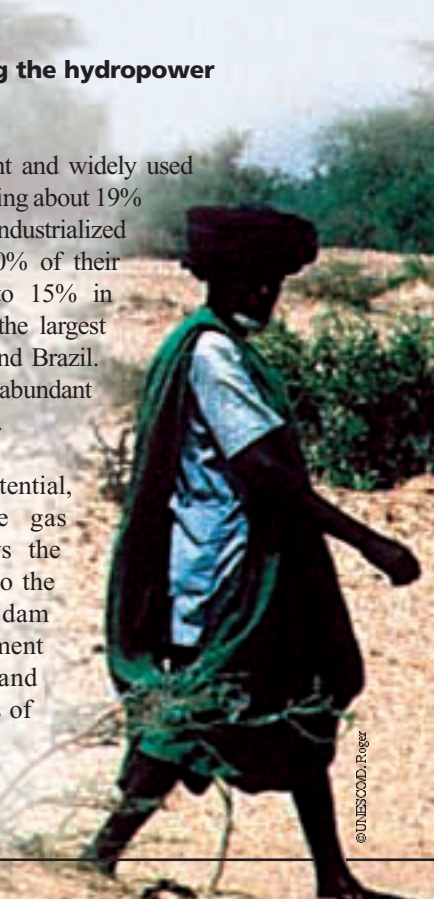
'By developing half of this potential, we could reduce greenhouse gas emissions by about 13%,' says the report. However, it also points to the many negative impacts of dam construction, including displacement of local populations and environmental damage (like loss of biodiversity and wetlands).

Amy Otchet



In Haiti, a woman bathes her daughter in their courtyard

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