



Overview

Beyond scarcity

Power, poverty and the global water crisis

The global crisis in water consigns large segments of humanity to lives of poverty, vulnerability and insecurity

The water is not good in this pond. We collect it because we have no alternative. All the animals drink from the pond as well as the community. Because of the water we are also getting different diseases.

Zenebech Jemel, Chobare Meno, Ethiopia

Of course I wish I were in school. I want to learn to read and write.... But how can I? My mother needs me to get water.

Yeni Bazan, age 10, El Alto, Bolivia

The conditions here are terrible. There is sewage everywhere. It pollutes our water. Most people use buckets and plastic bags for toilets. Our children suffer all the time from diarrhoea and other diseases because it is so filthy.

Mary Akinyi, Kibera, Nairobi, Kenya

They [the factories] use so much water while we barely have enough for our basic needs, let alone to water our crops.

Gopal Gujur, farmer, Rajasthan, India

Four voices from four countries united by a single theme: deprivation in access to water. That deprivation can be measured by statistics, but behind the numbers are the human faces of the millions of people denied an opportunity to realize their potential. Water, the stuff of life and a basic human right, is at the heart of a daily crisis faced by countless millions of the world's most vulnerable people—a crisis that threatens life and destroys livelihoods on a devastating scale.

Unlike wars and natural disasters, the global crisis in water does not make media headlines. Nor does it galvanize concerted international action. Like hunger, deprivation in access to water is a silent crisis experienced by the poor and tolerated by those with the resources, the technology and the political power to end it. Yet this is a crisis that is holding back

human progress, consigning large segments of humanity to lives of poverty, vulnerability and insecurity. This crisis claims more lives through disease than any war claims through guns. It also reinforces the obscene inequalities in life chances that divide rich and poor nations in an increasingly prosperous and interconnected world and that divide people within countries on the basis of wealth, gender and other markers for disadvantage.

Overcoming the crisis in water and sanitation is one of the great human development challenges of the early 21st century. Success in addressing that challenge through a concerted national and international response would act as a catalyst for progress in public health, education and poverty reduction and as a source of economic dynamism. It would give a decisive

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impetus to the Millennium Development Goals—the targets adopted by governments as part of a global partnership for poverty reduction. The business as usual alternative is to tolerate a level of avoidable suffering and loss of human potential that all governments should regard as ethically indefensible and economically wasteful.

Water for life, water for livelihoods

“By means of water”, says the Koran, “we give life to everything.” That simple teaching captures a deeper wisdom. People need water as surely as they need oxygen: without it life could not exist. But water also gives life in a far broader sense. People need clean water and sanitation to sustain their health and maintain their dignity. But beyond the household water also sustains ecological systems and provides an input into the production systems that maintain livelihoods.

Ultimately, human development is about the realization of potential. It is about what people can do and what they can become—their capabilities—and about the freedom they have to exercise real choices in their lives. Water pervades all aspects of human development. When people are denied access to clean water at home or when they lack access to water as a productive resource their choices and freedoms are constrained by ill health, poverty and vulnerability. Water gives life to everything, including human development and human freedom.

In this year’s *Human Development Report* we look at two distinct themes in the global water crisis. The first, explored in chapters 1–3, is water for life. Delivering clean water, removing wastewater and providing sanitation are three of the most basic foundations for human progress. We look at the costs of not putting in place these foundations and set out some of the strategies needed to bring universal access to water and sanitation within reach. The second theme, water for livelihoods, is the subject of chapters 4–6. Here we focus on water as a productive resource shared within countries and across borders, highlighting the immense challenges now facing many governments to manage water equitably and efficiently.

Some commentators trace the global challenge in water to a problem of scarcity. The spirit of Thomas Malthus, who in the 19th century disconcerted political leaders by predicting a future of food shortages, increasingly pervades international debates on water. With population rising and demands on the world’s water expanding, so the argument runs, the future points to a “gloomy arithmetic” of shortage. We reject this starting point. The availability of water is a concern for some countries. But the scarcity at the heart of the global water crisis is rooted in power, poverty and inequality, not in physical availability.

Nowhere is this more apparent than in the area of water for life. Today, some 1.1 billion people in developing countries have inadequate access to water, and 2.6 billion lack basic sanitation. Those twin deficits are rooted in institutions and political choices, not in water’s availability. Household water requirements represent a tiny fraction of water use, usually less than 5% of the total, but there is tremendous inequality in access to clean water and to sanitation at a household level. In high-income areas of cities in Asia, Latin America and Sub-Saharan Africa people enjoy access to several hundred litres of water a day delivered into their homes at low prices by public utilities. Meanwhile, slum dwellers and poor households in rural areas of the same countries have access to much less than the 20 litres of water a day per person required to meet the most basic human needs. Women and young girls carry a double burden of disadvantage, since they are the ones who sacrifice their time and their education to collect water.

Much the same applies to water for livelihoods. Across the world agriculture and industry are adjusting to tightening hydrological constraints. But while scarcity is a widespread problem, it is not experienced by all. In water-stressed parts of India irrigation pumps extract water from aquifers 24 hours a day for wealthy farmers, while neighbouring smallholders depend on the vagaries of rain. Here, too, the underlying cause of scarcity in the large majority of cases is institutional and political, not a physical deficiency of supplies. In many countries scarcity is the product of public policies that have

encouraged overuse of water through subsidies and underpricing.

There is more than enough water in the world for domestic purposes, for agriculture and for industry. The problem is that some people—notably the poor—are systematically excluded from access by their poverty, by their limited legal rights or by public policies that limit access to the infrastructures that provide water for life and for livelihoods. In short, scarcity is manufactured through political processes and institutions that disadvantage the poor. When it comes to clean water, the pattern in many countries is that the poor get less, pay more and bear the brunt of the human development costs associated with scarcity.

Human security, citizenship and social justice

Just over a decade ago *Human Development Report 1994* introduced the idea of human security to the wider debate on development. The aim was to look beyond narrow perceptions of national security, defined in terms of military threats and the protection of strategic foreign policy goals, and towards a vision of security rooted in the lives of people.

Water security is an integral part of this broader conception of human security. In broad terms water security is about ensuring that every person has reliable access to enough safe water at an affordable price to lead a healthy, dignified and productive life, while maintaining the ecological systems that provide water and also depend on water. When these conditions are not met, or when access to water is disrupted, people face acute human security risks transmitted through poor health and the disruption of livelihoods.

In the world of the early 21st century national security concerns loom large on the international agenda. Violent conflict, concerns over terrorist threats, the proliferation of nuclear weapons and the growth of illicit trade in arms and drugs all pose acute challenges. Against this backdrop it is easy to lose sight of some basic human security imperatives, including those linked to water. The 1.8 million child deaths each year related to unclean water

and poor sanitation dwarf the casualties associated with violent conflict. No act of terrorism generates economic devastation on the scale of the crisis in water and sanitation. Yet the issue barely registers on the international agenda.

It is not just the contrast with national security imperatives that is striking. Today, international action to tackle the crisis in HIV/AIDS has been institutionalized on the agenda of the Group of Eight countries. Threatened with a potential public health crisis in the form of avian flu, the world mobilizes rapidly to draw up a global plan of action. But the living reality of the water and sanitation crisis elicits only the most minimal and fragmented response. Why is that? One plausible explanation is that, unlike HIV/AIDS and avian flu, the water and sanitation crisis poses the most immediate and most direct threat to poor people in poor countries—a constituency that lacks a voice in shaping national and international perceptions of human security.

Apart from the highly visible destructive impacts on people, water insecurity violates some of the most basic principles of social justice. Among them:

- *Equal citizenship.* Every person is entitled to an equal set of civil, political and social rights, including the means to exercise these rights effectively. Water insecurity compromises these rights. A woman who spends long hours collecting water, or who suffers from constant water-related illness, has less capacity to participate in society, even if she can participate in electing her government.
- *The social minimum.* All citizens should have access to resources sufficient to meet their basic needs and live a dignified life. Clean water is part of the social minimum, with 20 litres per person each day as the minimum threshold requirement.
- *Equality of opportunity.* Equality of opportunity, a key requirement for social justice, is diminished by water insecurity. Most people would accept that education is integral to equality of opportunity. For example, children unable to attend school when they are afflicted by constant bouts of sickness caused by unclean water do not,

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in any meaningful sense, enjoy a right to education.

- *Fair distribution.* All societies set limits to the justifiable extent of inequality. Deep inequality in access to clean water in the home or productive water in the field does not meet the criterion for fair distribution, especially when linked to high levels of avoidable child death or poverty.

The idea of water as a human right reflects these underlying concerns. As the UN Secretary-General has put it, “Access to safe water is a fundamental human need and, therefore, a basic human right.” Upholding the human right to water is an end in itself and a means for giving substance to the wider rights in the Universal Declaration of Human Rights and other legally binding instruments—including the right to life, to education, to health and to adequate housing. Ensuring that every person has access to at least 20 litres of clean water each day to meet basic needs is a minimum requirement for respecting the right to water—and a minimum target for governments.

Human rights are not optional extras. Nor are they a voluntary legal provision to be embraced or abandoned on the whim of individual governments. They are binding obligations that reflect universal values and entail responsibilities on the part of governments. Yet the human right to water is violated with impunity on a widespread and systematic basis—and it is the human rights of the poor that are subject to the gravest abuse.

Reaching the Millennium Development Goal target in 2015—a test of humanity

There is now less than 10 years to go to the 2015 target date for achieving the Millennium Development Goals—the time-bound targets of the international community for reducing extreme poverty and hunger, cutting child deaths, getting children an education and overcoming gender inequalities. Progress in each of these areas will be conditioned by how governments respond to the crisis in water.

The Millennium Development Goals provide a benchmark for measuring progress towards the human right to water. That is why

halving the proportion of world population without sustainable access to safe drinking water and basic sanitation—Goal 7, target 10—is a key target in its own right. But achieving that target is critical to the attainment of other goals. Clean water and sanitation would save the lives of countless children, support progress in education and liberate people from the illnesses that keep them in poverty.

The urgency of achieving the Millennium Development Goal for water and sanitation cannot be overstated. Even if the targets are achieved, there will still be more than 800 million people without water and 1.8 billion people without sanitation in 2015. Yet despite progress the world is falling short of what is needed, especially in the poorest countries. Changing this picture will require sustained action over the next decade allied to a decisive break with the current business as usual model.

The 2015 target date is important for practical and symbolic reasons. At a practical level it reminds us that time is running out—and that the deadline for the investments and policies needed to deliver results is fast approaching. Symbolically, 2015 matters in a deeper sense. The state of the world in that year will be a judgement on the state of international cooperation today. It will hold up a mirror to the generation of political leaders that signed the Millennium Development Goal pledge and deliver the verdict on whether the pledge was honoured in the breach or the observance.

Some time in 2015 another less important but no less symbolic event will take place. The US National Aeronautics and Space Administration will launch the Jupiter Icy Moons Project. Using technology now under development, a spacecraft will be dispatched to orbit three of Jupiter’s moons to investigate the composition of the vast saltwater lakes beneath their ice surfaces—and to determine whether the conditions for life exist. The irony of humanity spending billions of dollars in exploring the potential for life on other planets would be powerful—and tragic—if at the same time we allow the destruction of life and human capabilities on planet Earth for want of far less demanding technologies: the infrastructure to deliver clean

water and sanitation to all. Providing a glass of clean water and a toilet may be challenging, but it is not rocket science.

Mahatma Gandhi once commented that “the difference between what we do and what we are capable of doing would suffice to solve most of the world’s problems.” That observation has a powerful resonance for the Millennium Development Goals. The unprecedented combination of resources and technology at our disposal today makes the argument that the 2015 targets are beyond our reach both intellectually and morally indefensible. We should not be satisfied with progress that falls short of the goals set—or with half measures that leave whole sections of humanity behind.

Water for life—the global crisis in water and sanitation

Clean water and sanitation are among the most powerful drivers for human development. They extend opportunity, enhance dignity and help create a virtuous cycle of improving health and rising wealth.

People living in rich countries today are only dimly aware of how clean water fostered social progress in their own countries. Just over a hundred years ago London, New York and Paris were centres of infectious disease, with diarrhoea, dysentery and typhoid fever undermining public health. Child death rates were as high then as they are now in much of Sub-Saharan Africa. The rising wealth from industrialization boosted income, but child mortality and life expectancy barely changed.

Sweeping reforms in water and sanitation changed this picture. Clean water became the vehicle for a leap forward in human progress. Driven by coalitions for social reform, by moral concern and by economic self-interest, governments placed water and sanitation at the centre of a new social contract between states and citizens. Within a generation they put in place the finance, technology and regulations needed to bring water and sanitation for all within reach.

The new infrastructure broke the link between dirty water and infectious disease. By one estimate water purification explains almost half the mortality reduction in the United States in

the first third of the 20th century. In Great Britain the expansion of sanitation contributed to a 15-year increase in life expectancy in the four decades after 1880.

The fault line between sanitation and water

In rich countries clean water is now available at the twist of a tap. Private and hygienic sanitation is taken for granted. Concern over water shortages may occasionally surface in some countries. But that concern has to be placed in perspective. Children in rich countries do not die for want of a glass of clean water. Young girls are not kept home from school to make long journeys to collect water from streams and rivers. And waterborne infectious disease is a subject for history books, not hospital wards and morgues.

The contrast with poor countries is striking. While deprivation is unequally distributed across regions, the facts of the global water crisis speak for themselves. Some 1.1 billion people in the developing world do not have access to a minimal amount of clean water. Coverage rates are lowest in Sub-Saharan Africa, but most people without clean water live in Asia. Deprivation in sanitation is even more widespread. Some 2.6 billion people—half the developing world’s population—do not have access to basic sanitation. And systemic data underreporting means that these figures understate the problem.

“Not having access” to water and sanitation is a polite euphemism for a form of deprivation that threatens life, destroys opportunity and undermines human dignity. Being without access to water means that people resort to ditches, rivers and lakes polluted with human or animal excrement or used by animals. It also means not having sufficient water to meet even the most basic human needs.

While basic needs vary, the minimum threshold is about 20 litres a day. Most of the 1.1 billion people categorized as lacking access to clean water use about 5 litres a day—one-tenth of the average daily amount used in rich countries to flush toilets. On average, people in Europe use more than 200 litres—in the United States more than 400 litres. When a European

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person flushes a toilet or an American person showers, he or she is using more water than is available to hundreds of millions of individuals living in urban slums or arid areas of the developing world. Dripping taps in rich countries lose more water than is available each day to more than 1 billion people.

Not having access to sanitation means that people are forced to defecate in fields, ditches and buckets. The “flying toilets” of Kibera, a slum in Nairobi, Kenya, highlight what it means to be without sanitation. Lacking access to toilets, people defecate into plastic bags that they throw onto the streets. The absence of toilets poses particularly severe public health and security problems for women and young girls. In sanitation as in water, gender inequality structures the human costs of disadvantage.

Access to water and sanitation reinforces some long-standing human development lessons. On average, coverage rates in both areas rise with income: increasing wealth tends to bring with it improved access to water and sanitation. But there are very large variations around the average. Some countries—such as Bangladesh and Thailand in sanitation, and Sri Lanka and Viet Nam in water—do far better than would be expected solely on the basis of income. Others—such as India and Mexico for sanitation—do far worse. The lesson: income matters, but public policy shapes the conversion of income into human development.

The human development costs—immense

Deprivation in water and sanitation produces multiplier effects. The ledger includes the following costs for human development:

- Some 1.8 million child deaths each year as a result of diarrhoea—4,900 deaths each day or an under-five population equivalent in size to that for London and New York combined. Together, unclean water and poor sanitation are the world’s second biggest killer of children. Deaths from diarrhoea in 2004 were some six times greater than the average annual deaths in armed conflict for the 1990s.
- The loss of 443 million school days each year from water-related illness.
- Close to half of all people in developing countries suffering at any given time from a health problem caused by water and sanitation deficits.
- Millions of women spending several hours a day collecting water.
- Lifecycles of disadvantage affecting millions of people, with illness and lost educational opportunities in childhood leading to poverty in adulthood.

To these human costs can be added the massive economic waste associated with the water and sanitation deficit. Measuring these costs is inherently difficult. However, new research undertaken for this year’s *Human Development Report* highlights the very large losses sustained in some of the world’s poorest countries. The research captures the costs associated with health spending, productivity losses and labour diversions.

Losses are greatest in some of the poorest countries. Sub-Saharan Africa loses about 5% of GDP, or some \$28.4 billion annually, a figure that exceeds total aid flows and debt relief to the region in 2003. In one crucial respect these aggregate economic costs obscure the real impact of the water and sanitation deficit. Most of the losses are sustained by households below the poverty line, retarding the efforts of poor people to produce their way out of poverty.

On any measure of efficiency, investments in water and sanitation have the potential to generate a high return. Every \$1 spent in the sector creates on average another \$8 in costs averted and productivity gained. Beyond this static gain, improved access to water and sanitation has the potential to generate long-run dynamic effects that will boost economic efficiency.

Whether measured against the benchmark of human suffering, economic waste or extreme poverty, the water and sanitation deficit inflicts a terrifying toll. The flip-side is the potential for reducing that deficit as a means for human progress. Water and sanitation are among the most powerful preventive medicines available to governments to reduce infectious disease. Investment in this area is to killer diseases like diarrhoea what immunization is to measles—a life-saver. Research for this Report shows that access to safe water

reduces child death rates by more than 20% in Cameroon and Uganda. In Egypt and Peru the presence of a flush toilet in the house reduces the risk of infant death by more than 30%.

A crisis above all for the poor

The crisis in water and sanitation is—above all—a crisis for the poor. Almost two in three people lacking access to clean water survive on less than \$2 a day, with one in three living on less than \$1 a day. More than 660 million people without sanitation live on less than \$2 a day, and more than 385 million on less than \$1 a day.

These facts have important public policy implications. They point clearly towards the limited capacity of unserved populations to finance improved access through private spending. While the private sector may have a role to play in delivery, public financing holds the key to overcoming deficits in water and sanitation.

The distribution of access to adequate water and sanitation in many countries mirrors the distribution of wealth. Access to piped water into the household averages about 85% for the wealthiest 20% of the population, compared with 25% for the poorest 20%. Inequality extends beyond access. The perverse principle that applies across much of the developing world is that the poorest people not only get access to less water, and to less clean water, but they also pay some of the world's highest prices:

- People living in the slums of Jakarta, Indonesia; Manila, the Philippines; and Nairobi, Kenya, pay 5–10 times more for water per unit than those in high-income areas of their own cities—and more than consumers pay in London or New York.
- High-income households use far more water than poor households. In Dar es Salam, Tanzania, and Mumbai, India, per capita water use is 15 times higher in high-income suburbs linked to the utility than in slum areas.
- Inequitable water pricing has perverse consequences for household poverty. The poorest 20% of households in El Salvador, Jamaica and Nicaragua spend on average more than 10% of their household income on water. In the United Kingdom a 3% threshold is seen as an indicator of hardship.

Prognosis for meeting the Millennium Development Goal target

The Millennium Development Goals are not the first set of ambitious targets embraced by governments. “Water and sanitation for all” within a decade was among the impressive set of targets adopted following high-level conferences in the 1970s and the 1980s. Performance fell far short of the promise. Will it be different this time round?

In aggregate the world is on track for the target for water largely because of strong progress in China and India, but only two regions are on track for sanitation (East Asia and Latin America). Large regional and national variations are masked by the global picture.

- On current trends Sub-Saharan Africa will reach the water target in 2040 and the sanitation target in 2076. For sanitation South Asia is 4 years off track, and for water the Arab States are 27 years off track.
- Measured on a country by country basis, the water target will be missed by 234 million people, with 55 countries off track.
- The sanitation target will be missed by 430 million people, with 74 countries off track.
- For Sub-Saharan Africa to get on track, connection rates for water will have to rise from 10 million a year in the past decade to 23 million a year in the next decade. South Asia's rate of sanitation provision will have to rise from 25 million people a year to 43 million a year.

The Millennium Development Goals should be seen as a minimum threshold of provision not as a ceiling. Even if they are achieved, there will still be a large global deficit. What is worrying about the current global trajectory is that the world is on course to finish below the floor defined by the Millennium Development Goal promise.

Closing the gaps between current trends and targets

Changing this picture is not just the right thing to do, but also the sensible thing to do. It is the right thing to do because water and sanitation are basic human rights—and no government should be willing to turn a blind eye to the current level of human rights violation or the

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associated loss of human potential. And it is the sensible thing to do because access to water and sanitation equips people to get themselves out of poverty and to contribute to national prosperity.

Quantifying the potential gains for human development from progress in water and sanitation is difficult. But best estimates suggest that the benefits heavily outweigh the costs. The additional costs of achieving the Millennium Development Goal on the basis of the lowest-cost, sustainable technology option amount to about \$10 billion a year. Closing the gap between current trends and target trends for achieving the Millennium Development Goal for water and sanitation would result in:

- Some 203,000 fewer child deaths in 2015 and more than 1 million children's lives saved over the next decade.
- An additional 272 million days gained in school attendance as a result of reduced episodes of diarrhoea alone.
- Total economic benefits of about \$38 billion annually. The benefits for Sub-Saharan Africa—about \$15 billion—would represent 60% of its 2003 aid flows. Gains for South Asia would represent almost \$6 billion.

Can the world afford to meet the costs of accelerated progress towards water and sanitation provision? The more appropriate question is: can the world afford *not* to make the investments?

The \$10 billion price tag for the Millennium Development Goal seems a large sum—but it has to be put in context. It represents less than five days' worth of global military spending and less than half what rich countries spend each year on mineral water. This is a small price to pay for an investment that can save millions of young lives, unlock wasted education potential, free people from diseases that rob them of their health and generate an economic return that will boost prosperity.

Four foundations for success

If high-level international conferences, encouraging statements and bold targets could deliver clean water and basic sanitation, the global crisis would have been resolved long ago.

Since the mid-1990s there has been a proliferation of international conferences dealing with water, along with a proliferation of high-level international partnerships. Meanwhile, there are 23 UN agencies dealing with water and sanitation.

So many conferences, so much activity—and so little progress. Looking back over the past decade, it is difficult to avoid the conclusion that water and sanitation have suffered from an excess of words and a deficit of action. What is needed in the decade ahead is a concerted international drive starting with nationally owned strategies, but incorporating a global action plan. There are no ready-made blueprints for reform, but four foundations are crucial for success.

- *Make water a human right—and mean it.* All governments should go beyond vague constitutional principles to enshrine the human right to water in enabling legislation. To have real meaning, the human right has to correspond to an entitlement to a secure, accessible and affordable supply of water. The appropriate entitlement will vary by country and household circumstance. But at a minimum it implies a target of at least 20 litres of clean water a day for every citizen—and at no cost for those too poor to pay. Clear benchmarks should be set for progressing towards the target, with national and local governments and water providers held accountable for progress. While private providers have a role to play in water delivery, extending the human right to water is an obligation of governments.
- *Draw up national strategies for water and sanitation.* All governments should prepare national plans for accelerating progress in water and sanitation, with ambitious targets backed by financing and clear strategies for overcoming inequalities. Water and, even more so, sanitation are the poor cousins of poverty reduction planning. They suffer from chronic underfinancing, with public spending typically less than 0.5% of GDP. Life-saving investments in water and sanitation are dwarfed by military spending. In Ethiopia the military budget is 10 times

the water and sanitation budget—in Pakistan, 47 times. Governments should aim at a minimum of 1% of GDP for water and sanitation spending. Tackling inequality will require a commitment to financing strategies—including fiscal transfers, cross-subsidies and other measures—that bring affordable water and sanitation to the poor. National strategies should incorporate benchmarks for enhanced equity including:

- *Millennium Development Goals.* Supplementing the 2015 target of halving the proportion of people without access to water and sanitation with policies to halve the gap in coverage ratios between rich and poor.
- *Poverty Reduction Strategy Papers.* Making water and sanitation key priorities, with clear goals and targets linked to medium-term financing provisions.
- *Water providers.* Ensuring that utilities, public and private, along with municipal bodies, include clear benchmarks for equity, with associated penalties for noncompliance.
- *Support national plans with international aid.* For many of the poorest countries development assistance is critical. Progress in water and sanitation requires large upfront investments with long payback periods. Constraints on government revenue limit the financing capacity of many of the poorest countries, while cost-recovery potential is limited by high levels of poverty. Most donors recognize the importance of water and sanitation. However, development assistance has fallen in real terms over the past decade, and few donors see the sector as a priority: the sector now accounts for less than 5% of development assistance. Aid flows will need to roughly double to bring the Millennium Development Goal within reach, rising by \$3.6–\$4 billion annually. Innovative financing strategies such as those provided for under the International Finance Facility are essential to provide upfront financing to avert the impending shortfall against the Millennium Development Goal target. Donors should act in support of nationally

owned and nationally led strategies, providing predictable, long-term support. There is also scope for supporting the efforts of local governments and municipal utilities to raise money on local capital markets.

- *Develop a global action plan.* International efforts to accelerate progress in water and sanitation have been fragmented and ineffective, with a surfeit of high-level conferences and a chronic absence of practical action. In contrast to the strength of the international response for HIV/AIDS and education, water and sanitation have not figured prominently on the global development agenda. Having pledged a global action plan two years ago, the Group of Eight countries have not set water and sanitation as a priority. The development of a global action plan to mobilize aid financing, support developing country governments in drawing on local capital markets and enhance capacity-building could act as a focal point for public advocacy and political efforts in water and sanitation.

Providing water for life

“The human right to water”, declares the United Nations Committee on Economic, Social and Cultural Rights, “entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic use.” These five core attributes represent the foundations for water security. Yet they are widely violated.

Why is it that poor people get less access to clean water and pay more for it? In urban areas the cheapest, most reliable source of water is usually the utility that maintains the network. Poor households are less likely to be connected to the network—and more likely to get their water from a variety of unimproved sources. In Dar es Salaam, Tanzania, or Ouagadougou, Burkina Faso, fewer than 30% of households are connected.

When households are not connected, they have limited options. Either they collect water from untreated sources or a public source, or they purchase water from a range of

Poor people get less access to clean water and pay more for it

The criterion for assessing policy should not be public or private but performance or nonperformance for the poor

intermediaries, including standpipe operators, water vendors and tanker truck operators. The debate on water privatization has tended to overlook the fact that the vast majority of the poor are already purchasing their water in private markets. These markets deliver water of variable quality at high prices.

High prices for the poor

Distance from the utility inflates prices. As water passes through intermediaries and each adds transport and marketing costs, prices are ratcheted up. Poor people living in slums often pay 5–10 times more per litre of water than wealthy people living in the same city.

Utility pricing policies add to the problems. Most utilities now implement rising block tariff systems. These aim to combine equity with efficiency by raising the price with the volume of water used. In practice, the effect is often to lock the poorest households into the higher tariff bands. The reason: the intermediaries serving poor households are buying water in bulk at the highest rate. In Dakar poor households using standpipes pay more than three times the price paid by households connected to the utility.

If utility prices are so much cheaper, why do poor households not connect to the utility? Often because they are unable to afford the connection fee: even in the poorest countries this can exceed \$100. In Manila the cost of connecting to the utility represents about three months' income for the poorest 20% of households, rising to six months' in urban Kenya. Location is another barrier to entry. In many cities utilities refuse to connect households lacking formal property titles, thereby excluding some of the poorest households.

Rural households face distinct problems. Living beyond formal networks, rural communities typically manage their own water systems, though government agencies are involved in service provision. Most agencies have operated on a "command and control" model, often supplying inappropriate technologies to inappropriate locations with little consultation. The result has been a combination of underfinancing and low coverage, with rural women bearing the costs by collecting water from distant sources.

The key role of public providers

In recent years international debate on the human right to water has been dominated by polarized exchanges over the appropriate roles of the private and public sectors. Important issues have been raised—but the dialogue has generated more heat than light.

Some privatization programmes have produced positive results. But the overall record is not encouraging. From Argentina to Bolivia, and from the Philippines to the United States, the conviction that the private sector offers a "magic bullet" for unleashing the equity and efficiency needed to accelerate progress towards water for all has proven to be misplaced. While these past failures of water concessions do not provide evidence that the private sector has no role to play, they do point to the need for greater caution, regulation and a commitment to equity in public-private partnerships.

Two specific aspects of water provision in countries with low coverage rates caution against an undue reliance on the private sector. First, the water sector has many of the characteristics of a natural monopoly. In the absence of a strong regulatory capacity to protect the public interest through the rules on pricing and investment, there are dangers of monopolistic abuse. Second, in countries with high levels of poverty among unserved populations, public finance is a requirement for extended access regardless of whether the provider is public or private.

The debate on privatization has sometimes diverted attention from the pressing issue of public utility reform. Public providers dominate water provision, accounting for more than 90% of the water delivered through networks in developing countries. Many publicly owned utilities are failing the poor, combining inefficiency and unaccountability in management with inequity in financing and pricing. But some public utilities—Porto Alegre in Brazil is an outstanding example—have succeeded in making water affordable and accessible to all.

There are now real opportunities to learn from failures and build on successes. The criterion for assessing policy should not be public or private but performance or nonperformance for the poor.

Some countries have registered rapid progress in water provision. From Colombia to Senegal and South Africa innovative strategies have been developed for extending access to poor households in urban areas. While rural populations continue to lag behind urban populations globally, countries as diverse as Morocco and Uganda have sustained rapid increases in coverage. What are the keys to success?

Political leadership and attainable targets make the difference

As emphasized throughout this Report, there are no ready-made solutions. Policies that produce positive outcomes for the poor in one setting can fail in another. However, some broad lessons emerge from the success stories. The first, and perhaps the most important, is that political leadership matters. The second is that progress depends on setting attainable targets in national plans that are backed by financing provisions and strategies for overcoming inequality.

This does not mean uncritical support for blanket subsidies. Well designed subsidies in Chile, Colombia and South Africa do reach the poor—and do make a difference. But in many cases subsidies ostensibly designed to enhance equity in utility pricing provide large transfers to the wealthy, with few benefits for poor households that are not connected to utilities. Similarly, in much of Sub-Saharan Africa higher income households with connections to utilities derive the greatest gains from water sold at prices far below the level needed to cover operations and maintenance costs.

Regulation and sustainable cost-recovery are vital to equity and efficiency

Because water networks are natural monopolies, regulation needs to ensure that providers meet standards for efficiency and equity—in effect, protecting the interests of the user. Strong, independent regulatory bodies have been difficult to establish in many developing countries, leading to political interference and non-accountability. But efforts to build regulation through dialogue between utility providers and citizens have yielded some major advances—in Hyderabad, India.

More broadly, it is important that governments extend the regulatory remit beyond formal network providers to the informal markets that poor people use. Regulation does not mean curtailing the activities of private providers serving the poor. But it does mean working with these providers to ensure adherence to rules on equitable pricing and water quality.

Sustainable and equitable cost-recovery is part of any reform programme. In many cases there are strong grounds for increasing water prices to more realistic levels and for improving the efficiency of water management: in many countries water losses are too high and revenue collection is too low to finance a viable system.

What is sustainable and equitable varies across countries. In many low-income countries the scope for cost-recovery is limited by poverty and low average incomes. Public spending backed by aid is critical. Middle-income countries have more scope for equitable cost-recovery if governments put in place mechanisms to limit the financial burden on poor households.

Middle-income and some low-income countries also have the potential to draw more on local capital markets. This is an area in which international support can make a difference through credit guarantees and other mechanisms that reduce interest rates and market perceptions of risk.

Building on the national and global planning framework set out in chapter 1, core strategies for overcoming national inequalities in access to water include:

- Setting clear targets for reducing inequality as part of the national poverty reduction strategy and Millennium Development Goal reporting system, including halving disparities in coverage between rich and poor.
- Establishing lifeline tariffs that provide sufficient water for basic needs free of charge or at affordable rates, as in South Africa.
- Ensuring that no household has to spend more than 3% of its income to meet its water needs.
- Targeting subsidies for connections and water use to poor households, as developed in Chile and Colombia.

Progress depends on setting attainable targets in national plans that are backed by financing provisions and strategies for overcoming inequality

Even more than water, sanitation suffers from a combination of institutional fragmentation, weak national planning and low political status

- Increasing investments in standpipe provision as a transitional strategy to make clean, affordable water available to the poor.
- Enacting legislation that empowers people to hold providers to account.
- Incorporating into public-private partnership contracts clear benchmarks for equity in the extension of affordable access to poor households.
- Developing regulatory systems that are effective and politically independent, with a remit that stretches from the utility network to informal providers.

Closing the vast deficit in sanitation

“The sewer is the conscience of the city”, wrote Victor Hugo in *Les Misérables*. He was describing 19th century Paris, but the state of sanitation remains a powerful indicator of the state of human development in any community.

Almost half the developing world lacks access to sanitation. Many more lack access to good quality sanitation. The deficit is widely distributed. Coverage rates are shockingly low in many of the world’s very poorest countries: only about 1 person in 3 in Sub-Saharan Africa and South Asia has access—in Ethiopia the figure falls to about 1 in 7. And coverage rates understate the problem, especially in countries at higher incomes. In Jakarta and Manila old sewerage systems have been overwhelmed by a combination of rapid urbanization and chronic underinvestment, leading to the rapid spread of pit latrines. These latrines now contaminate groundwater and empty into rivers, polluting water sources and jeopardizing public health.

Access to sanitation bestows benefits at many levels. Cross-country studies show that the method of disposing of excreta is one of the strongest determinants of child survival: the transition from unimproved to improved sanitation reduces overall child mortality by about a third. Improved sanitation also brings advantages for public health, livelihoods and dignity—advantages that extend beyond households to entire communities. Toilets may seem an unlikely catalyst for human progress—but the evidence is overwhelming.

Why the deficit is so large

If sanitation is so critical to social and economic progress, why is the deficit so large—and why is the world off track for achieving the Millennium Development Goal target? Many factors contribute.

The first is political leadership or, rather, its absence. Public policies on sanitation are as relevant to the state of a nation as economic management, defence or trade, yet sanitation is accorded second or third order priority. Even more than water, sanitation suffers from a combination of institutional fragmentation, weak national planning and low political status.

Poverty is another barrier to progress: the poorest households often lack the financing capacity to purchase sanitation facilities. But other factors also constrain progress, including household demand and gender inequality. Women tend to attach more importance to sanitation than do men, but female priorities carry less weight in household budgeting.

How community-government partnerships can help

The daunting scale of the sanitation deficit and the slow progress in closing that deficit are seen by some as evidence that the Millennium Development Goal target is now unattainable. The concern is justified, but the conclusion is flawed. There are many examples of rapid progress in sanitation, some driven from below by local communities and some led by governments:

- In India and Pakistan slum dweller associations have collaborated to bring sanitation to millions of people, using the power of communities to mobilize resources. The National Slum Dwellers Federation in India and the Orangi Pilot Project in Pakistan, among many other community organizations, have shown what is possible through practical action.
- The Total Sanitation Campaign in Bangladesh has been scaled up from a community-based project to a national programme that is achieving rapid increases in access to sanitation. Cambodia, China, India and Zambia have also adopted it.

- Government programmes in Colombia, Lesotho, Morocco and Thailand have expanded access to sanitation across all wealth groups. West Bengal in India has also achieved extraordinary progress.
- In Brazil the condominial approach to sewerage has reduced costs and brought sanitation to millions of people—and it is now being adopted elsewhere.

Each of these success stories has different roots. Widely divergent public policies have been developed to respond to local problems. But in each case the emphasis has been on developing demand for sanitation, rather than applying top-down supply-side models of provision. Community initiative and involvement have been critical. But equally critical has been the interaction between government agencies and local communities.

Local solutions to local problems may be the starting point for change. But it is up to governments to create the conditions for resolving national problems through the mobilization of finance and the creation of conditions for markets to deliver appropriate technologies at an affordable price. Community-led initiatives are important—even critical. However, they are not a substitute for government action. And private financing by poor households is not a substitute for public finance and service provision.

Overcoming the stigma of human waste

One of the most important lessons from the sanitation success stories is that rapid progress is possible. With support from aid donors, even the poorest countries have the capacity to mobilize the resources to achieve change. Perhaps the biggest obstacle can be summarized in a single word: stigma.

There are some uncomfortable parallels between sanitation and HIV/AIDS. Until fairly recently the cultural and social taboos surrounding HIV/AIDS impeded development of effective national and international responses, at enormous human cost. That taboo has been weakening, partly because of the scale of the destruction—but also because HIV/AIDS afflicts all members of society without regard for distinctions based on wealth.

In sanitation the taboo remains resolutely intact. This helps to explain why the subject does not receive high-level political leadership, and it seldom figures in election campaigns or public debate. One of the reasons that the stigma has been so slow to dissolve is that the crisis in sanitation, unlike the crisis in HIV/AIDS, is more discriminating: it is overwhelmingly a crisis for the poor, not the wealthy. Tackling the crisis will require more awareness of the scale of the costs generated by the deficit in sanitation, as well as a wider recognition that sanitation is a basic right.

Among the key policy challenges in sanitation:

- Developing national and local political institutions that reflect the importance of sanitation to social and economic progress.
- Building on community-level initiatives through government interventions aimed at scaling up best practice.
- Investing in demand-led approaches through which service providers respond to the needs of communities, with women having a voice in shaping priorities.
- Extending financial support to the poorest households to ensure that sanitation is an affordable option.

Managing water scarcity, risk and vulnerability

In the early 21st century debates on water increasingly reflect a Malthusian diagnosis of the problem. Dire warnings have been posted pointing to the “gloomy arithmetic” of rising population and declining water availability. Is the world running out of water?

Not in any meaningful sense. But water insecurity does pose a threat to human development for a large—and growing—section of humanity. Competition, environmental stress and unpredictability of access to water as a productive resource are powerful drivers of water insecurity for a large proportion of the global population.

Viewed at a global level, there is more than enough water to go around and meet all of humanity’s needs. So why is water scarcity

Community-led initiatives are important, but they are not a substitute for government action—and private financing by poor households is not a substitute for public finance and service provision

Scarcity has been induced by policy failures—when it comes to water management, the world has been indulging in an activity analogous to a reckless and unsustainable credit-financed spending spree

a problem? Partly because water, like wealth, is unequally distributed between and within countries. It does not help water-stressed countries in the Middle East that Brazil and Canada have more water than they could ever use. Nor does it help people in drought-prone areas of northeast Brazil that average water availability in the country is among the highest in the world. Another problem is that access to water as a productive resource requires access to infrastructure, and access to infrastructure is also skewed between and within countries.

Measured on conventional indicators, water stress is increasing. Today, about 700 million people in 43 countries live below the water-stress threshold of 1,700 cubic metres per person—an admittedly arbitrary dividing line. By 2025 that figure will reach 3 billion, as water stress intensifies in China, India and Sub-Saharan Africa. Based on national averages, the projection understates the current problem. The 538 million people in northern China already live in an intensely water-stressed region. Globally, some 1.4 billion people live in river basin areas where water use exceeds sustainable levels.

Water stress is reflected in ecological stress. River systems that no longer reach the sea, shrinking lakes and sinking groundwater tables are among the most noticeable symptoms of water overuse. The decline of river systems—from the Colorado River in the United States to the Yellow River in China—is a highly visible product of overuse. Less visible, but no less detrimental to human development, is rapid depletion of groundwater in South Asia. In parts of India groundwater tables are falling by more than 1 metre a year, jeopardizing future agricultural production.

These are real symptoms of scarcity, but the scarcity has been induced by policy failures. When it comes to water management, the world has been indulging in an activity analogous to a reckless and unsustainable credit-financed spending spree. Put simply, countries have been using far more water than they have, as defined by the rate of replenishment. The result: a large water-based ecological debt that will be transferred to future generations. This debt raises important questions about national accounting

systems that fail to measure the depletion of scarce and precious natural capital—and it raises important questions about cross-generational equity. Underpricing (or zero pricing in some cases) has sustained overuse: if markets delivered Porsche cars at give-away prices, they too would be in short supply.

Future water-use scenarios raise cause for serious concern. For almost a century water use has been growing almost twice as fast as population. That trend will continue. Irrigated agriculture will remain the largest user of water—it currently accounts for more than 80% of use in developing countries. But the demands of industry and urban users are growing rapidly. Over the period to 2050 the world's water will have to support the agricultural systems that will feed and create livelihoods for an additional 2.7 billion people. Meanwhile, industry, rather than agriculture, will account for most of the projected increase in water use to 2025.

Augmenting supply

In the past governments responded to water stress by seeking to augment supply. Large-scale river diversion programmes in China and India underline the continuing appeal of this approach. Other supply-side options have also grown in importance. Desalination of sea water is gaining ground, though high energy costs make this an option principally for wealthier countries and cities by the sea. “Virtual water” imports—the water used in the production of imported food—are another option. Here too, however, there are limited options for low-income countries with large food deficits—and there are food security threats from a potential loss of self-reliance.

Damping demand

Demand-side policies are likely to be more effective. Increasing the “crop per drop” ratio through new productivity-enhancing technology has the potential to reduce pressure on water systems. More broadly, water pricing policies need to better reflect the scarcity value of water. The early withdrawal of perverse subsidies that encourage overuse would mark an important step in the right direction for countries

such as India and Mexico, which have inadvertently created incentives for the depletion of groundwater through electricity subsidies for large farms. In effect, governments have been subsidizing the depletion of a precious natural resource, transferring the costs to the environment—and to future generations.

Managing uncertainty

Many governments across the developing world are now faced with the need for managing acute adjustments in water. Realigning supply and demand within the frontiers of ecological sustainability and water availability—a central objective in new strategies for integrated water resources management—has the potential to create both winners and losers. And there are win-win scenarios. But the danger is that the interests of the poor will be pushed aside as large agricultural producers and industry—two constituencies with a strong political voice—assert their claims. Water is power in many societies—and inequalities in power can induce deep inequalities in access to water.

Water infrastructure is critical in reducing unpredictability and mitigating risk. Globally, the inequalities in access to infrastructure are very large. They are reflected in simple indicators for water storage capacity: the United States stores about 6,000 cubic metres of water per person; Ethiopia, 43. Even rich countries are exposed to water-related disruption, however, as evidenced by the impact of Hurricane Katrina on New Orleans. But the risks weigh most heavily on poor countries.

Droughts and floods, extreme forms of water insecurity, have devastating consequences for human development. In 2005 more than 20 million people in the Horn of Africa were affected by drought. Meanwhile, the floods that struck Mozambique reduced its GNI by an estimated 20%. Rainfall variability and extreme changes in water flow can destroy assets, undermine livelihoods and reduce the growth potential of whole economies: variability reduces Ethiopia's growth potential by about a third, according to the World Bank. Whole societies are affected. But it is the poor who bear the brunt of water-related shocks.

Dealing with climate change

Climate change is transforming the nature of global water insecurity. While the threat posed by rising temperatures is now firmly established on the international agenda, insufficient attention has been paid to the implications for vulnerable agricultural producers in developing countries. The Framework Convention on Climate Change adopted in 1992 warned governments that “where there are risks of serious and irreversible damage, lack of full scientific certainty should not be used as a reason for postponing action”. Few warnings have been more perilously ignored.

Global warming will transform the hydrological patterns that determine the availability of water. Modelling exercises point to complex outcomes that will be shaped by micro-climates. But the overwhelming weight of evidence can be summarized in a simple formulation: many of the world's most water-stressed areas will get less water, and water flows will become less predictable and more subject to extreme events. Among the projected outcomes:

- Marked reductions in water availability in East Africa, the Sahel and Southern Africa as rainfall declines and temperature rises, with large productivity losses in basic food staples. Projections for rainfed areas in East Africa point to potential productivity losses of up to 33% in maize and more than 20% for sorghum and 18% for millet.
- The disruption of food production systems exposing an additional 75–125 million people to the threat of hunger.
- Accelerated glacial melt, leading to medium-term reductions in water availability across a large group of countries in East Asia, Latin America and South Asia.
- Disruptions to monsoon patterns in South Asia, with the potential for more rain but also fewer rainy days and more people affected by drought.
- Rising sea levels resulting in freshwater losses in river delta systems in countries such as Bangladesh, Egypt and Thailand.

The international response to the water security threat posed by climate change has been inadequate. Multilateral efforts have focussed

Climate change is transforming the nature of global water insecurity

International aid for adaptation ought to be a cornerstone of the multilateral framework for dealing with climate change

on mitigating future climate change. These efforts are critical—and the negotiation of deeper carbon emission cuts after the expiration of the current Kyoto Protocol in 2012 is a priority. Restricting future global warming to an increase of no more than 2° Celsius over pre-industrial levels should be a priority. Attaining that target will require major adjustments in the energy policies of both industrial and developing countries, supported by financing for the transfer of clean technologies.

More adaptation—not just mitigation

Even with drastic reductions in carbon emissions, past emissions mean that the world now has to live with dangerous climate change. Climate change is not a future threat, but a reality to which countries and people have to adapt. Nowhere is the challenge of developing effective adaptation strategies more pressing than in rainfed agriculture, where the livelihoods of millions of the world's poorest people will become more precarious as rainfall patterns become more variable and, in some cases, water availability declines.

International aid for adaptation ought to be a cornerstone of the multilateral framework for dealing with climate change. However, aid transfers have been woefully inadequate. The Adaptation Fund attached to the Kyoto Protocol will mobilize only about \$20 million by 2012 on current projections, while the Global Environmental Facility—the principal multilateral mechanism for adaptation—has allocated \$50 million to support adaptation activities between 2005 and 2007.

Beyond the multilateral framework, a decline in development assistance to agriculture has limited the financing available for adaptation. Aid has fallen rapidly in both absolute and relative terms over the past decade. For developing countries as a group aid to agriculture has fallen in real terms from \$4.9 billion a year to \$3.2 billion, or from 12% to 3.5% of total aid since the early 1990s. All regions have been affected. Aid to agriculture in Sub-Saharan Africa is now just under \$1 billion, less than half the level in 1990. Reversing these trends will be critical to successful adaptation.

The way ahead

Countries face very different challenges in water management. But some broad themes emerge—along with some broad requirements for successful strategies. Among the most important:

- Developing integrated water resources management strategies that set national water use levels *within* the limits of ecological sustainability and provide a coherent planning framework for all water resources.
- Putting equity and the interests of the poor at the centre of integrated water resources management.
- Making water management an integral part of national poverty reduction strategies.
- Recognizing the real value of water through appropriate pricing policies, revised national accounting procedures and the withdrawal of perverse subsidies encouraging overuse.
- Increasing pro-poor water supply through the provision of safe wastewater for productive use by separating industrial and domestic waste and working with farmers to reduce health risks.
- Increasing national investment and international aid for investment in water infrastructure, including storage and flood control.
- Recalibrating the response to global warming by placing greater emphasis on strategies for adaptation in national water management policies and aid efforts.
- Tripling aid to agriculture by 2010, with annual flows rising from \$3 billion to \$10 billion. Within this broad provision aid to Africa will need to increase from about \$0.9 billion to about \$2.1 billion a year, as envisaged for agricultural activities under the Comprehensive Africa Agricultural Development Programme of the African Union and the New Partnership for Africa's Development.

Managing competition for water in agriculture

One hundred years ago William Mulholland, superintendent of the Los Angeles Water Department, resolved the city's water shortage problem through a brutally effective innovation:

a “water grab”. By forcibly transferring water used by farmers in the Owens Valley, more than 200 miles away, he made it possible for Los Angeles to become one of the fastest growing cities in the United States.

Times have changed. These days Californians resolve water disputes in courts of law. But across much of the developing world competition over water is intensifying at an alarming rate, giving rise to intense—and sometimes violent—conflict. The danger is that the Mulholland model will resurface in a new guise, with power, rather than a concern for poverty and human development, dictating outcomes.

Competition patterns vary across countries. But two broad trends are discernable. First, as urban centres and industry increase their demand for water, agriculture is losing out—and will continue to do so. Second, within agriculture, competition for water is intensifying. On both fronts, there is a danger that agriculture in general and poor rural households in particular will suffer in the adjustment.

Such an outcome could have grave implications for global poverty reduction efforts. Despite rapid urbanization, most of the world’s extreme poor still live in rural areas—and small farmers and agricultural labourers account for the bulk of global malnutrition. As the single biggest user of water in most countries, irrigated agriculture will come under acute pressure. Given the role of these systems in increasing agricultural productivity, feeding a growing population and reducing poverty, this presents a major human development challenge.

Mediating through economic and political structures

With demands on water resources increasing, some reallocation among users and sectors is inevitable. In any process of competition for scarce resources, rival claims are mediated through economic and political structures and through systems of rights and entitlements. As competition for water intensifies, future access will increasingly reflect the strength of claims from different actors. Outcomes for the poorest, most vulnerable people in society will be determined by the way institutions mediate and manage rival

claims—and by whether governments put equity concerns at the centre of national policies.

Balancing efficiency and equity

Adjustment processes are already taking place. Cities and industries are extending their hydrological reach into rural areas, giving rise to disputes and occasionally violent protests. Parallel conflicts between different parts of the same country and different users are increasingly evident.

The development of trade in water rights through private markets is seen by some as the solution to balancing efficiency and equity in the adjustments to water reallocation. By enabling agricultural producers to sell water, so the argument runs, governments can create the conditions for directing a scarce resource to more productive outlets, while compensating and generating an income for farmers.

Private water markets offer a questionable solution to a systemic problem. Even in the United States, where they are underpinned by highly developed rules and institutions, it has often been difficult to protect the interests of the poor. In Chile the introduction of private water markets in the 1970s enhanced efficiency but led to high levels of inequity and market distortions caused by concentrations of power and imperfect information. For developing countries, with weaker institutional capacity, there are distinct limits to the market.

Managing allocations and licencing

Looking beyond water markets, many governments are seeking to manage adjustment pressures through quantitative allocations and licences. This approach holds out more promise. Even here, however, formal and informal power imbalances often undermine the position of the poor. In West Java, Indonesia, textile factories have usurped the water rights of smallholder farmers. And in the Philippines farmers in irrigation schemes have lost out to municipal users. The absence or nonenforcement of regulations is another potent threat. In India unregulated groundwater extraction on the Bhavani River has meant less water and more poverty in irrigation systems.

Outcomes for the poorest, most vulnerable people in society will be determined by the way institutions mediate and manage rival claims—and by whether governments put equity concerns at the centre of national policies

One lesson from water reforms is that far more weight needs to be attached to equity

Water rights are critical for human security in agricultural areas. The sudden loss or erosion of entitlements to water can undermine livelihoods, increase vulnerability and intensify poverty on a large scale. Far more than to the wealthy, water rights matter to the poor for an obvious reason: poor people lack the financial resources and political voice to protect their interests outside a rules-based system. Water rights count for little if, in implementation, they skew advantages to those with power.

Balancing formal and customary rights

Sub-Saharan Africa faces distinctive challenges. Governments there are seeking, with donor support, to expand the irrigation frontier and to establish formal systems of rights as a supplement—or replacement—for customary rights. What will this mean for human development?

Outcomes will depend on public policies. Expanding irrigation capacity is important because it has the potential to raise productivity and reduce risk. The region is overwhelmingly dependent on rainfed agriculture. But irrigation infrastructure is a scarce and contested resource. Evidence from the Sahel region of West Africa shows that smallholders can often lose out in competition for irrigation to larger scale, commercial producers.

Management of customary rights poses further problems. Contrary to some perceptions, customary rights to water incorporate detailed management and use provisions to maintain ecological sustainability. But they often disadvantage poorer households and women. Introducing formal rules and laws does not automatically change this picture. In the Senegal River Valley customary rights holders have used their power to maintain social exclusion from water. Meanwhile, in Tanzania the introduction of formal water rights has benefited commercial farmers on the Pangani River to the disadvantage of small farmers downstream.

Giving more attention to equity

One lesson from water reforms is that far more weight needs to be attached to equity. In contrast to land reform, for example, distributional

concerns have not figured prominently on the integrated water resources management agenda. There are some exceptions—as in South Africa—but even here it has proven difficult to achieve redistributive outcomes.

Irrigation systems are at the centre of the adjustment. Infrastructure for irrigation has an important bearing on poverty. Cross-country research suggests that poverty prevalence is typically 20%–40% lower inside irrigation networks than outside, but with very large variations. Irrigation appears to be a far more powerful motor for poverty reduction in some countries than in others. Land inequality is a major factor. Highly unequal countries (India, Pakistan and the Philippines) do worse in efficiency *and* equity than more equal countries (China and Viet Nam).

This finding suggests that there is no inherent tradeoff between increasing productivity and reducing poverty in irrigation. There is considerable scope for managing adjustment pressures in agriculture through measures that enhance both efficiency and equity in a mutually reinforcing virtuous cycle. Equitable cost-sharing, pro-poor public investments and the participation of producers in management hold the key to successful reform.

Addressing deep-seated gender inequalities

Real empowerment in irrigation systems requires measures to address deep-rooted gender inequalities. Women are doubly disadvantaged in irrigation systems. Lacking formal rights to land in many countries, they are excluded from irrigation system management. At the same time, informal inequalities—including the household division of labour, norms on women speaking in public and other factors—mitigate against women having a real voice in decision-making.

Breaking down these structures has proven difficult even in the most ambitious schemes for transferring management authority from government agencies to users. In Andhra Pradesh, India, poor farmers now have a far greater say in management—but poor women farmers are still silent. Change is possible, however. In

Uganda legislation requiring female representation in water user associations is making a difference.

Reaching the poor

Looking to the future, one of the greatest challenges is to ensure that strategies for enhancing water productivity extend to the poor. Technology is not neutral in its distributional effects—and the danger is that efforts to get more crop per drop from water resources will bypass poor households.

This does not have to be the case. The revival of small-scale water harvesting programmes in India in response to the groundwater crisis has shown the potential to generate large returns to investment and at the same time to reduce risk and vulnerability. Similarly, micro-irrigation technologies do not have to be geared solely to large capital-intensive producers. Innovative new designs and low-cost technologies for drip irrigation have been taken up extensively. Here, too, the social and economic returns are large. On one estimate the extension of low-cost irrigation technologies to 100 million smallholders could generate net benefits in excess of \$100 billion, with strong multiplier effects in income and employment generation.

The way developing country governments address the challenge of balancing equity and efficiency goals in water management will have an important bearing on human development. Putting the interests of the poor at the centre of integrated water resources management policies is an organizing principle. But that principle has to be backed by practical pro-poor policies. Among the most important:

- Strengthening the water and land rights of poor households.
- Respecting customary rights and integrating these rights into formal legal systems.
- Enhancing the capacity of poor people to claim and defend water rights through legal empowerment and accountable institutions.
- Increasing national investments in irrigation and reversing aid cuts for the irrigation sector, with development assistance doubling to about \$4 billion annually over the next 20 years.

- Enhancing equity within irrigation systems to support poverty reduction and efficiency objectives through sustainable and equitable cost-sharing mechanisms.
- Decentralizing the management and financing of irrigation systems to empower users.
- Integrating irrigation development into wider rural development programmes to make agriculture more profitable for smallholders.
- Putting gender rights to water at the centre of national development, and implementing policies to increase the voice of women in water management decisions.
- Developing integrated water-harvesting and groundwater policies extending from small-scale to large-scale infrastructure.
- Promoting the development, distribution and adoption of pro-poor technologies.

Managing transboundary water for human development

Water is a source of human interdependence. Within any country water is a shared resource serving multiple constituencies, from the environment to agriculture, industry and households. But water is also the ultimate fugitive resource. It crosses national frontiers, linking users across borders in a system of hydrological interdependence.

As competition for water intensifies within countries, the resulting pressures will spill across national borders. Some commentators fear that transboundary competition will become a source of conflict and future water wars. That fear is exaggerated: cooperation remains a far more pervasive fact of life than conflict. However, the potential for crossboundary tensions and conflict cannot be ignored. While most countries have institutional mechanisms for allocating water and resolving conflict within countries, cross-border institutional mechanisms are far weaker. The interaction of water stress and weak institutions carries with it real risks of conflict.

Hydrological interdependence

Hydrological interdependence is not an abstract concept. Two in every five people in the

The fear that transboundary competition will become a source of conflict and future water wars is exaggerated: cooperation remains a far more pervasive fact of life than conflict

Transboundary water governance is a human development issue: cooperation can reduce the potential for conflict and unlock benefits by improving the quality of shared water, generating prosperity and more secure livelihoods

world live in international water basins shared by more than one country. International rivers are a thread that binds countries: 9 countries share the Amazon and 11 the Nile, for example. Rivers also bind the livelihoods of people. The Mekong, one of the world's great river systems, generates power in its upper reaches in China and sustains the rice production and fishery systems that support the livelihoods of more than 60 million people in the lower reaches of its basin.

With hydrological interdependence comes deeper interdependence. As a productive resource, water is unique in that it can never be managed for a single use: it flows between sectors and users. That is true within countries and between them. How an upstream country uses a river inevitably affects the quantity, timing and quality of water available to users downstream. The same interdependence applies to aquifers and lakes.

Why is transboundary water governance a human development issue? Because failure in this area can produce outcomes that generate inequity, environmental unsustainability and wider social and economic losses.

There is no shortage of illustrations. The Aral Sea, described by some as the world's worst human-caused ecological disaster, is an extreme case in point. Less widely appreciated is the damage caused to shared river systems and lakes by overuse: the shrinkage of Lake Chad in Sub-Saharan Africa is an example.

Inequitable water management can heighten inequalities and water insecurity. For example, people living in the Occupied Palestinian Territories face acute water scarcity. Limited access to surface water is one factor. More important is the unequal sharing between Israel and Palestine of the aquifers below the West Bank. Average per capita water use by Israeli settlers on the West Bank is some nine times higher than by Palestinians sharing many of the same water sources.

Benefits of cooperation for human development

Successful cooperation in the management of shared waters can produce benefits for human

development at many levels. Apart from reducing the potential for conflict, cooperation can unlock benefits by improving the quality of shared water, generating prosperity and more secure livelihoods and creating the scope for wider cooperation.

Experience highlights both the potential benefits of cooperation and the costs of non-cooperation. Countries of the European Union have dramatically improved river water standards through cooperation, creating gains for industry, human health and domestic users. In Southern Africa a joint infrastructure programme is generating revenue for Lesotho and improved water for South Africa. Brazil and Paraguay have unlocked benefits from shared river management through power generation. Countries in Central Asia, by contrast, are paying a high price for noncooperation, with large losses for irrigation and hydropower.

Contrary to the claims of water war pessimists, conflict over water has been the exception, not the rule. Going back over the past 50 years, there have been some 37 cases of reported violence between states over water—and most of the episodes have involved minor skirmishes. Meanwhile, more than 200 water treaties have been negotiated. Some of these treaties—such as the Indus Basin Treaty between India and Pakistan—have remained in operation even during armed conflict.

Despite the general absence of armed conflict, cooperation has often been limited. For the most part it has focussed on technical management of water flow and volumetric allocations. Some river basin initiatives—notably the Nile Basin Initiative—are starting to change this picture. Progress has been hampered, however, by limited mandates, weak institutional capacity and underfinancing. These are all areas where international cooperation and partnerships can make a difference.

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Water flows through all aspects of human life. Throughout history water management has presented people and governments with far-reaching technical and political challenges. The

story of water management is at once a story of human ingenuity and human frailty. From the aqueducts of ancient Rome to the great public works of 19th century Europe and the United States, the provision of clean water for life has been made possible through innovative technologies. At the same time, unclean water and poor sanitation have claimed more lives over the past century than any other cause—and in many developing countries they continue to do so.

The management of water for livelihoods has an even longer history. Since the dawn of civilization in the Indus Valley and Mesopotamia the

management of water as a productive resource has been marked by ingenious infrastructure systems that have sought to harness the productive potential of water while limiting its potential for destruction. Human vulnerability in the face of failure in these endeavours, or as a result of shifts in the hydrological cycle, is reflected in the demise of civilizations, the collapse of agricultural systems and environmental destruction. Faced with the threat of climate change and mounting pressure on the world's freshwater resources, the 21st century water governance challenge may prove to be among the most daunting faced in human history.

Unclean water and poor sanitation have claimed more lives over the past century than any other cause

Eight reasons for the world to act on water and sanitation—links to the Millennium Development Goals

The Millennium Development Goals are the world's time-bound targets for overcoming extreme poverty and extending human freedom. Representing something more than a set of quantitative benchmarks to be attained by 2015, they encapsulate a broad vision of shared development priorities. That vision is rooted in the simple idea that extreme poverty and gross disparities of opportunity are not inescapable features of the human condition but a curable affliction whose continuation diminishes us all and threatens our collective security and prosperity.

The multifaceted targets set under the Millennium Development Goals cut across a vast array of interlinked dimensions of development, ranging from the reduction of extreme poverty to gender equality to health, education and the environment. Each dimension is linked

through a complex web of interactions. Sustained progress in any one area depends critically on advances across all the other areas. A lack of progress in any one area can hold back improvements across a broad front. Water and sanitation powerfully demonstrate the linkages. Without accelerated progress in these areas many countries will miss the Millennium Development Goals. Apart from consigning millions of the world's poorest people to lives of avoidable poverty, poor health and diminished opportunities, such an outcome would perpetuate deep inequalities within and between countries. While there is more to human development than the Millennium Development Goals, the targets set provide a useful frame of reference for understanding the linkages between progress in different areas—and the critical importance of progress in water and sanitation.

Millennium Development Goal	Why governments should act	How governments should act
Goal 1 Eradicate extreme poverty and hunger	<ul style="list-style-type: none"> The absence of clean water and adequate sanitation is a major cause of poverty and malnutrition: <ul style="list-style-type: none"> One in five people in the developing world—1.1 billion in all—lacks access to an improved water source. One in two people—2.6 billion in all—lacks access to adequate sanitation. Diseases and productivity losses linked to water and sanitation in developing countries amount to 2% of GDP, rising to 5% in Sub-Saharan Africa—more than the region gets in aid. In many of the poorest countries only 25% of the poorest households have access to piped water in their homes, compared with 85% of the richest. The poorest households pay as much as 10 times more for water as wealthy households. Water is a vital productive input for the smallholder farmers who account for more than half of the world's population living on less than \$1 a day. Mounting pressure to reallocate water from agriculture to industry threatens to increase rural poverty. 	<ul style="list-style-type: none"> Bringing water and sanitation into the mainstream of national and international strategies for achieving the Millennium Development Goals requires policies aimed at: <ul style="list-style-type: none"> Making access to water a human right and legislating for the progressive implementation of that right by ensuring that all people have access to at least 20 litres of clean water a day. Increasing public investment in extending the water network in urban areas and expanding provision in rural areas. Introducing "lifeline tariffs", cross-subsidies and investments in standpipes to ensure that nobody is denied access to water because of poverty, with a target ceiling of 3% for the share of household income spent on water. Regulating water utilities to improve efficiency, enhance equity and ensure accountability to the poor. Introducing public policies that combine sustainability with equity in the development of water resources for agriculture. Supporting the development and adoption of pro-poor irrigation technologies.
Goal 2 Achieve universal primary education	<ul style="list-style-type: none"> Collecting water and carrying it over long distances keep millions of girls out of school, consigning them to a future of illiteracy and restricted choice. Water-related diseases such as diarrhoea and parasitic infections cost 443 million school days each year—equivalent to an entire school year for all seven-year-old children in Ethiopia—and diminish learning potential. Inadequate water and sanitation provision in schools in many countries is a threat to child health. The absence of adequate sanitation and water in schools is a major reason that girls drop out. Parasitic infection transmitted through water and poor sanitation retards learning potential for more than 150 million children. 	<ul style="list-style-type: none"> Linking targets and strategies for achieving universal primary education to strategies for ensuring that every school has adequate water and sanitation provision, with separate facilities for girls. Making sanitation and hygiene parts of the school curriculum, equipping children with the knowledge they need to reduce health risks and enabling them to become agents of change in their communities. Establishing public health programmes in schools and communities that prevent and treat water-related infectious diseases.

Eight reasons for the world to act on water and sanitation—links to the Millennium Development Goals (continued)

Millennium Development Goal	Why governments should act	How governments should act
Goal 3 Promote gender equality and empower women	<ul style="list-style-type: none"> Deprivation in water and sanitation perpetuates gender inequality and disempowers women. Women bear the brunt of responsibility for collecting water, often spending up to 4 hours a day walking, waiting in queues and carrying water. This is a major source of time poverty. The time women spend caring for children made ill by waterborne diseases diminishes their opportunity to engage in productive work. Inadequate sanitation is experienced by millions of women as a loss of dignity and source of insecurity. Women account for the bulk of food production in many countries but experience restricted rights to water. 	<ul style="list-style-type: none"> Putting gender equity in water and sanitation at the centre of national poverty reduction strategies. Enacting legislation that requires female representation on water committees and other bodies. Supporting sanitation campaigns that give women a greater voice in shaping public investment decisions and household spending. Reforming property rights and the rules governing irrigation and other water user associations to ensure that women enjoy equal rights.
Goal 4 Reduce child mortality	<ul style="list-style-type: none"> Dirty water and poor sanitation account for the vast majority of the 1.8 million child deaths each year from diarrhoea—almost 5,000 every day—making it the second largest cause of child mortality. Access to clean water and sanitation can reduce the risk of a child dying by as much as 50%. Diarrhoea caused by unclean water is one of the world's greatest killers, claiming the lives of five times as many children as HIV/AIDS. Clean water and sanitation are among the most powerful preventative measures for child mortality: achieving the Millennium Development Goal for water and sanitation at even the most basic level of provision would save more than 1 million lives in the next decade; universal provision would raise the number of lives saved to 2 million. Waterborne diseases reinforce deep and socially unjust disparities, with children in poor households facing a risk of death some three to four times greater than children in rich households. 	<ul style="list-style-type: none"> Treating child deaths from water and sanitation as a national emergency—and as a violation of basic human rights. Using international aid to strengthen basic healthcare provision in preventing and treating diarrhoea. Establishing explicit linkages between targets for lowering child mortality and targets for expanding access to water and sanitation. Prioritizing the needs of the poorest households in public investment and service provision strategies for water and sanitation. Ensuring that Poverty Reduction Strategy Papers recognize the link between water and sanitation and child mortality. Publishing annual estimates of child deaths caused by water and sanitation problems.
Goal 5 Improve maternal health	<ul style="list-style-type: none"> The provision of water and sanitation reduces the incidence of diseases and afflictions—such as anaemia, vitamin deficiency and trachoma—that undermine maternal health and contribute to maternal mortality. 	<ul style="list-style-type: none"> Treating water and sanitation provision as a key component in strategies for gender equality. Empowering women to shape decisions on water and sanitation at the household, local and national levels.
Goal 6 Combat HIV/AIDS, malaria and other diseases	<ul style="list-style-type: none"> Inadequate access to water and sanitation restricts opportunities for hygiene and exposes people with HIV/AIDS to increased risks of infection. HIV-infected mothers require clean water to make formula milk. Achieving the Millennium Development Goal target for water and sanitation would reduce the costs to health systems of treating water-related infectious diseases by \$1.7 billion, increasing the resources available for HIV/AIDS treatment. Poor sanitation and drainage contribute to malaria, which claims some 1.3 million lives a year, 90% of them children under the age of five. 	<ul style="list-style-type: none"> Integrating water and sanitation into national and global strategies for tackling malaria and improving living conditions of HIV/AIDS patients. Ensuring that households caring for people with HIV/AIDS have access to at least 50 litres of free water. Investing in the drainage and sanitation facilities that reduce the presence of flies and mosquitoes.

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Eight reasons for the world to act on water and sanitation—links to the Millennium Development Goals (continued)

Millennium Development Goal	Why governments should act	How governments should act
<p>Goal 7 Ensure environmental sustainability</p> <p><i>Halve the proportion of people without sustainable access to safe drinking water and basic sanitation</i></p>	<ul style="list-style-type: none"> The goal of halving the proportion of people without access to water and sanitation will be missed on current trends by 234 million people for water and 430 million people for sanitation. Sub-Saharan Africa will need to increase new connections for sanitation from 7 million a year for the past decade to 28 million a year by 2015. Slow progress in water and sanitation will hold back advances in other areas. 	<ul style="list-style-type: none"> Putting in place practical measures that translate Millennium Development Goal commitments into practical actions. Providing national and international political leadership to overcome the twin deficits in water and sanitation. Supplementing the Millennium Development Goal target with the target of halving water and sanitation coverage disparities between the richest and poorest 20%. Empowering independent regulators to hold service providers to account for delivering efficient and affordable services to the poor.
<p>Reverse the loss of environmental resources</p>	<ul style="list-style-type: none"> The unsustainable exploitation of water resources represents a growing threat to human development, generating an unsustainable ecological debt that will be transferred to future generations. The number of people living in water-stressed countries will increase from about 700 million today to more than 3 billion by 2025. Over 1.4 billion people currently live in river basins where the use of water exceeds minimum recharge levels, leading to the desiccation of rivers and depletion of groundwater. Water insecurity linked to climate change threatens to increase malnutrition by 75–125 million people by 2080, with staple food production in many Sub-Saharan African countries falling by more than 25%. Groundwater depletion poses a grave threat to agricultural systems, food security and livelihoods across Asia and the Middle East. 	<ul style="list-style-type: none"> Treating water as a precious natural resource, rather than an expendable commodity to be exploited without reference to environmental sustainability. Reforming national accounts to reflect the real economic losses associated with the depletion of water resources. Introducing integrated water resources management policies that constrain water use within the limits of environmental sustainability, factoring in the needs of the environment. Institutionalizing policies that create incentives for conserving water and eliminating perverse subsidies that encourage unsustainable water-use patterns. Strengthening the provisions of the Kyoto Protocol to limit carbon emissions in line with stabilization targets of 450 parts per million, bolstering clean technology transfer mechanisms and bringing all countries under a stronger multilateral framework for emission reductions in 2012. Developing national adaptation strategies for dealing with the impact of climate change—and increasing aid for adaptation.
<p>Goal 8 Develop a global partnership for development</p>	<ul style="list-style-type: none"> There is no effective global partnership for water and sanitation, and successive high-level conferences have failed to create the momentum needed to push water and sanitation in the international agenda. Many national governments are failing to put in place the policies and financing needed to accelerate progress. Water and sanitation is weakly integrated into Poverty Reduction Strategy Papers. Many countries with high child death rates caused by diarrhoea are spending less than 0.5% of GDP on water and sanitation, a fraction of what they are allocating to military budgets. Rich countries have failed to prioritize water and sanitation in international aid partnerships, and spending on development assistance for the sector has been falling in real terms, now representing only 4% of total aid flows. International aid to agriculture has fallen by a third since the early 1990s, from 12% to 3.5% of total aid. 	<ul style="list-style-type: none"> Putting in place a global plan of action to galvanize political action, placing water and sanitation on to the agenda of the Group of Eight, mobilizing resources and supporting nationally owned planning processes. Developing nationally owned plans that link the Millennium Development Goal target for water and sanitation to clear medium-term financing provisions and to practical policies for overcoming inequality. Empowering local governments and local communities through decentralization, capacity development and adequate financing, with at least 1% of GDP allocated to water and sanitation through public spending. Increasing aid for water by \$3.6–\$4 billion annually by 2010, with an additional \$2 billion allocated to Sub-Saharan Africa. Increasing aid for agriculture from \$3 billion to \$10 billion annually by 2010, with a strengthened focus on water security.