

IRIN

In-Depth

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Running Dry: the humanitarian impact of the global water crisis

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1. Features -The global water crisis: Managing a dwindling resource



Credit: Manoocher Deghati/IRIN

"Our demand for water has turned us into vampires, draining the world of its lifeblood. What can we do to prevent mass global drought and starvation?" asked Fred Pearce, the *New Scientist's* environmental expert and author of 'When the Rivers Run Dry', published in February 2006.

There is some mordant irony that in the last 18 months parts of the world have witnessed colossal damage and lost of life due to the excess of water, at a time when the diminishing stock of freshwater continues to affect millions of people and threaten future crises.

Since the tsunami of December 2004 claimed more than a quarter-million lives and caused billions of dollars of damage, excess of water has created other natural disasters, including the 2005 hurricanes in the Caribbean, western Pacific and the United States and flooding from unprecedented rainfall across Europe. Even now, post-earthquake Pakistan is bracing itself for a season of landslides as the monsoon rains loosen and let slip the ruptured mountainsides of the Himalayas.



A skeletal child receives food through a tube at an emergency feeding centre in Niger. Malnutrition is a serious problem each year in Niger; the drought and famine of 2006 brought it to catastrophic proportions.
Credit: Edward Parsons/IRIN

At the same time, millions of people live without access to adequate or clean water, with little hope their situation will improve as the global water-shortage crisis escalates. Droughts caused devastating living conditions in Niger in 2005 and in parts of eight countries in eastern Africa in early 2006, affecting over 13 million people. Although the poor – both rural and urban – are typically the most vulnerable whenever resources are squeezed, the dimensions of this crisis will affect us all.

According to the United Nations Water Development Report of March 2006, the combination of lower precipitation and higher evaporation in many regions is diminishing water quantities in rivers, lakes and

groundwater. In addition, increased pollution is damaging ecosystems and the health, lives and livelihoods of those without access to adequate, safe drinking water and basic sanitation.

From the Aral Sea to Lake Chad and including most of the major rivers of the world, water reduction through environmental change and human exploitation is massive. In Africa, studies have shown rainfall patterns shifting away from the continents' interior to its coasts, leaving millions of fast-growing inland populations without sufficient water for consumption or food production.

The triennial UN report further claimed that "major demographic changes are also seriously affecting the quality and quantity of available freshwater on the planet." For the first time in human history, a smaller proportion of the global population now lives in rural areas, according to UN statistics from June 2006. Increased urbanisation, especially in developing countries, leads directly to poor health as the work necessary to develop infrastructure required to deliver clean water and sanitation proves insurmountable in many countries. Inadequate water not only leads to poor health but also a low quality of life and, in some cases, social unrest. The tragedy of the water crisis is that irrespective of the changes caused by global warming or the pressures of modern man on the environment, there is a lot of water around, if only we knew how to share and manage it.

Water resources

The Washington-based thinktank, the Center for Strategic and International Studies (CSIS) stated in a recent publication that "global trends in population, urbanisation, economic development, industrialisation, migration and other areas have pushed water demand to unsustainable levels." The indicators are alarming.

Our planet's total freshwater resource available for human consumption every year is approximately 14,000sqkm, but this represents only 0.03 percent of all the Earth's water. If this amount were divided equally amongst the population of the world, it would provide more than enough water for everyone's needs.

However, different people have varying levels of water access for socioeconomic and political reasons, and the location of water is disproportionate to the concentrations of human settlements as well. For example, the Amazon River carries about 15 percent of the Earth's freshwater runoff but supplies water to less than 1 percent of the world's population. Advances in human engineering and technology have only exacerbated both the disparities in water access and the rate at which we use our freshwater.

Heavy use of groundwater was not made possible

until relatively recent technological advances in geology, well-drilling, pump technology and rural electrification. For most areas exploiting groundwater and deeper 'fossil' aquifers, these advances date from the 1950s but have been greatly accelerated in the last decade.



Children of the Banke district, western Nepal - Scores of children became sick due to water-borne diseases and unhygienic conditions as a result of the floods there in 2006. Many suffered from eye-borne diseases, fever, diarrhoea, cholera and scabies.
Credit: Naresh Newar/IRIN

According to the International Association of Hydrologists, "Today a global withdrawal of 600-700 km³/a [cubic kilometres per year] makes groundwater the world's most extracted raw material." In 'From Development to Management', a publication from January 2003, the association explained that this level of extrac-

tion has been and remains a cornerstone of the Asian 'green agricultural revolution,' it also provides about 70 percent of piped water supply in the European Union and effectively supports rural communities across large areas of sub-Saharan Africa.

Many experts said that current levels of usage come with an expensive environmental pricetag. The unregulated use of boreholes and private pumps represents what Pearce described as "an extraordinary 'barefoot' hydrological revolution". Today, more than 21 million Indian farmers use private pumps to tap underground reservoirs to water more than two-thirds of all their irrigated crops. This water took millennia to build up and is rapidly running out.

Even in 1999, the rate of demise of these fossil aquifers was about 3m a year in India alone. And what one expert described as the "colossal anarchy" of underground water management in India is being repeated all over the world. "From China to Iran and Indonesia to Pakistan, rivers are running dry under the impact of increased abstractions," Pearce said in the February edition of *New Scientist*.

According to some estimates, the amount of water being used globally is more than twice the quantity being recharged by rainfall every year. India, China and Pakistan alone account for more than half the world's total use of underground water for agriculture. While farmers produce bumper crops and high-yielding crop varieties flourish, the prognosis for water resources is bleak. Clearly, the level of current usage is unsustainable. "The farmers are certainly destroying their children's future, if not their own," Pearce said.

During the course of the twentieth century, global water consumption rose six-fold, more than double the rate of population growth.

Cross-cutting

Water is a cross-cutting factor affecting every aspect

of human well-being and prosperity. Critical to basic human health, water availability is precondition for the production of food, raising of livestock, slaking of thirst, prevention of disease and provision of good hygiene and sanitation.

Clean water is also crucial for social and economic development through health facilities and education, through energy production and industrial expansion.

In relation to security from water-related crisis, there is an increased need for protection from floods and drought which, for a variety of reasons, are affecting people more regularly - especially communities in the developing world, where protection and mitigation from natural disasters is less common and where a disproportionately high number of victims of natural disasters live.

Today, millions of people, mainly women, struggle to locate and transport water for the drinking, cooking and washing needs of their families. From China to Peru, Niger to Palestine, Afghanistan to Mexico, the effort to access water of adequate quality and quantity absorbs a major part of the daily efforts of millions of poor people. Harrowing stories of the difficulties or high cost for families trying to obtain the minimum of water are only too common from rural or urban communities in the developing world. Of course the cost is not only effort and opportunity cost and a reduced quality of life, but also health and life itself is lost. Millions of people, possible as many as five million, and most of them children, die each year from illnesses and diseases caused by contaminated and unclean water.



The Abidjan skyline in Côte d'Ivoire. For the first time in history, more people now live in urban rather than rural areas across the globe.
Credit: Sarah Simpson/IRIN

A desperate 'Catch 22' situation exists for most developing countries: The very thing these countries need to raise funds to tackle water problems - economic development - requires yet more water to supply agriculture and industries that drive it.

Consumption patterns and virtual water

Global consumption preferences are dangerous and arguably unsustainable when it comes to efficient water use. Economists use the term 'virtual water' to express the quantity of water wrapped up in the growing and manufacture of goods traded around the world. To produce 1kg of coffee, a staggering 20,000 litres of water are needed. The virtual water content of a single, 250g hamburger is 11,000 litres, while 1kg of cheese and sugar require 5,000 and 3,000 litres respectively. Even 1kg of milk sucks up 2,000 litres of water, while a normal cotton T-shirt hijacks as much as 7,000 litres, according to Fred Pearce's grim calculations.

Consumption patterns show an ever-increasing desire

for products that require high levels of water, while global population growth continues unabated. It is increasingly difficult to resist the Malthusian logic of those who warn of a major crisis of demand and supply in relation to water.

According to analysts, some countries will increasingly be forced to import more of their food to cope with water scarcity. Countries that rely on agriculture need immense amounts of water for irrigation. It is estimated that one needs 1,000 cubic metres of water to grow one tonne of grain. By importing wheat, water-stressed countries can allocate more of their scarce freshwater to other industries or cities.

According to the New York-based Global Policy Forum, 26 percent of global wheat imports come from water-stressed regions in Asia, Africa and the Middle East. It is estimated that in the next 15 years, as countries join the ranks of food importers, the demand for international grain will increase by 30 percent. For instance, countries like China, India and Pakistan, which are currently grain self-sufficient, will likely start importing food in coming years due to water and land scarcity. For those nations without sufficient foreign exchange to turn to imports, such as those in sub-Saharan Africa, higher world grain prices, combined with detrimental changes in rainfall, will likely mean greater hunger and more calls for humanitarian aid.



Women and children wait with their jerry cans to collect water from a borehole in Padibe internally displaced people's (IDP) camp in Kitgum District, northern Uganda. Every day millions of women struggle to locate water for their families needs. Credit: Stuart Price/IRIN

"Widespread over-consumption of freshwater resources is causing a collapse in global freshwater systems that will be a primary driver in future water scarcity," stated CSIS in their 2005 report, 'Addressing Our Global Water Future'. The report claimed that according to the UN Population Division's

population projections, 15 countries - home to 2.3 billion people - would be 'water stressed', meaning per capita water availability is below 1,700 cubic metres per year, by 2025.

Future conflicts?

Financial markets are beginning to take an interest in investing in water companies, recognising that if an estimated two billion people are expected to be short of water in 2050 the resource could become more valuable than oil. Regional disputes and intrastate conflicts over water are already common in many countries. Some analysts say that future wars will be fought over water, not oil, and claim that water wars are inevitable.

Five years ago, the US National Intelligence Council reported that the likelihood of inter-state conflict over water would increase in the next 15 years. Publications and research papers with titles linking water and war

reverberate around the world, and the current statistics give little cause for optimism.

History has shown that there has always been a shortage of water in some place on Earth at some time. Whenever this happened, there was competition for water and sometimes conflict. Locally and regionally, competition for water is currently increasing. A publication presented at the Third World Water Forum in Japan in 2003 outlined the scope of the problem. This report, compiled by Bill Cosgrove and published by Green Cross International with the UN Environmental, Scientific and Cultural Organization, stated that the threats to regional and global ecosystems caused by manmade and natural climate change are significant, with serious security implications. Inequities are increasing between the rich, who can afford to cope, and the poor, who cannot. The Earth may near a "point of discontinuity in human civilisation" unless it learns to cooperate, it warned.

The report is one of many highlighting the grave need for increased international management and cooperation if conflicts over water are to be avoided. Despite increased recognition that the present crisis is a combination of the interrelated factors of environmental mismanagement, poor governance, overpopulation and climate change, additional claim add that learning to share water would also build peace. Optimists argue that history teaches us that people cooperate over water rather than fight over this life-giving resource and also point to a range of low-tech, community-based methods of conserving freshwater and recharging diminished aquifers. Cosgrove's analysis, in conclusion, sided cautiously with the optimists.

The challenge

The world's governments agreed at the Millennium Summit in 2000 to halve the number of people who lack access to safe water, mainly in the world's cities, by 2015. With rapidly growing urban populations, the challenge is immense, and with current levels of surface and groundwater depletion, it is not clear what impact such an aspiration, in the unlikely event that it is achieved, would have on the environment.

The CSIS report, using statistics from UN Children's Fund and the UN World Health Organisation, estimated that in order to meet the Millennium Development Goals approximately 1.5 billion people will need to be given access to water over the next nine years. Little wonder the UN declared 2005-2015 the International Decade for Action, launching a Water for Life campaign in an effort to address the most detrimental humanitarian results of the current, and increasing, global water crisis.

This IRIN In-Depth focuses on the most pertinent issues surrounding the water crisis through feature essays dealing with some of the 'macro' issues and direct field reports from the communities and people most affected by water scarcity and contamination.

Water is running out: How inevitable are international conflicts?



"The world is running out of water". Many countries have been declared to be in a state of water-stress or water-scarcity, and some experts believe that in the future wars will be fought over water not oil.
Credit: Eddy Posthuma de Boer/International Federation

The world's population is growing and water consumption is increasing, but water resources are decreasing. "The world is running out of water," stated Tony Clarke and Maude Barlow, activists and experts on water issues, in their article 'Water Wars', published by the Polaris Institute in 2003. They said that by 2025, world population would increase to 2.6 billion more than the present day and water demands would exceed availability by 56 percent. People will live in water-scarcity areas, and disputes over resources are inevitable.

There are currently 263 rivers and countless aquifers that either cross or demarcate international political boundaries, according to the Atlas of International Freshwater Agreement, and 90 percent of countries in the world must share these water basins with at least one or two other states.

The Global Policy Forum, a United States-based non-profit organisation with consultative status at the United Nations, uses the term 'water-stress' to describe situations in which each person in a country has access to less than 1,500 cubic meters of water each year. The term 'water scarcity' refers to situations in which each person in a country has access to less than 1,000 cubic meters of water per year. It is estimated that two-thirds of the world's population will live in areas of acute water stress or water scarcity by 2025.

Nowadays, tensions and disputes between countries are rising due to increasing problems of water scarcity, rapid population growth, degradation in water quality and uneven economic growth. "If current trends continue, we could be faced with a very grave situation," said former Soviet Union President Mikhail Gorbachev, who is now president of the Green Cross International, an organisation that provides analysis and expertise in environmental and economic issues.

The issue of water and the sharing of water has always been a key concern in the Middle East. Across watersheds of Jordan to the Tigris and Euphrates rivers, the

potential for strife today is even higher than before, as the regions are running out of water as political insecurities increase. Since 1950, approximately 80 percent of all violent disputes over water resources globally have occurred in the Middle East. According to Aaron Wolf of the Transboundary Freshwater Dispute Database at Oregon University in the US, people living in the region for generations have taken for granted the availability of water. Only recently have they started to realise the shortage of this vital resource. He warned that this diminishing supply could further weaken the fragile relationships between nations, between economic sectors and between individuals and their environment in the region.

Armed conflict between Israel and Palestine over the Jordan River has been going on for more than 50 years, and it is getting worse. This sacred river for Christians, Muslims and Jews is now facing a serious problem, as it carries not only less water each year but the water itself is increasingly unclean. An Israeli 'kibbutz' said, "It's hard to believe now, but we used to actually drink the water and go swimming with the children without worrying." Friends of Earth Israeli director Gidon Bromberg said the Israeli government needs to act immediately to solve the problem of the Jordan River. "The river's ecosystem has been so badly compromised that the damage may be irreversible," he said.



The world's population is increasing and becoming more urbanized. However water resources are decreasing. By 2025 the world's population will grow by a further 2.6 billion, and water demand will exceed availability by 56 percent. Two-thirds of the world's population will live in an area of acute water scarcity.
Credit: Munich Re

In Southeast Asia, the nations of Bangladesh, India and Nepal dispute the best uses of water from the Ganges-Brahmaputra Basin. Tensions and disagreements over water are also erupting along the Mekong River in Indochina as well as around

the Aral Sea in Eastern Europe. There have been long-standing disputes between Ethiopia, Sudan and Egypt over the Nile River: The vast majority of the river's flows are used by Egypt, even though it originates in Ethiopia. "We generate about 85 percent of the total Nile waters," said Misfinta Genny, Ethiopia's deputy minister of water. "We have not utilised this resource at all so far. [...] We must develop these resources, basically for the benefit of our people." Egypt's main concern is that Ethiopia would deplete the water supply before it reached Egypt, with serious implications for agriculture and small industries along the banks of the Nile. Competition for water is also on the rise within countries.

Increasingly, experts have cautioned that if certain countries do not improve water management and cooperation in the future, water wars are inevitable. Former UN Secretary-General Boutros Boutros Ghali threatened that, "The next war among countries will not be for oil or territorial borders, but only for the problem of water."

Background on international water

Globally, there are some 263 river basins that span across international borders. Europe has the greatest number of international basins (67), followed by Africa (59), Asia (57), North America (40) and South America (38). These international river basins cover almost one-half of the earth's land surface and are also home to approximately 40 percent of the world's population. These rivers generate 60 percent of freshwater flows around the globe.

Most of these basins cross two or more political borders. The Danube, for instance, has 17 riparian states. The Congo, Nile, Niger and Rhine are all located in nine different countries. The Amazon, the Mekong River, the Euphrates, the Tigris, the Aral Sea, the Ganges, the Jordan, and La Plata in South America are situated in or flow through at least five sovereign states. The third international World Water Forum in Kyoto, Japan, in 2003 emphasised the critical and urgent need of water management and cooperation between riparian states in order to preserve water supply and prevent disputes. Gorbachev, representing Green Cross International, stated, "Water management can only be effective based on the basin approach. All countries involved – the entire basin - have to be considered together."

Basis of conflict



Since 1950, 80 percent of all violent and armed conflicts over water resources have occurred in the Middle East.
Credit: Tom Spender/IRIN

resources. The Pacific Institute for Studies in Development, Environment and Security began a project in the 1980s to trace all incidents and tensions originating from water issues. Water-related conflicts are chronologically presented from 3000 BC until the present day. The different categories and types of conflict based on the severity of the event include:

- Control of water resources (state and nonstate actors): where water supplies or access to water is at the root of tensions;

- Military tool (state actors): where water resources or water systems themselves are used by a nation or a state as a weapon during a military action;
- Political tool (state and nonstate actors): where water resources or water systems themselves are used by a nation, state, or nonstate actor for a political goal;
- Terrorism (nonstate actors): where water resources or water systems are either targets or tools of violence or coercion by nonstate actors;
- Military target (state actors): where water resources or systems are targets of military actions by nations or states;
- Development disputes (state and nonstate actors): where water resources or can be caused by using water as military tool, water systems are a major source of contention and dispute in the context of economic and social development.



As water resources are decreasing, intra-national and international conflicts over water may be inevitable. In Sri Lanka for example, in late July 2006, one local newspaper headline stated: "Water War Has Begun!"
Credit: Hugo Ramii/IRIN

Water resources are crucial for domestic, industrial, agricultural, and environmental use. By controlling water resources, a country has the ability to control the economy and population. For instance, upstream regions or countries enjoy the benefit of using water flows firsthand, while downstream areas might receive lesser amounts of many watersheds across state borders. Cooperation between riparian states can be highly problematic.

Industrial development or the expansion of agriculture can also cause water conflicts when the excessive use of water by one state affects the water supply of another. In India and China in particular, the massive and unregulated use of private pumps is depleting underground aquifers at unsustainable and unprecedented rates.

Urbanisation has also disproportionately increased the demand for water for urban populations, when it is arguably their rural counterparts, with farms and livestock, who need more water. The problem of uneven water distribution and the deterioration in water quality due to pollution and chemical contamination all contribute to the emergence of tensions and conflicts both within and between states.

Water and civil conflict

On 6 July 2000, thousands of farmers in the Yellow River basin in China clashed with police over a government plan to relocate excess water from a local reservoir to cities and industries. The farmers had been expecting to use the reservoir to irrigate their crops following a bad drought that dried up the usual river flows that fed their fields. The incident took place downstream in Shandong, the last province the Yellow River runs through before reaching the sea. China's Yellow River has run dry before reaching the sea several times since 1972. The longest record, for 226 days, was recorded in 1997.

In the same year, water disputes also occurred between northern and southern provinces in Thailand, where the water level of the Chao Phraya River had markedly decreased. Tensions have also simmered for years in the downstream areas of the Indus River, where Pakistan's Punjab and Sind provinces fight over water use. In April 2001, desperate demonstrators shouting, "Give us water!" clashed violently with police in Karachi.



The Nile River, Uganda. The Nile River has become the source of dispute between Egypt and the 10 other countries who share its basin. According to the Nile colonial treaty of 1929, any country south of Egypt needs Egypt's approval to use the river for irrigation or hydropower purposes.
Credit: Manoocher Deghati/IRIN

Typically, tensions erupt into violent conflict when access to resources is tightened due to exceptional factors such as drought. In southern India in 2002, clashes broke out between two southern Indian states, Karnataka and Tamil Nadu, over access to the Chauvery River, which flows from Karnataka to Tamil Nadu. Karnataka accused Tamil Nadu of wasting water and greedily expanding its irrigated land. Tamil Nadu said its neighbour had forgotten the principle of sharing and suggested the farmers there concentrate on crops other than rice. Farmers and local youths blocked roads with burning tyres and shouted slogans against Tamil Nadu. When the Indian Supreme Court ordered Karnataka to release more water from its dams, public anger in Karnataka worsened. Similar water-related violence occurred in 1991 in Bangalore, where 25 people died.

In Kenya in January 2005, thousands of people fled their homes due to clashes over water in Kenya's Rift Valley, northwest of the capital, Nairobi. Youths from the Maasai and Kikuyu communities fought using

machetes, spears, bows and arrows and clubs. At least 15 people were killed.

In late July 2006, a headline from one newspaper in Sri Lanka shouted, "Water War Has Begun!" Violent conflicts were reported between the government armies and the Liberation Tigers of Tamil Eelam. The government accused the rebels of shutting the Maavilaru sluice gate in northeast Sri Lanka. The Tigers defended themselves by saying they had closed the gate in protest over government delays in improving the water system in the region. This conflict affected 50,000 people, who have limited alternative drinking-water supplies and no access to water to irrigate their farms as a result of the closure.

Another critical concern for southern Sri Lanka is a lack of sufficient groundwater. The Maavilaru waterway is the region's main water supplier, but because it has been blocked, the area has become more vulnerable. It is reported that tractors have been used to transport water to the region. The conflict has directly affected farmers, who for five of the last six seasons have had difficult times, experiencing water shortages, low prices for rice and high costs of fuel, labours and pesticide. Only a few have made any profit and surplus. Palitha Kohona, Sri Lanka's head secretary for peace, told Reuters, "Water is critical to human existence. Our objective is to secure the water, and we will get it [back]".

Sri Lanka government has stated that the Tamil Tigers have breached the laws of war by blocking the water supply. These events are the latest in hostilities between the government and the Tamil Tigers rebels that have led to the deaths of at least 800 people this year and more than 85,000 people since 1983.

Water expert Aaron T. Wolf stated that by 2015, nearly 3 billion people, or 40 percent of the expected world population, will be living in countries that have difficulty mobilising enough water to meet their industrial and domestic needs. Competition for water between cities and farms, between neighbouring states and provinces, will be intense. Tensions at the regional or intra-national level can eventually intrigue conflict across borders. As water quantity decreases every year and water quality worsens in many parts of the world, national, regional and international stability are at stake. Internal water stresses will also shift international political alliances and create more humanitarian crises.

Water and international conflict

Increasingly, politicians and experts in water-related issues believe that nations will go to war over water and not oil in the twenty-first century. It is calculated that at least 90 percent of water resources are situated under several sovereign nations.

Riparian states have natural advantages or disadvantages. Downstream states face potentially nightmare situations of having little if any control over the quan-

tity of water flowing into their land. The vulnerability of states further away from the source of any river is naturally increased. Egypt and the Nile basin illustrate the problems this can cause. Egypt lives in fear of its upstream neighbour, Sudan, in terms of water consumption. This example is discussed in detail later in this essay.

In a similar case, Turkey, which profits from the headwaters of the Tigris and the Euphrates, has developed 19 hydroelectric power stations and 22 dams as part of their Southeastern Anatolia Project, which is commonly known by its Turkish acronym GAP. The project is intended to increase the quantity of irrigated water available to Turkish farmers. A side effect, however, is that downstream Iraq and Syria have seen a decline of approximately 50 percent of water from both rivers since the 1990s - and the project is still four years from its planned completion date in 2010. Syria obtains around 80 percent of its water supply from these rivers, while Iraq is 100 percent dependent.

In February 1992, at the opening of the Ataturk Dam, Turkey's former President Suleyman Demirel said, "Neither Syria nor Iraq can lay claim to Turkey's rivers any more than Ankara could claim their oil. This is a matter of sovereignty. We have a right to do anything we like. The water resources are Turkey's; the oil resources are theirs. We don't say we share their oil resources, and they can't say they share our water resources."

This plan almost caused military conflict between Turkey and Syria later in 1998. Damascus accused Ankara of restraining water supply to downstream countries, while Ankara accused Syria of protecting Kurdish separatist leaders. The implications of less water are massive for predominantly agrarian societies that depend on river water in their agriculture and for their nascent industries.

In 2000, a dispute between China and India arose over the Brahmaputra River. India accused China of not sharing any information on water pressure and heavy rainfall in the upstream countries. Excess water caused a landslide and collapsed dam in Tibet, which unleashed a 26m wall of water that rushed into India and Bangladesh, causing flooding, destroying properties and claiming lives. Further concern emerged when China was reported to be planning to divert the river's water for building dams and hydropower potential.

Several water experts said that heavily populated countries would likely feel the greatest impact from water scarcity. The Global Policy Forum said that India, a country with one of the lowest water-resource levels in the world, would become severely starved for water by 2015.

The Okavango is the fourth-largest river in southern Africa. Its basin spans Angola, Botswana, Namibia and Zimbabwe. In 1996, Namibia planned to divert the river's water to its capital city, Windhoek. Angola and Botswana protested Namibia's plan, saying it would

harm people and the river's ecosystem. Even though the Okavango Commission was formed in 1994 to manage disputes in the area, water rivalries continue.

Who owns water?

Sovereignty over water flows is hard to define and enforce, even though agreements between some riparian states have been reached. Clear identification of 'ownership' of water resources is problematic but necessary in order to enhance political stability and international relations. Negotiation of agreements can take years. In the meantime, the ecosystem of a river may continue to be harmed or even destroyed, with the accompanying deterioration of the quality and quantity of water impacting the local population. The Indus treaty took 10 years of negotiations, while the agreements dealing with the Ganges took 30 years and the Jordan 40 years.

According to the Pacific Institute for Studies in Development, Environment and Security, there have been 507 international disputes concerning water resources in the last 50 years. Only 37 of these have become violent, the majority involving Israel and its neighbours. Nevertheless, analysts warn that with ever-diminishing resources, overuse and exploitation of water, and rapidly rising populations, the threat of violence becomes even more serious. Peter Gleick, an international water expert and president of the Pacific Institute, told IRIN, "There is long history of water conflict, and as water becomes more scarce, it will, indeed, lead to violent conflict in the future."

The impacts of dams: a continuing controversy



Lesotho's Mohale dam is one of the world's highest rock fill dams. \$2 trillion has been spent constructing 45,000 large dams around the globe since 1900.
Credit: Lesotho Highlands Development Authority

"I was there, and they are now constructing an airport, a bridge, roads, everything. The whole area is moving now. About US\$2 billion will be spent in that area, and it will bring it alive."

This is the optimistic view of Ibrahim Mahmud Hamid, Sudan's minister of humanitarian affairs, who spoke to IRIN about the anticipated social and economic benefits of the Merowe/Hamadad Dam, which is currently being built on the River Nile in northern Sudan. It is the largest hydropower project under construction in Africa.

According to the World Commission on Dams (WCD), an independent organisation set up in 1998 by the World Bank and the World Conservation Union, \$2 trillion has been spent constructing 45,000 large dams around the globe since 1900. Such projects have blockaded 61 percent of the world's rivers and displaced more than 40 million people.

Today, large dams produce 20 percent of the world's electricity and 12 percent of its food, generating an income of \$50 billion annually. There are currently 1,600 new, large dams planned or under construction in 46 river systems around the world, 40 of them in developing countries.

Although dams as an industry are a key ingredient to water-resource management, their construction and use have prompted fierce debate and controversy between government institutions and civil society movements the world over.

Opposing interests

Chaired by former South African Education Minister Kader Asmal, the WCD was set up in 1998 to look independently at "the increasingly confrontational debate about the role the world's 45,000 large dams have played in development."

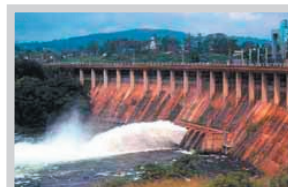
Governments build dams as a strategy to deal with very specific issues, including the prevention of floods; the provision of water for drinking, sanitation and irri-

gation; and the generation of hydroelectricity.

"There is a lot of flooding in this area, but we need to work out how to keep the water. With these dams, you can solve most of these and other problems, not only in Nairobi, but in the whole country and the whole region. With demand rising, it will be difficult to get water to everybody, but there is lots of potential," said Gerald Rukunga, programme manager of water and sanitation for the African Medical and Research Foundation (AMREF) in Kenya. AMREF works to alleviate poverty in Africa and supports proposals to build dams in Kenya.

Proponents of dams maintain that the industry brings about widespread improvement in income, welfare, food security and employment, both directly and indirectly, which in turn leads to a reduction in poverty. Detractors, however, blame dams for destroying ecosystems, reducing aquatic biodiversity and forcing the displacement of millions of people from their homes.

Aviva Imhof, South East Asia programme director of the International Rivers Network (IRN), said dams leave "a trail of devastation in their wake." IRN, a non-governmental organisation that works to "protect rivers and defend the rights of communities that depend on them," opposes destructive dams and the development model they advance, campaigning instead for sustainable development practices and the conservation of rivers and their watersheds.



The Owen Falls Dam in Uganda, is one of the world's largest storage dams. Dams are built for very specific purposes, in this case Hydro-electricity generation.
Credit: T. de Sallis/UNEP

Two sides

"It means nothing to build billion-dollar dams if they alienate the weak," said WCD's Asmal. "It means nothing to stop dams if our protests only entrench poverty."

To more fully assess both sides of the issue, WCD published 'Dams and Development: A New Framework for Decision Making' in 2000. The first comprehensive, global and independent research of its kind, the report drew attention to how dam-building impacts human rights, within the context of international agreements such as the Universal Declaration of Human Rights and the International Covenant on Economic, Social and Cultural Rights. These agreements include the right of future generations to inherit a sustainable planet, the right to be free from coercive or forced internal displacement, and the right to protect sights of natural heritage.

When it was first published, the report was seen as a victory by anti-dam interest groups, as it appeared to give weight to their assertions that dams have negative environmental impacts and do not produce the

economic benefits that are promised.

"The WCD report largely vindicates what critics have been saying for years," said Patrick McCully, executive director of IRN.

Others, however, including the award-winning Indian novelist and anti-dam activist Arundhati Roy, who opposes the construction of the Narmada Dam in India, called the report a "compromise".

"The problem is that it can be used by funding agencies to pretend that they have an enlightened approach, while the reality remains completely different. The industry is learning our language and then carrying on just the same," she said.

The construction, operation and output of large dams have social, environmental and economic impacts that are both positive and negative, direct and indirect - and these are woven together in very intricate ways. In all cases, some parties gain, such as the urban dwellers that benefit from increased water and electricity supply, while others lose, such as the poor, rural people who are displaced from their homes when a dam is built.

For example, the soon-to-be-completed Three Gorges Dam on the Yangtze River in China's southwestern Sichuan Province, is being built to meet the country's growing energy demands. However, it will flood an area of more than 632sqkm and displace 1.4 million people from their homes.

Jan Selby, senior lecturer in international relations at the University of Sussex and author of several books on resource politics, sees dams as a tool of the prevailing economic system, which can lead to a number of negative side effects.

"For instance, the deepening of capitalist social relations requires the destruction of subsistence relations, with people being forced off their land, being forced to sell their labour and buy and sell on the 'market'. Dam building contributes to this process," he said.



Lesotho's Katse Dam is the highest in Africa at 185m. The flooded valley covers an area of 35.8 square kilometres, and the valleys are flooded for over 45 kilometres from the dam wall.
Credit: IRIN

The case for dams

Dam proponents maintain that once a dam is built, a region's food production increases, food-related infrastructure develops, floods are controlled and domestic and business consumers in urban areas have an enhanced supply of electricity and water.

These elements combine, they say, to enrich the economy as a whole, encouraging foreign investment and leading to secondary economic gains in the service, health and education sectors.

According to the Asian Development Bank, secondary effects of dams can include "improved access to water for household needs, improved health conditions, reservoir fisheries, increased local economic activity, improved access to markets via roads, employment in construction and tourism, recession agriculture in the reservoir margins and recreation."

A loan from the Asian Development Bank will be used to construct the 144 megawatt Kali 'Gandaki A' plant in western Nepal. In terms of hydropower, Nepal - with water resources second only to Brazil - has great, albeit untapped, potential. According to the Independent Power Producers Association and a World Bank report in 2004, respectively, 60 percent of Nepal's population have no electricity, and 30 percent live below the poverty line of \$1 per day.

When the plant becomes fully operational, it will supply power to 1.3 million people, according to the Nepal Electricity Authority (NEA). With further development, the NEA plans to increase its electricity generating capacity by 30 per cent, producing 2,230 megawatts of electricity and exporting 400 megawatts to neighbouring India.

In Laos, the World Bank is helping fund the Nam Theun 2 dam project on the Xe Bang Fai River. The \$1.3 billion project has been fiercely criticised by NGOs working in the region, because the dam will displace thousands of people. Government officials and the World Bank, however, said the project would stimulate economic and social development in a country with few natural resources. Laos has "few other options, apart from chopping down forests or gold mining," said Peter Stephens, the World Bank's chief external officer for South East Asia and the Pacific.

Laos plans to generate foreign currency by selling the power generated by the dam to Thailand. Speaking to Radio Free Asia's Lao service, Finance Minister Somdy Douangdy said, "The Lao government believes that the Nam Theun 2 is one of the projects with high potential for income generation. Therefore, we consider this project important for poverty eradication and for helping Laos remove itself from underdevelopment by 2020 as planned."

The case against dams

During construction, dams create a large number of jobs for both skilled and unskilled workers. The 60 megawatt, \$138 million Khimti Khola plant in Nepal, for example, employed more than 3,000 people between 1996 and 2000, according to the NEA.

Once a dam is built, however, the highly sophisticated technology involved in its operation demands a relatively small number of employees, all of whom must have technical expertise. As a result, government agencies or private corporations usually take over the management of a dam, and the community loses control of its water resource.

Dams “increase state capacity to control and store water, especially for irrigation and flood control purposes and to generate electricity,” said Jan Selby in interview. They also change social relations, because the local population loses control over their land as “localised agriculture is transformed into irrigated monoculture and agribusiness,” he also said.



Dam construction has led to the displacement of hundreds of thousands across the world. Those displaced are often left without compensation or housing and are forced to live in temporary camps. Credit: David Swanson/IRIN

Dams flood vast tracts of land and create reservoirs in areas that were once river valleys. As a result, fragile river ecosystems and habitats are fragmented and ruined. Fisheries are destroyed, and the migration paths of animals and fish may be blocked. Dams have been linked to the extinction of several species of freshwater fish, according to Christer Nilsson of the Landscape Ecology Group at Umea University in Sweden.

“Flow manipulations hinder channel development [...] and may cause extensive modification of aquatic communities. Dams obstruct the dispersal and migration of organisms, and these and other effects have been directly linked to loss of populations and entire species of freshwater fish,” Nilsson said in a 2005 report for *‘Science’* journal.

Water quality downstream declines as submerged vegetation decomposes and deoxygenates the water, allowing mercury levels to rise. According to the WCD, a staggering 28 percent of all artificial greenhouse-gas emissions may be caused by rotting vegetation in dams.

Research has shown that river sediment becomes trapped behind dam walls, causing the retention of important nutrients and changing the downstream morphology of the riverbed, delta and coastline. This buildup of sediment also affects a dam’s functionality. In the worst case, WCD said, a reservoir could lose more than 80 percent of its storage capacity to silt in less than 30 years.

Experts have also argued that downstream water-flow rates are disrupted and fluctuate due to changing demands for hydropower, thereby affecting the natu-

ral seasonal ‘rhythm’ of a river and the habitats that depend on it. Seasonal flood patterns are inevitably halted, disconnecting the river from its flood plain and eradicating the ecological gains provided by the flooding.

In addition to these grave environmental consequences, dam construction can devour villages, towns and heritage sites, in some cases displacing hundreds of thousands of people. Sudan’s Merowe/Hamadad dam project, for example, will displace 9,500 families, or 50,000 people, from their homeland in the Nile Valley.

According to civil-society experts and World Bank researcher Anek Nakhabout, the Nam Theun 2 dam project in Laos will displace 6,200 people and adversely affect more than 100,000 villagers who depend on the Xe Bang River for their livelihoods.

Relocated communities often become fragmented as they are moved to other locations to make way for reservoirs. Livelihood patterns and resources are diminished; downstream wetlands can dry out; and floodplain fertility can decline. Those displaced by dam projects are often left without compensation or housing.

Global dam production has led to the “impoverishment of millions,” according to WCD chairman Asmal. “The profitability of these schemes remains elusive.”

“After we moved, we had trouble simply eating and clothing ourselves and our families. We also had no seeds or tools, and even now when it rains, we often sit in our houses with umbrellas over our heads since the roofs leak so badly. We don’t yet have the means to fix them. We left land that was ours to come to a strange place where we have absolutely nothing,” said Aissata Lamarana, a member of the women’s agricultural cooperative of Falekalé village, one of the new settlements for people displaced by the Garafiri Dam, on the Konkoure River in Guinea. Civil-society and anti-dam groups said Lamarana’s words typify the experience of many who are displaced by government-organised dam-building.

Politics

Water management and dam construction are highly politicised processes between regional states.

According to a report on the five central Asian countries of Kyrgystan, Tajikstan, Uzbekistan, Kazakhstan and Turkmenistan by the thinktank International Crisis Group, “The downstream countries require more water for their growing agricultural sectors and rising populations, while the economically weaker upstream countries are trying to win more control over their resources and want to use more water for electricity generation and farming. These disputes between countries often lead to a lack of drinking water for villagers.”

Impact assessments have found that the costs and the benefits of dams do not balance out. "The poor, other vulnerable groups and future generations are likely to bear disproportionate share of the social and environmental costs of large dam projects without gaining a commensurate share of the economic benefits," said a WCD report. "Lack of equity in the distribution of benefits has called into question the value of many dams in meeting water and energy development needs."



Dams "have been directly linked to loss of populations and entire species of freshwater fish."
Credit: Danish Society for a Living Sea

Economic status and gender have a considerable role to play in whether a dam has a positive or negative impact. "There can be serious distribution problems between top-enders and tail-enders, between landlords and tenants, between farmers and labourers, and at the household level between men and women,"

the WCD report stated.

The advantages a dam provides - such as irrigation and electricity - disproportionately benefit the wealthier members of society. Larger landowners are better able to afford the machinery needed to make the best use of the irrigated land, whilst small landowners do not have the economic resources to use the irrigated water and are often forced off their land or priced out of the market.

Poor and marginalised people bear the brunt of the costs associated with involuntary resettlement caused by dam construction. A recent article in the journal 'Human Rights Brief' found that in India, between 40 percent and 50 percent of those displaced by dam projects were ethnic minorities, even though they account for only 8 percent of the population.

"Nobody has ever proven that the benefits of large dams go to the poor," said Carlos Linares, senior water-policy advisor at the United Nations Development Programme (UNDP) headquarters in New York. "They may reflect well on GNP and other macroeconomic indicators and increase production, but that doesn't really give us any idea of the equity aspects of large dams. Nobody has proven that yet."

Typically, the communities most affected by the construction of dams have been left out of the planning process. "I don't think villagers understand the long-term impact. It is something they can not even imagine," said Nakhabout of the World Bank.

Women also bear a disproportionate burden, such as "forced displacement and grievances arising from poorly handled resettlement and compensation programmes," said Selby.

According to a recent report by the Canada-based International Development Studies Network, "Compensation payments to those displaced by projects are most often made to men, converting the collective assets of families into disposable assets held by men. Women are also most dependent on the common resources that are eliminated by dam projects."

Broken promises

"Dams have made an important and significant contribution to human development," said a 2000 WCD report, but "the adverse impacts of dams have fallen disproportionately on rural dwellers, subsistence farmers, indigenous peoples, ethnic minorities and women."

According to the report, construction costs overrun, on average, by 56 percent; one in four dams irrigates only one-third of the land it was supposed to; 25 percent of dams deliver less than half the promised water; and more than half the hydroelectric dams do not generate as much power as promised.

The arguments for and against dams continue to create controversy. Still, they continue to be built on an ever-larger scale, encouraged, endorsed and funded by international banks and financial institutions such as the International Monetary Fund and the World Bank.

Some experts who recognise the advantages that dams bring, like UNDP's Linares, felt that the answer to improving both livelihoods and access to water lies in small-scale, community-based dams. "Storing water, especially in light of climate variability and climate change, can be done at the community level to prevent and to prepare for the impacts of climate variability. I believe that communities can build small dams at the community level to control floods and to store water in times of drought," he said.

A catalyst for peace? The case for water cooperation



The River Ruzizi cuts its way through the valley floor of mountains between Bukavu and Kamanyola, South Kivu Province, eastern DRC. The river separates Rwanda, and DRC, and many people from both nations depend upon it for their livelihoods.
Credit: Olu Sarr/IRIN

Increasingly, warnings are heard that such is the need for water and such is the parlous state of shared water resources that future wars will be fought over water. Violent conflicts that have their roots in water disputes, especially within states, are ongoing in the world today. Ironically, the word 'rival' historically originates from 'those who share the same river'.

However, others argue that instead of inciting people to war, interdependence on water can be a catalyst for peace. Kader Asmal, chairman of the World Commission on Dams, said that "there is not a shred of evidence" that wars will be fought over water. Tony Allen, a professor at Kings College and School of Oriental and African Studies in London, told IRIN that the absence of even a single armed conflict over water since the 1960s showed that "the 'water war' is a stupid idea".

Researchers at Oregon State University have disputed Allen's claims. Their Transboundary Freshwater Dispute Database revealed there were 507 disputes over water during the second half of the twentieth century. Only 37 of these were violent, and as many as 30 of them were between Israel and one of its neighbours. At the same time, there have been 1,228 agreements, or other cooperative arrangements. The number of peaceful and accommodating events thus largely outnumbers the violent ones. And it is not only peaceful countries that sign treaties and share water. Countries currently at war keep up cooperation regarding water.

Other researchers argued the last real water war occurred 4,500 years ago between the city-states Lagash and Umma in Mesopotamia. No war has actually been fought over water since then, they said.

As water is so essential, people and states are forced to cooperate, since the contrary would have devastating results. There are several different approaches to water cooperation: The Transboundary Freshwater Dispute Database evaluates 'water events' on a scale from -7 to +7. The negative side is for conflicts, and the positive

for cooperation, including both verbal and technological support, as well as treaties and alliances. Minus 7 represents a total breakdown of negotiation and resorting to hostilities. The majority of events involving water, hostile or cooperative, are in the range of -2 and 2, meaning they are solely verbal, with no aggressive or antagonistic actions taken.

Water treaties

There are 263 transboundary river basins in the world, and in most of these regions people cooperate peacefully without formal treaties to stipulate the terms and rules of resource sharing. Treaties can be necessary in some cases, however, especially regarding larger river basins shared by more than two riparian states.

Several water treaties have either helped stabilise a region or at least continued to function in spite of hostilities. Aaron Wolf, director of the Transboundary Freshwater Dispute Database, said water concerns "gives people a reason to talk even during wars. It works as a vehicle for dialogue."

For example, the Indus River was once a 'domestic' river in British India but later became a transnational river through both India and Pakistan. Through the Indus Water Treaty and the Indus Commission, the two countries continued talks and cooperation from 1960 onwards. Even during the Indo-Pakistani wars of 1965 and 1971 talks were held through the Indus Commission, and a dispute about whether India was giving Pakistan enough water was solved by negotiations and the help of 'neutral experts' as stipulated in the Indus Water Treaty.

Another example is the cooperation around the Mekong River. The Mekong Committee was formed in 1957, with Cambodia, Laos, Thailand and Vietnam as permanent members and China and Burma as indirect members. Contrary to most other water treaties, this agreement was not the result of an earlier conflict, but a way to get guidelines for future cooperation. There was also assistance from the United Nations and the United States. The committee was most active during its early years, when many studies planning different projects were conducted. With the help of resources from international donors, agriculture, fishing and the potential of electric power were investigated and extensive mapping of the area begun. Since the Mekong basin is a very well-watered region, it is considered unlikely that any disputes would result in conflict, as there is little risk of any absolute shortage of water for any of the states involved. The risk of conflict is far higher in drought-prone regions, where the absence of water is literally a question of life and death for people, communities and livelihoods.

Through the cooperation in the Mekong Committee, Thailand and Laos also came to an agreement about the Lao Nam Ngum River. Thailand was in great need

of electricity, and Laos had the resource potential but not the means to build a hydroelectric power station. With support from Thailand, the plant was constructed, and Laos could sell electricity to Thailand.

Because the Mekong treaty stipulated that representatives from each of the four permanent members had to participate in all meetings, the committee transformed into an interim committee from 1978 to 1991, when Cambodia did not participate. The remaining three countries continued to meet for advisory sessions throughout that period. After Cambodia returned to the committee in 1991, a new treaty was negotiated. In 1995, the Mekong River Commission was created.



Ministers meet in Ethiopia as part of the Nile River Basin Initiative (NBI). The objective of the NBI is to achieve sustainable socio-economic development through cooperative and efficient use of the common Nile basin water resources.
Credit: IRIN

The current Mekong River Commission, however, has encountered more problems since the upstream riparian China - not a member of the commission - started planning dams and hydroelectric power stations that will have a direct impact on all the downstream states.

Approximately 60 million people depend on the Mekong River for food and water.

A reason to communicate

The Jordan River offers another example of a water-course situated in a troubled part of the world. Divided between Israel, Jordan, Lebanon and Syria, the water of the Jordan River has been the focus of many disputes. The use of water from the Jordan is so extensive that the Dead Sea's depth is shrinking by almost a metre per year.

Approximately 90 percent of the river's water is diverted and used for irrigation and drinking, mostly by Israel, but also by Jordan and Syria. During the 1950s and 1980s, there were several attempts to come to an agreement about the usage of the water, but no treaty was signed. However, representatives did agree on a draft plan that was accepted by all sides. It was only due to the fact that the Arab states perceived signing such an agreement as an indirect way to recognise the state of Israel that the treaty was not signed. Most countries, nonetheless, have followed the water-allocation proportions suggested in the plan by and large, and informal 'picnic-table' meetings have been held every year with representatives of the riparian states. During the dry months, when the Jordan River is even more important than other times, these meetings have been as frequent as every two weeks.

During the peace negotiations between Israel and the Palestine Liberation Organisation in 1995, as well as between Israel and Jordan in 1994, water was a crucial

issue. Both these peace treaties include specific chapters on the use of water from the Jordan River, as well as the use of water from the Yarmuk and groundwater in the case of the treaty with Jordan.

Israel, Jordan and the Palestinian Authority also cooperate on other water projects, such as the Two Seas Canal. It is prospected to provide the area with potable drinking water as well as restore the water level in the Dead Sea. Environmentalists, however, have criticised the project for the negative impact it might have on the region.

Israel has also signed bilateral treaties with the Palestine Authority and Jordan, in 1995 and 1994, respectively.

Sharing water, sharing energy

Renewable energy, such as hydroelectricity, is often seen as the only opportunity for developing countries to electrify their countries. According to World Bank estimates, hydropower today amounts to approximately 19 percent of the world's electricity. Their research also shows that the remaining exploitable potential for hydroelectricity is 5,400 TWh * per year, and that at least 90 percent of this is in developing countries. This is a substantial amount of energy - as a comparison, the whole of the US uses only 3,900 TWh per year, and the United Kingdom less than 400 TWh/year. There is, therefore, a great potential for developing countries to electrify larger areas domestically, as well as to export cost-efficient energy to neighbours with a larger appetite for electricity.

There are certain problems for developing countries in their attempts to extract this energy. First, the lack of resources to finance such infrastructure, and, second, that watercourses most often are shared between countries and depended upon for people's daily lives. Cooperation between possible beneficiaries is hence vital for the development of industrialising countries.

The Lesotho Highlands Water Project is an example of water-and-energy-related cooperation. The tiny country of Lesotho is totally enclosed by South Africa. It is poor in most ways, but rich in water. South Africa needed water, and in 1978 the governments of the two countries set up a joint technical team to investigate the possibility of Lesotho exporting water to South Africa. In 1986, the final report from a second study was completed, and the Treaty on the Lesotho Highlands Water Project between the Government of the Kingdom of Lesotho and the Government of the Republic of South Africa was signed.

Through this agreement, South Africa invests in the Lesotho infrastructure and buys reasonably priced water, while Lesotho benefits from investments and hydropower. The Transboundary Freshwater Dispute Database concluded their study of the Lesotho Highlands Water Project that "it is testimony to the resilience of these arrangements, that no significant changes were made despite the ... dramatic political

shift in South Africa.”

The Rusumo Falls Hydroelectric Project in Kagera River is another interesting energy project on its way in Africa. It is one of 22 potential water and/or energy projects researched by the Nile Basin Initiative (NBI). NBI is a cooperative body for riparian states in the Nile Basin. Their objective is to achieve sustainable socio-economic development through cooperative and efficient use of the common Nile basin water resources. Power and water exchange are the most common among these projects.



A child dying due to the affects of a drought in Somalia. “The real problem in the world today is that people are dying from lack of clean water and proper sanitation. That is the humanitarian crisis that the world should focus on,” otherwise “the human suffering will continue.”
Credit: IRIN

The planned hydrostation at Rusumo Falls is a joint project between Burundi, Rwanda and Tanzania. Once operational, it will be able to provide thousands of people with low-cost power, according to one of the feasibility studies. Today, only around 2 percent of the households in this region

have access to electricity, and the country average for both Burundi and Rwanda is less than 5 percent. The average for Tanzania is approximately 10 percent. Supported by international donors such as the African Development Bank, the European Union and the governments of Sweden and Norway, the Rusumo Falls Project has already been approved by the eight other Nile countries that are not directly involved in the project, as well as the ministers of energy in Burundi, Rwanda and Tanzania. Further feasibility studies are planned to commence in the end of 2006.

Lack of clean water is the real problem

Aaron Wolf told IRIN that the focus on ‘water wars’ is misguided and will actually do more harm than help. “The real problem in the world today is that people are dying from lack of clean water and proper sanitation. That is the humanitarian crisis that the world should focus on,” he said. “On the international level, we will see an increasing amount of treaties and negotiations, and that will help avoid international conflicts. But on a more local level, the human suffering will continue.”

The additional strain on water resources due to population growth and the subsequent increase in food production is yet another piece of evidence that cooperation over water will be more and more important in the future.

The 2004 UN report ‘Water: A Shared Responsibility’ stated, “At the same time, competition for water is also manifested in the demands between different users - urban versus rural, present uses versus future demands, competing regions, water quantity versus water quality and water concerns versus other social priorities.”

Thus, cooperation is necessary not only between, but also within, states. The importance of jointly managing the world’s water resources is being emphasised by many experts, including Wolf. It is time to realise that water is not an endless resource, and global cooperation is needed to protect it.

* TWh = Terawatt hour and therefore 10 to the power of twelve. In terms of magnitude this is above the GWh (gigawatt-hours) category which is above the MWh (megawatt-hour) level.

Water privatisation: a profitable commodity or basic right?



A young Nigerian slave collects water from a traditional well in far west Niger. Water is scarce in the desert region of Tillaberi. Furthermore, although the world is covered in water, only 0.77% of it is groundwater. Credit: G. Cranston/IRIN

Although water covers most of the earth's surface, only 2.5 percent of it is freshwater. And only a small fraction of that - no more than 0.01 percent - is easily accessible in lakes or rivers; the rest of it is frozen in glaciers and polar ice caps. Because of this, access to clean water is a major prob-

lem for many millions of people.

In addition to the 0.01 percent of the world's water in lakes and rivers, another 0.77 percent is groundwater that can be accessed through wells and boreholes, which require investment for drilling activities and pipeline construction. Involving private interests can be a way of finding the necessary means to expand such infrastructure, but doing so has sparked a fierce debate.

According to the United Nations World Health Organisation (WHO), slightly more than 50 percent of the world's population have tap water in their homes or grounds. An additional 33 percent have an 'improved water supply', which means they have access to a community standpipe, a borehole, a protected well, a protected spring or safe rainwater collection. Unprotected wells and springs, as well as rivers and lakes and tanker-provided water, are considered 'not improved', meaning they pose potential health risks to users.

Since 1990, the percentage of people with access to an improved water supply, as well as piped-in tap water has increased. According to WHO and the UN children's agency (Unicef), the increase in percentage has been mainly in rural areas: In 2002, 72 percent of the rural population globally had access to improved water supply and 27 percent had a house connection.

The largest share of the world's freshwater is used for agricultural purposes, such as for irrigation or for livestock. Agricultural use of water amounts to 70 percent of total water consumption; 22 percent is used by the industrial sector, and only 8 percent by households.

The right to water

"Water is not a privilege, it's a right!" said Mikhail Gorbachev, former president of the Soviet Union and current chairman of the board of Geneva-based environmental NGO Green Cross International. Many others agree with him. During the UN International Year of Freshwater in 2003, the UN Committee on Economic, Social and Cultural Rights issued a general comment that the right to adequate amounts of clean water for personal use is a human right. This means that all signatory countries to the Convention on Economic, Social and Cultural Rights are obliged to provide their citizens with enough quantities of clean and safe water for domestic use. It does not, however, say that water has to be provided for free; rather, it has to be 'affordable'.

Traditionally, governments have provided water without demanding payment or included water charges in general tax fees. Recently, however, more and more countries and cities have looked into alternatives, such as private management of water works, especially in the domestic water sector in urban areas. It has as well become more and more common that public water companies in developed countries charge fees that will fully cover the cost of the water used, instead of the water being generally subsidised for all users through tax revenues.

This change of policy has been heavily criticised by those who suffer economically from the changes and those who advocate on their behalf. Many moral issues have been raised by lobbyists and anti-privatisation NGOs, which claim that it is not acceptable to make people pay for something as fundamentally necessary as water.

The most zealous anti-privatisation activists claim that poor people, at the very least, should always have access to free water, since it is available for free in nature. One of the most well-known anti-privatisation activists is the Indian author Vandana Shiva, who wrote in her book 'Water Wars' that "water must be free for sustenance needs. Since nature gives water to us free of cost, buying and selling it for profit violates our inherent right to nature's gift and denies the poor of their human rights."

Still, providing safe drinking water for everyone everywhere is a cost that has to be covered by someone.

The beginning of privatisation

During the last decade, privatisation of the water-delivery system has affected millions of people. It been implemented in industrialised countries, and it has also boomed in the developing world, placing an extra financial burden on millions of impoverished people. The wave of privatisation in the developing world started in Latin America in the early 1990s, and it

has spread to many countries in Africa and Asia as well. The UN Development Programme (UNDP) said about privatisation in Africa that “until the mid-1990s, privatisation was limited to a small number of francophone countries. Since then, many more privatisations have taken place with still more governments announcing tenders and intentions to privatise.”



Agricultural use of water amounts to 70 percent of the world's total freshwater consumption.
Credit: Issandr El Amrani/IRIN

Pro-privatisation activist Fredrik Segerfeldt is critical of the anti-privatisation movement. “The pace of privatization has slowed,” he wrote in one report. “It is therefore vital that we have a serious discussion based

on facts and analysis, rather than on anecdotes and dogmas.”

A World Bank report from 2005 concluded that “privatization activity peaked in 1997 and dropped off in the late 1990s and, while still at overall low levels, is slowly creeping back.”

One of the reasons for the rapid rise of water privatisation in developing countries is that the World Bank is one of the biggest privatisation advocates, together with government donors and certain other development agencies. Through structural reforms, donors can oblige governments to privatise public services, often against the will of the affected citizens who fear privatisation will only increase their burdens.

‘Reclaiming Public Water’, published by Transnational Institute and Corporate Europe Observatory in January 2005, weighs in on the privatisation debate. The book focuses on how to make the public alternative work, rather than just arguing against privatisation. The institute’s fear that private, bottom-line-driven companies will not supply water to those who cannot afford to pay high prices is nevertheless clearly stated: “The water needs of the poor should not be left in the hands of profit-driven, transnational water corporations.”

Millennium Development Goals

The Millennium Development Goals (MDGs) were set by the UN in 2000. The eight goals represent a commitment by all UN member states to work together to eradicate poverty and improve lives all over the world by 2015. Enhancing water quality and increasing the number of people with access to safe drinking water and sanitation is vital to several of the MDGs, such as eradicating extreme poverty and hunger, improving health and attaining environmental sustainability.

Although everyone agrees that water is a basic need that should be provided for everyone, there are different opinions and approaches on how to do so.

The World Water Council is an international organisation for cooperation between NGOs and governments regarding water-related issues. They have estimated that investment in water and sanitation must be doubled to achieve the MDGs. Approximately \$30 billion annually is needed, divided between just over \$10 billion for supplying water and almost \$20 billion for sewerage. At the moment, private financing only covers around 10 percent of investment in water-related infrastructure, and the vast majority of water consumers who are connected to a network are served by publicly owned and operated companies.

Kendra Okonski is the environment programme director at International Policy Network, a London-based charity that educates the public about the role of market institutions in the context of global policy debates. She used Senegal as an example of private interests investing in expanding the pipe network outside of the cities, with a 23 percent extension as a result.

The parties in the privatisation debate: World Bank vs. NGOs

The privatisation debate is largely divided between nongovernmental organisations that are against privatisation and larger donor organisations that favour it. The World Bank prefers to talk about ‘private participation’ rather than ‘privatisation’. In a staff-guidance report from 2004, it states that “Using the private sector [...] to deliver services will remain a part of the Bank Group’s activities where this is feasible and effective.”

The World Bank also encourages public water systems to fully charge for the cost of the water they provide. Its justification is that “private participation, tariff policy [and] reform of public sector utilities are not ends in themselves,” but merely the most efficient way to provide clean water to the most people. Other pro-privatisation advocates are the International Monetary Fund and similar large donor organisations, but certain NGOs and thinktanks, such as the London-based Globalisation Institute, also agree.

The British Department for International Development (DFID), has been known to support the ‘British model’ of privatisation, where both the assets and the operation of the assets are privatised, while most other privatisation supporters recommend the ‘French model’, where only the operation of the assets is privatised, and the ownership still remains public. ‘Liberalisation’ of the service sector, including water supply, is also a fundamental part of the international trade agreements dealt with under the General Agreement on Trade in Services (GATS).

There are many arguments for privatisation of water. A common one is that private entrepreneurs are more efficient in increasing access to clean drinking water and have more technological skills and more assets for investment. Anti-privatisation activists claim that this is not true, but that privatising will only lead to

prohibitively high prices for the poor.

Using the example of Argentina, where at the same time some municipalities privatised their waterworks and others did not, Okonski said, "There is evidence to suggest that private systems provide cleaner water. The municipalities that privatised saw a decline in waterborne diseases, as well as child mortality due to diarrhoea and similar diseases."

Privatisation: A success, given the right conditions

Privatisation of water is often characterised as profit-hungry multinational companies overcharging the poorest in the world, forcing them to choose between water and food. Those who favour privatisation, however, argue that this does not have to happen. Pro-privatisation lobbyists, water companies and donor representatives have maintained that successful privatisation of water is possible with a few prerequisites, including a government that is strong enough to uphold regulations and to force the private company to do a good job. AquaFed, the International Federation of Water Operators, claim that through reasonable contracts and cooperation with the government, private enterprises can provide reliable services to all citizens.

According to the World Bank, there are two more conditions that need to be fulfilled for any privatisation reform to be successful. First, the reform must be backed by political will, meaning that those who support the government must benefit from the reform in terms of lower prices or better services. Second, the reform has to be politically viable, so those the government rely on cannot lose from the reform.

AquaFed states in its code of ethics that private water should be provided in a way that still ensures total sovereignty of the public authorities over the services. The administration must have the power to fine the private service provider if it fails to achieve the previously established goals, and the provider must also have the financial incentive to provide the best possible service to avoid being fined. Multinational companies also have another motivation to perform well, since good results in one country make it more likely that the company can run the water system elsewhere.

Gerard Payen, the president of AquaFed, said in a speech at the 4th World Water Forum in Mexico in 2006 that "private water operators are used to making the right to access to water effective for individuals. In developing countries, they have helped public authorities to connect more than 10 million people to water-supply systems in the last decade."

However, the domain of private water provision is not confined to multinational companies. Okonski said the term 'entrepreneur' would better describe those who sell water, as it is more inclusive of the realities on the ground. In many instances, in the developing world, water is provided by private means - not

through large companies, but by local water vendors that use tank trucks or even donkey carts to transport it. "Maybe the solution to water problems is bottom-up," Okonski said. "One step to drastic progress in Africa would be to make it easier for people to start their own business." Less bureaucracy would thus help to provide more people with water, she argued.

Providing water to those not yet connected

Many cities, following the implementation of water privatisation, have shown an increase in so-called 'system coverage', which is the number of families connected to the water service. Buenos Aires, Abidjan and Conakry, Guinea, are three cities the World Bank claims have increased their system coverage. The first two examples have increased coverage by approximately 15 percent; and Conakry, almost 25 percent. In Lima, however, privatisation, reportedly, had little impact on coverage.



At a community school in Nthombimbi, Zambia, children gather around a water pump. "There is evidence to suggest that private systems provide cleaner water" and lead to a reduction in "waterborne diseases, as well as child mortality due to diarrhoea and similar diseases."
Credit: UNICEF/Giacomo Pirozzi

Okonski believed private entrepreneurs had a larger interest in connecting more people. "Municipalities," she said, "see people as a burden; entrepreneurs see them as a resource."

It is often the poorest areas that are not connected to the water system, and without regulations in the contract between the government and the private company, there are often small incentives to connect these areas. In Durban, South Africa, however, many new customers were connected to the water system with the new methods introduced by the private sector.

In the informal settlement of Cato Crest, for example, installing pipes for traditional water supply would have cost too much, so a system of communal standpipes and private water tanks was introduced instead. At the standpipes, everyone has access to water and pays by the bucket, and there is also an option of installing private ground tanks instead. Each month, the tank owner pays for water in advance, and each day the tank is refilled. If the tank owner cannot pay a full month in advance, his tank is not refilled, but he always has access to the standpipes.

Private water providers have also shown to be more labour-efficient in many cases. Since the potential profit of a private company can increase if expenses, such as labour costs, are reduced, many public companies dismiss staff after being privatised. This was the case in Conakry, where the labour productivity was reportedly doubled after privatisation. On one hand, efficiency is good for the consumer because it keeps the costs down, but on the other, it increases unemployment.

Opposing privatisation

One of the most distinctive voices against privatisation is the World Development Movement, a UK-based NGO. It launched a 'Dirty aid, dirty water' campaign, which, among other things, tried to dissuade the British government from supporting international privatisation efforts. For example, the organisation opposed DFID involvement in the privatisation processes in Ghana and Tanzania, as well as Sierra Leone and other places. Other voices against privatisation of water are the Anti-Privatisation Forum in South Africa; the Water Page, an online information site; and a number of NGOs all over the world, especially in places where water facilities have been, or are about to be, privatised.

"The private sector has failed to keep the promises of investments, which are often used as arguments in the privatisation process," said Vicky Cann from World Development Movement, when she explained why public companies are better suited to provide water due to the impossible nature of providing necessities such as water and at the same time making a profit. "Private water companies just don't deliver, especially for the poorest communities," she said.

Okonski, however, said that in cases where privatisation has not been successful, the "biggest contributing factor is the lack of rule of law."

Alternatives to privatisation

The town of Teshie, outside Accra, Ghana, has a water supply system that was built in the 1960s. Since then, the population has quadrupled, but the waterworks have not been modified to accommodate increased demand. Since 1999, no water at all has been delivered through the pipes. To provide for their needs, people were forced to buy their water by the bucket, a solution that cost as much as 16 times more than water from the tap. To solve this problem, it was suggested that Accra's waterworks, including those at Teshie, be privatised. Despite protests from some quarters, the inhabitants of Teshie themselves were not picky. Their priority was access to clean water at a reasonable price; it did not matter who provided it.

Following the decisions to privatise water in Accra, Ghana, prices almost doubled in some areas. The small town of Savelugu in northern Ghana, however, took a different route. They formed a 'public-community partnership': The community collectively buys water

from the public company and takes responsibility for payment collections and minor repairs. They also set the price at which they sell the water to members of the community. This partnership has reduced to 15 percent that quantity of water which is unaccounted for - through poor management, compared to Ghana's average 50 percent.

Is water a commodity?

In 2000, 'Fortune' magazine claimed that water would be "to the twenty-first century what oil was to the twentieth", meaning that the trade in water would escalate and involve larger and larger sums of money.



A street standpipe in Dakar, Senegal, where poorer residents buy water by the bucket at inflated prices. Across the globe, millions of poor pay a high price for what many see as a basic human right.
Credit: IRIN

In India, poor citizens have been promised water for free since independence, but this promise is not even close to being fulfilled. Sometimes, the poor have to pay 10 or 20 times more than their well-off neighbours for safe water, according to UNDP statistics: those on-tap normally pay far less than those buying from street tanks and by the bucket.

In many areas, such as in Vijayawada in Andhra Pradesh, the poor have said they would actually be willing to pay for water, if the services were safe and reliable, and especially if those who are better able to afford water were excluded from receiving subsidised water. One example of how this could be done is through microfinance institutions. With a small loan, a family could afford to drill its own well and install a simple pump, and thus have access to safe water at a small cost.

The most common argument against privatisation has a moral basis: How can one privatise a communal commodity like water, and who should be allowed to set the price for a resource that is so essential? The pro-privatisation lobby responds to this question by asserting that the more important issue should be how to provide affordable water to as many people as possible. If private contractors can do this better than public agencies, they argue, why should they be prohibited from doing so? According to the World Development Movement, 95 percent of the world's drinking water is in public hands, but only 83 percent of the world's population has access to an improved water supply. There must be a more efficient way to provide safe drinking water than the present system.

When the price of water escalates too much, people

must choose between water and other necessities, such as food. In the north of Mexico, along the US-border, water is sometimes so expensive that children drink cheaper bottled soft drinks instead, according to the US-based consumer advocacy organisation Public Citizen.

Subsidising water for the poorest, or not?

The pro-privatisation lobby has argued that instead of paying for water services through tax money, it is fairer to pay for what one uses. This would also help reduce waste. To ensure that everyone would be able to afford water, governments could subsidise a base amount of water. The government in Senegal, for example, subsidises the first 10,000 litres for all families every month. The amount of water is based on what is considered to be enough to fulfil the everyday basic needs of a typical Senegalese family.

Some countries, however, have found it difficult to continue subsidising water after being compelled to privatise by international donors such as the International Monetary Fund or the World Bank. Donors often require that governments stop subsidising in connection with privatisation reforms, as was the case in Bolivia in 1997. In order to be given a \$138 million loan to help the country control inflation and bolster economic growth, Bolivia had to agree to sell off all remaining public enterprises, including the waterworks in Cochabamba, Bolivia's third-largest city. After closed-door negotiations, the Cochabamba water system was handed over to Aguas del Tunari on a 40-year concession. After seeing a major increase in water prices that was many times higher than the 35 percent forewarned by Aguas del Tunari, the people of Cochabamba took to the streets. For four days they closed down the city by erecting roadblocks and organising marches in protest against water bills that easily reached \$20 per month - in a town where a minimum monthly wage was less than \$100. The demonstrations and the violence continued for several months, and a six people were shot dead before the Bolivian government changed its mind and terminated the contract with Aguas del Tunari.

Later, Aguas del Tunari and its parent corporation, Bechtel, sought \$25 million in damages as well as \$25 million in lost profits for the breach of the exclusive, 40-year, multimillion-dollar contract to bring drinking water and sanitation services to Cochabamba. In January 2006, however, they dropped the claim and settled with a token payment.

Okonski praised the example of Chile, where there is almost full system coverage (95 percent in 2002) since the water works were privatised in the 1990s. Chilean interests own all the private providers, which creates a greater collective responsibility for the vital national resources. There is also a 'water stamp' system that is used to make sure that everyone has access to sufficient amounts of water. The government gives those who cannot afford water special vouchers that can be used to pay the water bills.

What will happen next?

The debate over whether or not privatisation is good for people and for the environment is not likely to end anytime soon. So far, the trend points towards more and more countries and cities privatising their water facilities, and more and more people being affected detrimentally with the main burden falling on the poor.

Vicky Cann from the World Development Movement, however, said the trend will reverse. "As civil society and trade unions are voicing their opposition against privatisation in the same time as private water companies withdraw from the former public market due to the difficulties to profit from this sector," she said, there will be a shift towards less privatisation. "The crucial question is whether international donor organisations will recognise this and stop advocating privatisation so hard."

On the other hand, Okonski said, "Private provision has been successful, but there is still much more to do." She advocated the strengthening of property rights and the rule of law for privatisation to work, adding that "the rhetoric against privatisation will collapse on its own contradiction." In the meantime, the fact remains that millions of poor pay a high price for what many see as an essential and basic resource in life. For those that cannot the consequences are, according to numerous civil society organisations world-wide, clearly seen in the quality of their lives and their profiles in terms of health, morbidity and ultimately mortality.

The gender dimensions of water access



"The world's water resources are our lifeline for survival, and for sustainable development in the twenty-first century. [...] We need to free women and girls from the daily chore of hauling water, often over great distances" - United Nations Secretary General, Kofi Annan, 2005.
Credit: IRIN

management. We need to make sanitation a priority. This is where progress is lagging most."

In his statement in March 2005, one week before the start of the International Water for Life Decade, United Nations Secretary-General Kofi Annan stressed the importance of involving women and girls in water-management policy.

One goal of the decade is to halve the number of people without access to safe drinking water and basic sanitation by 2015. It places special emphasis on the participation of women in turning this aspiration into reality.

Global institutions, such as the UN, have long emphasised the essential nature of water and its relation to the alleviation of poverty. It is an absolute necessity – regardless of geography, ethnicity or socio economic status – to sustain human life, as well as a prerequisite to economic activity. Clearly, water is also a non-negotiable requirement for food production, industry, domestic use and health.

Although water is a basic human need, the manner in which people interact with it and use it is highly dependant upon their gender. Historically, gender has dictated the relationships between men and women and water. It is these behaviours and identities that lead to men and women having very different roles in the use and management of water.

"Gender refers to the roles and responsibilities of women and men and the relationship between them. It does not simply refer to women or men, but to the way behaviours and identities are determined through the process of socialisation," said the Women's Environment and Development Organisation (WEDO), an international agency that advocates for women's

equality in global policy. "The world's water resources are our lifeline for survival, and for sustainable development in the twenty-first century. [...] We need to free women and girls from the daily chore of hauling water, often over great distances. We must involve them in decision-making on water

management. We need to make sanitation a priority.

Public and private domain

Water is the focal point of many women's lives, especially those who have limited access to it.

"Women are the managers of the water resource at the household and village level, especially in rural areas. They take care of the children and the sick, and they prepare the food. They fetch water and firewood for cooking," said Carlos Linares, senior water-policy advisor for the UN Development Programme.

Indeed, for many women the provision of water is an overriding priority of daily domestic life.

"All my life, everything has been about water. I want to have a bath - there is no water. I want to wash clothes - no water. I want to cook - no water. Always, everything is water, no water," said Hua, 47, who lives in Fikayi in northern Nigeria and is a member of the local water, sanitation and hygiene group WASH.

At the household level, women have the primary responsibility for cooking, cleaning, sanitation and health. They take on this role because of local custom and tradition, said Catherine Mwangi, executive director of the Kenya Water for Health Organisation (KWAHO), a nongovernmental agency that works to provide sustainable water and sanitation to disadvantaged communities.



Pakistan - Women and children have the laborious and sometimes dangerous task of fetching water. The recent earthquake disrupted many water sources and survivors had to trek up to three kilometres to fetch water.
Credit: Ramita Navai/IRIN

"In many cultures, it was always the women and the girl child providing the water because of the cooking. These traditions persist today," she said.

A 2003 study by Unicef, the UN children's agency, of households in 23 countries in sub-Saharan Africa found that 25 percent of the women surveyed spent between 30 minutes and one hour each day collecting and carrying water; 19 percent spent an hour or more. This burden was com-

pounded in drought-prone areas.

"It is difficult for me because I have six children at home" said Kilma Sabaou from Niger. "Before I come to collect water, I have other things to do for my children."

Water-gathering responsibilities leave many women and girls without the time or energy to engage in income-generating activities or to pursue an education. In fact, many young girls are denied schooling because family water needs take precedence.

"Normally, the girl would have to wake up get the water and so arrive at school late. Or she would be so late she wouldn't go to school at all. [...] Women and girls spend a lot of time going far away to look for water," Mwango said.

According to the UN Food and Agriculture Organisation, men are rarely expected to perform such tasks. The subordination of women by men is commonplace in many countries, and most women are not consulted in decision making about how best to use water resources, even though they have a deeper understanding of the issue.

Women's knowledge of natural resources extends to other areas as well. "Women use vegetation and forests for medicinal plants, food and fuel, as well as for income generation," said a recent report by WEDO. "But these ecosystems rely on a healthy water supply. As the environment deteriorates, women's livelihoods become increasingly vulnerable."

While women's relationship to water is usually confined to the domestic sphere, men's primary interest in water in rural settings is within the public domain; that is, agricultural production and irrigation.

This focus determines how resources are allocated. In some communities, there may be infrastructure for irrigation when there is none for drinking water, as men's work is regarded as part of the productive economy and therefore more worthy of investment.

Women's access to water is often limited because they do not own property. A 2003 report by the Gender and Water Alliance, entitled 'Gender Perspectives on Policies in the Water Sector', described how, in many cases, land ownership is a precondition to water rights.

"Rights to groundwater are usually granted to the owner of the land above it," said a recent report by Netherlands Development Assistance, part of the Netherlands Ministry of Foreign Affairs. "Water rights are very closely tied to land and consequently can only be transferred with that land." The report also found that even if women did hold a legal claim to land, cultural customs in many countries, such as Zimbabwe and Cameroon, prevented women from taking control over how public water was managed in their communities.

Land tenures are allocated to the heads of households, who are generally male. As such, many women have no legal claim to water. This complicates matters when outside agencies try to set up water projects in disadvantaged areas, Mwango explained.

"It is often the men who own the plots. So we have to involve the men, so that they can either donate or agree for the facilities to be put on their plot. Men have to be involved, as it is the men who own the land," she said.

Modernisation

The increasing tendency towards the privatisation of water and sanitation services by financial institutions such as the World Bank and the International Monetary Fund (IMF) has further subordinated women's access to water, according to the World Development Movement an international organisation which lobbies decision makers to stop policies that entrench poverty and campaigns for gender equality



Women supervising the sale of water from a tank they manage in Kibera, with funding from the Kenya Water for Health Organisation (KWAHO). Although being responsible for the sale and management of the water is empowering, gendered relations still remain. KWAHO has to attain permission from male landowners before it can import a water tank.
Credit: Ross Hudson/IRIN

As is detailed by Jan Selby, senior lecturer in international relations at the University of Sussex and author of several books on resource politics, including water, feels that privatisation of water services moves the decision-making process on water out of the home and into the formal domain, or out of women's hands and into men's.

"Modernisation of water supply disempowers women. Where women were previously largely responsible for household supply and management, modernisation results in power shifts to public institutions at state or local levels and business actors - especially agribusiness interests, which are more dominated by men."

At the World Water Forum in Mexico City in March 2006, officials from the World Bank argued that water could not be properly valued until it was assigned a market price which reflect the costs involved in its management, treatment and supply.

Furthermore, they contended that privatisation is necessary for investment in infrastructure. For example,

privatisation of the water sector was a precondition for an IMF loan to eight African countries.

In the developing world, it is often difficult to attribute a price tag to women's labour. Tradition dictates that the work women do, and the idea of assigning a tangible value to that work goes against custom. That is to say if a person; in this case a woman; has no real status in the hierarchy of their community, how can their work be assigned economic value?

If women's labour was given economic value, this would intern empower them within the community. However, predominantly this situation this does not occur.



Women queue for water in a drought-stricken district of Kenya in 2006. When environments deteriorate, women's livelihoods become increasingly vulnerable.
Credit: John Nyaga/IRIN

Ways forward

UN conferences, such the World Summit on Sustainable Development in 2002, and targets, such as the Millennium Development Goals, have emphasised how essential women's empowerment and gender equality are to poverty eradication.

Progress is being made on making gender issues an integral part of water-resource policy and management. In 2003, the Gender and Water Alliance and the Asian Development Bank (ADB) signed an agreement to promote gender mainstreaming into the water-sector activities of the bank's member countries.

"More action is needed in the Asia and Pacific region to ensure that water-sector activities are gender responsive," said Jan Van Heeswijk, director-general of the bank's regional and sustainable development

department. "This collaboration [...] will help ADB in our water policy of promoting the integration of gender concerns in policy, plans, programmes and projects."

Since that time, staff at ADB have received training on gender assessment of water resource management projects. Two studies were also completed - an evaluation of gender mainstreaming in ADB project designs (Gender Scan) and a good practice case study. The outputs of these are informing both partners of lessons learned for future gender mainstreaming.

Nonetheless, according to the UN Department of Economic and Social Affairs, successful implementation of these and other macro-level commitments depends upon a better developed and more mainstreamed understanding of the different roles men and women play in accessing and using water in human and environmental health, in sanitation and hygiene, in ecosystem stability, and within the public and private spheres.

Experts have agreed that a greater effort needs to be made to balance the roles, responsibilities and know-how of men and women in the management of water resources.

"Water policies and water-management systems should be gender-sensitive. They should reflect the divisions of labour – paid and unpaid – between men and women in all settings related to water," as was detailed by the report of the International Conference on Freshwater in Germany in 2001.

To achieve the goal of halving the number of people on this planet who lack access to water and sanitation, all stakeholders must acknowledge the role women play in providing water for their families and getting the most use out of every precious drop. If water equals life, women and girls bear a huge responsibility – and in turn deserve to be guaranteed the right to actively participate in shaping water-management policy.

Poverty and lack of water access: Inextricably linked



Worldwide, 1.1 billion people do not have access to clean water, and 2.6 billion people do not have access to basic sanitation. In addition, 2 million children die annually due to preventable water borne diseases.
Credit: Umanaka/UNEP

Abida Bibi, 22, lost her baby to the water crisis in the Punjabi town of Gujranwala in Pakistan. "My infant son died last year after suffering acute diarrhoea. He was four months old. I can never forget the agony he suffered," she said.

Abida and her husband

Jamal are two of the 1.1 billion people on the planet who live in an area with acute water scarcity and, as a result, improper sanitation. According to the United States Agency for International Development (USAID), approximately 250,000 children in Pakistan die each year from waterborne diseases that could have been prevented.

Abida and Jamal's two-year-old daughter has been ill for two months with dysentery. "We have no money to treat her," Abida said. "It will be a miracle if she survives this summer. It is what poor people have to live with."

Freshwater resources around the world are dwindling, and inadequate access to water is especially severe in the developing world, which lacks the infrastructure and coping mechanisms of industrialised nations.

In addition to the 1.1 billion people around the world who lack access to safe water, 2.6 billion people lack basic sanitation. Every 15 seconds, a child dies of a preventable waterborne disease, amounting to 2 million children annually. The World Bank has estimated that by 2035, three billion people who currently live in severe-water-scarcity areas - especially in Africa, the Middle East or South Asia - will have no access to safe water, period. This is a staggering prognosis by any standard.

Increasingly, experts, including those at the United Nations Development Programme (UNDP), have emphasised that improving water supply and sanitation are key to reducing many aspects of poverty. The Asian Development Bank (ADB) also sees water management as a vital component to eradicating poverty and sustaining economic growth. At the World Water Week symposium in Stockholm in 2002, Klaus Töpfer, who until 2006 was the longstanding chief of the UN Environment Programme (UNEP), said, "Without

adequate clean water, there can be no escape from poverty."

In Latin America, approximately 76 million people - 15 percent of the total population - do not have access to safe water, and around 116 million people do not have access to sanitation, said Kathy Sierra, the World Bank's vice-president for infrastructure and leader of its delegation to the Third World Water Forum in Japan in 2003. Like many other experts in attendance, Sierra said lack of water infrastructure and sanitation hinder development. Approximately there are 549 million people live in this region and the average income for a family of four is US\$8,000 per year.

Water, poverty, and war are intertwined together. War can also affect a country's water supply, and the situation in Iraq is a good example. Although the country benefits from two major sources of water - the Euphrates and the Tigris rivers - a large number of Iraqis do not have access to water. Clean water supplies were a problem in the country even before the outbreak of the recent war, and the conflict has only exacerbated the situation. The International Committee of the Red Cross (ICRC) reported that communities in Iraq are facing two problems in relation to water: People have either no access to water at all, or access only to dirty water. In August 2003, the main pipe supplying water to Baghdad was bombed, flooding on streets and leaving five million residents of the city without water. Adequate sewage management is another concern. Human, animal and industrial waste flow back into the rivers, contaminating the water and endangering lives and the ecosystem.

Disputes over clean water and sanitation are an issue in Johannesburg, South Africa. Many houses in the shantytowns have no water taps or toilets. People who live in these areas must share taps with dozens of others. Aida Matebone, who lives in one of the shantytowns in Johannesburg, revealed in a BBC interview in 2003, "It's difficult for me to come [to the taps] to wash, and come here to pour water for drinking, because it's very far." Speaking of a common situation for millions of urban families in South Africa, she added: "There's not enough water. [...] You have to give some other people the chance. This week, they have to wash; then you next week - which means the cleanliness of the people is so difficult, and health is at risk."

Shanin Nagar, a slum in the northwest India, has no roads, electricity, water lines or septic tanks. The people who live there - especially the women and young girls - must walk several kilometres to fetch water. The city council has tried to improve the situation and bring water to Shanin Nagar, but it charges 4,000 Indian rupees or US\$87 per household for road maintenance, and water and electricity connection. "We don't have that much money," said Nazma Bai, a resident of the slum.

Social workers in the area have tried to help residents

improve their hygiene practices, but they are incapable of building the necessary infrastructure themselves. The social workers and residents said the city council should provide water pipes, public latrines for free or lower the price.



In September 2000, The United Nations set the Millennium Development Goals which aim to eradicate poverty in all its forms around the globe by 2015. Target 10 seeks to halve the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015.
Credit: WHO/UNICEF

In Uganda, the government is struggling to alleviate poverty through improved sanitation and the eradication of waterborne diseases. The government spends US\$20 million per year to overcome the problem. Water and Sanitation Program Africa Region (WSP-AF), the World Bank's longest external partnership programme, reported that 440 children in Uganda die every week of waterborne diseases. Some 40,000,000 workdays are lost annually due to sanitation-related illnesses. WSP-AF has also reported that 90 percent of wastewater in Africa is untreated, further degrading the environment and endangering peoples lives.

Poor sanitation and hygiene is also a national crisis in Ethiopia. Currently, only 39.4 percent of the country's population has access to water, and only 28.9 percent has access to basic sanitation. As a result, 250,000 children die from water-related diseases annually.

Water, poverty and the Millennium Development Goals

In 2000, the UN set eight Millennium Development Goals (MDGs) to uphold the principles of human dignity, quality, equity, and to build a more peaceful and prosperous world. These goals, which are intended to be achieved by 2015, range from eradicating extreme

poverty to promoting gender equality, halting the spread of HIV/AIDS and ensuring environment stability. The goals are broken down into 14 targets.

Target number 10 is to cut in half the number of people without access to safe drinking water and sanitation. The UN World Health Organization (WHO), together with the UN children's agency (UNICEF) run a joint monitoring programme to measure and evaluate progress. WHO has reported that meeting Target 10 would cost as low as US\$8 billion annually. The agency also said that with more investment on the project, they could apply more advanced technology to improve quality and quantity of water supply and sanitation. "It is not investing for water's sake, but for poverty's sake," WHO added in its report.

WHO also emphasized that improvement in the water supply and sanitation sector would also increase the likelihood of achieving the rest of the MDGs. Improved water provision immediately improves health, especially in poor communities. Hours that were spent trekking to a water source could be invested in other activities that lift people out of poverty. They can use their time to study or pursue income-generating activities, which would enable them to eat better and live a healthier life. WHO added that improvement in sanitation would also help eliminate the health risks from a contaminated environment.

The agricultural sector would also benefit from improved water supply. Irrigation schemes would increase agricultural harvests and the income of the rural poor. Investments in the water sector also pay dividends in terms of gender equality and education, as women and girls have more time and energy to attend school, enabling them to eventually earn money to support their families.

Research conducted by the United Kingdom-based nonprofit organisation WaterAid showed that there is a significant connection between access to water and poverty reduction. Improved water and sanitation increases productivity, which then improves a country's economy.

Obstacles and collaboration

Improving water supply and sanitation to reduce poverty clearly requires a huge commitment from governments and investors in the water sector. Reform in water management, infrastructure, investment and governance are considered by experts to be essential aspects of reducing poverty. In the WHO 2005 report "Setting the Scene: Water, Poverty and the MDGs", the UN Economic and Social Commission for Asia and the Pacific (UNESCAP) and the Food and Agriculture Organization (FAO) said that political and institutional bodies often hinder the progress of MDGs. It is said that barriers are often come from governments rather than physical or economic sectors. Therefore, a large number of agencies are collaborating to help stakeholders, especially governments, better understand the link between water and poverty.

The ADB and the Poverty Environment Partnership (PEP), an informal network of development agencies from UNDP and UNEP, have worked together to create the Water and Poverty Initiative, which has set up a framework to understand the relationship.



Water, sanitation and poverty are inextricably connected. "Without adequate clean water, there can be no escape from poverty."

Credit: Shadley Lombard/UNEP

There are four elements of poverty reduction in the PEP framework: enhanced livelihood security through the use of water for income-producing activity; reduced health risks and mortality rates through improved sanitation, reduced vulnerability to water-related environmental hazards and disasters; and pro-poor economic growth through the active participation of all stakeholders

Water vulnerability and risks

The UN-Water is a new mechanism from the UN which was introduced in 2003. This organization is monitoring countries' progress on water related issue and help countries to achieve water and sanitation targets and goals by 2015. The UN-Water reported in 2005 that water-related hazards endanger the lives of millions of people and the environment and might hinder social economy activities. The MDGs emphasises the importance of the link between risk reduction and sustainable development.

Ironically, while the lack of clean water and, in the extreme, drought cause great suffering in today's world, the excess of water, in terms of floods and tsunamis or water contamination, also harms millions of people every year.

According to the UN-Water on the "Water Hazard Risks" report in 2005, water-related hazards are the main incident in several natural disasters. The report also stated that from 1991 to 2000, around 665,000 people died in 2,557 natural disasters, 90 percent of which were water-related. Floods in China caused by El Niño in 1991-1992 and 1997-1998 affected over 200 million people. Ninety-five percent of all deaths by disaster occurred in developing countries. Developed countries were affected by natural disasters, but the impact was not as high in terms of loss of life.

Pollution and natural hazards

The UN-Water revealed in its report on water-hazard risks in 2005 that it is vital to understand the relationship between natural hazards, the development process and poverty in order to reduce vulnerability when planning for development. Environmental experts have explained that natural disasters like floods and droughts are linked to excess or insufficient rainfall and river flows, among other phenomenon. A number of experts believe that human intervention plays a role in the occurrence and severity of natural disasters such as water and soil pollution.

In 2005, millions of people in China were left without water after a major leak from a chemical factory polluted their rivers. The water supply in the city of Harbin, the capital of the Heilongjiang Province in the northeast China, contained high levels of benzene, a poisonous chemical, as a result of the explosion at the chemical plant. The lives of 3.4 million people were in danger.

Arsenic contamination in drinking water in Bangladesh has been a major concern for the last 13 years. The first arsenic-contaminated water was discovered in 1993 in the southern part of Bangladesh. According to the last estimation from the government in 2000, there is arsenic contamination in 42 regions out of 64 in the country. WHO predicted that in the future, one out of 10 people in southern Bangladesh could die from cancer that had been triggered by exposure to arsenic. "Tens of millions of people are at risk," said the World Bank's local chief.



Many homes in shantytowns across South Africa do not have proper access to clean water or sanitation. People need to share water taps with dozens of others. "This week, they have to wash; then you next week - which means the cleanliness of the people is so difficult, and health is at risk." Credit: IRIN

Below are some causes of water vulnerability:

• Poverty

Poor people live from low-income budget, live in poor housing, and public services and use the vulnerable environment to survive. Not only this situation increases these people to be exposed to contaminate and vulnerable environment, but it also triggers natural disasters like floods, droughts and landslides to happen.

As a result, in the long term this condition undermines sustainable development. Infrastructure will not be able to withstand the hazards, loss in human lives and properties, and it would affect the national wealth and security in the country.

• **Unplanned Urbanization**

Increasing population meaning more and more people are in need to occupy lands to build their houses. Migration to urban areas also endangers the environment as people are forced to occupy lands which are not meant to be inhabited. Such situation happened in Asia, as urban areas expand its territories and build houses out of mangrove forests. It is not only damage the environment and the ecosystem but also endanger the people who live in the areas as they are exposed to natural hazards such as floods.

• **Environmental Degradation**

Human intervention can cause rapid environmental degradation which if not contained can trigger natural hazards. For instance in 2004, floods in Haiti were the result of lack land management. The country exploited charcoal as a domestic fuel and consequent deforestation. This condition enhances the country's vulnerability towards floods and mudslides.

• **Fragmented Institutional Structures**

Coordination from central to local governments is essential to prevent natural disasters. To prevent water-related hazard, government need more component than just water sector. Government needs a careful planning and detailed sectoral approaches to reduce the water-related vulnerability.

As experts have mentioned, humans play a role in the occurrence of pollution and natural disasters such as floods and droughts. Therefore, in order to reduce pollution and natural hazards, it is essential for governments to understand the relationship between nature and development. Coordination and cooperation from central to local governments is also needed when planning and building infrastructures.

Access to water and sanitation are fundamental precursors in the fight to alleviate poverty around the globe. Governments not only need to focus on water and sanitation, but also need to understand water vulnerability, and natural risks. Indeed, human intervention in the environment has caused many natural disasters and pollution. Therefore, the reduction level of pollution levels is of singular importance if this trend is to be reverted in the future.

According to WHO report in 2002, 83 percent of the world's population or approximately 5,2 billion people have access to safe drinking water. Although the statistic showed remarkable improvement from 1990 to 2002, however there are still 1.1 billion people in the world who still live without improved drinking water sources, who suffer for lack of clean or sufficient drinking water. In sub-Saharan Africa, 42 percent of the population lacks clean water. The number of people without improved drinking water sources in China is

equal to number of people who are unserved in the whole African continent. In China there are 39 millions people who are without safe water access.

There are still 2.6 billion people in the world without improved sanitation facilities. Only 36 percent of the population in sub-Saharan Africa have access to proper sanitation facilities. Approximately 1.5 billion people live without improved sanitation in China and India.

According to Alexander Likhotal, president of Green Cross International, an organisation that provides analysis and expertise in environmental and economic issues, cooperation and effective water management within countries must be improved if the Millennium Development Goals are to be achieved. "Without water and sanitation, you cannot achieve the alleviation of poverty in the world," he said. "Without water, you cannot achieve human dignity."

2. Frontlines - AFGHANISTAN: Water crisis a growing human tragedy



Severe drought means 2.5 million Afghan's face an imminent food crisis.
Credit: Evan Schneider/UN Library

production and the supply of drinking water to such an extent that the country is facing a growing human tragedy, experts have said.

In July, Sultan Shah, 65, and his 13-member family had to leave Nissozai, their village in the Shamalzo District in the southern province of Zabul, for Qalat city, the province's capital, because of the drought.

"I lost all I had in the village, including a garden of grapes, wheat crops and 50 cattle when our karaz [well] dried up. So I had to leave the village because we couldn't even find drinking water for ourselves," said Sultan, who found work as a labourer in Qalat.

Sultan Mahmood Mahmoodi, head of the hydrology and water-management department at the Ministry of Energy and Water (MoEW), said 80 percent of the people in rural areas and 70 percent of those living in cities did not have safe drinking water.

The United Nations and the Afghan government have warned that some 2.5 million people face an "imminent food crisis" due to the water shortage and have called for nearly US \$76 million in aid.

Officials estimate a further 6.5 million people are seasonally or chronically food insecure in the impoverished country, where 85 percent of the population relies on agriculture to make a living.

Abdul Wali Madaqiq, national project coordinator for the UN Environment Programme (UNEP), said from Kabul that drought hit the country once every 35 to 40 years and lasted up to five years.

Waleed Mahdi, head of the UN Food and Agriculture Organisation (FAO) Emergency Irrigation Rehabilitation Project in Kabul, said action needed to be taken. "If the crisis is not tackled, agriculture [will suffer], causing [more] food insecurity, and we will see an impact on the economy and on social and environmental safeguards," he said.

Agriculture is the major water consumer in Afghanistan, with rivers and canals providing most of the irrigation and wells providing the rest. Years of drought and armed conflict, however, have reduced the level of surface water in canals by up to 70 percent, causing

Years of drought, armed conflict and a lack of good management have seriously affected Afghanistan's water resources, cutting agricultural

a 60 percent drop in irrigated land. FAO has estimated that more than 36 percent of wells had dried up altogether and the water supply from those remaining was cut by up to 83 percent, causing an 81 percent decrease in irrigated land.

Officials said many of the country's 12 water reservoirs, built between 1920 and 1940, also needed fundamental repairs.

The effect of the water shortage on arable land and livestock has been devastating, with the number of domestic animals dropping dramatically between 1995 and 2003, according to FAO.

A lack of rain and snow has caused much of the surface-water shortage, but Mahdi pointed to other causes that could have been prevented. "This [shortage of surface-water irrigation] is basically due to an absence of proper water-resources management and development plans during the long conflict period, in addition to the absence of technical capacity and human resources," he said.



Once a source of irrigation for tens of thousands of acres of land, and a feeding source for several power reservoirs, Kabul's central river has turned into a dry ditch due to severe water shortage.
Credit: Sean Crowley/IRIN

The total quantity of water in an average year in Afghanistan is 75 billion cubic metres, comprised of 55 billion cubic metres of surface water and 20 billion cubic metres of ground water. The country loses some 30 billion cubic metres of water flowing outside the country annually, according to the MoEW.

Mahmoodi said the water flowed outside the country because there was no regulation of reservoirs and a lack of management. "If we manage this [...] inside our country, I am sure we would not have such crisis in the future," he said.

Officials at the MoEW said the main challenges were implementing a proper budget and finding skilled personnel to help tackle the situation.

MoEW said almost 90 percent of farmland in Afghanistan was still irrigated by traditional local systems. "As water canals and streams are not constructed properly, our farmers lose some 70 percent of their water as it flows towards their farm fields during irrigation because of the water infiltration into the ground," Mahmoodi said, adding that MoEW planned to boost efforts to increase efficiency by 45 percent in the next 10 years.

Mahdi said the water crisis had led to crop failure; a rise in the cultivation of the opium poppy as a drought-tolerant crop with a high return value; depletion of aquifers, causing scarcity of groundwater, especially in the central highlands and the northeast; move-

ment of labour from on-farm to off-farm employment; and the deterioration of social-hygiene and nutrition standards.

Moreover, officials said 40 percent of forests had been cut down due to water shortages and conflict. The return of millions of Afghans from neighbouring countries also had an impact.

Mahdi said a number of measures were needed to address the problem, including institutional reform in the water sector, enforcement of water-management and irrigation policies and a proper water-development plan. River-basin management and development plans were needed, uncompleted water projects had to be finished and feasibility studies of strategic water-supply schemes undertaken, he added.

Mahdi said Afghanistan had to open talks with neighbouring countries on cross-border water issues to create a more stable environment for donors. It also

needed a countrywide hydrometeorological network to analyse and help plan development to encourage private-sector investment.

Meanwhile, for Mohammad Ismail, 23, from Bahu Kala village in the Seurray District of Zabul Province, a solution appears a long way off.

"We spend hours carrying water long distances just to survive, while there is no assistance from the government and other aid groups to provide us with water tanks or other means," he said.

BURUNDI: Poor management cripples water delivery



The high cost of water leads many, including children, to resort to unsafe sources.
Credit: Jocelyne Sambira/IRIN

areas, lack clean drinking water.

While at least 75 percent of Burundi's 493,000 urban residents have their water delivered by the state-owned utility, Regideso, most Burundians are outside Regideso's supply grid and get water from lakes, rivers and swamps. The country is far from achieving the United Nations' minimum international standard one tap for every 500 people.

Collete Nibitanga, a resident of Buyengero Commune in the southern province of Bururi, said she could not find a single tap along the 20km road between Buyengero and Rumonge town. "People just drink water from marshes that are progressively drying up," she said.

The administrator of Buyengero, Innocent Ngendam-

By virtue of its location in Africa's Great Lakes region, Burundi has abundant water resources for its seven million people. However, most Burundians, especially in rural

bizi, said there were only 14 taps serving the town's 20,000 inhabitants, which amounts to one tap for every 1,400 people. Some people had to walk several kilometres to fetch water.

Poor maintenance of Regideso's supply network is partially to blame. "In some locations, pipes have burst, leading to wastage of large quantities of water," Ngendambizi said.

"Water taps in households, public institutions - such as boarding schools, universities, prisons, garrisons and various ministries - continue to leak day and night, further squandering the rare resource," said Liberat Nsabimana, director of water distribution at Regideso.

The water utility has launched a radio campaign urging consumers to be more careful about water consumption, but it had not made much difference, he said.

Devastating effects of war and poverty

Burundi's 13-year civil war seriously damaged Regideso's assets and has limited the utility's ability to provide services.

"Almost all public taps are not functioning, for they were destroyed," said François Sindimwo, Regideso's commercial manager. Moreover, the company had incurred heavy losses because most public institu-

tions had stopped paying their bills, he said.

Before civil war broke out in the early 1990s, Regideso supplied drinking water to 92 percent of the urban population. There are no signs that the current decline in service will turn around. Donors, who withdrew funding during the war, have not come forward with aid to improve water delivery. An uncertain outcome of ongoing peace talks between the rebel Forces Nationales de Liberation and the government could still scare donors away.

Poverty also impedes the provision of water to every citizen. Sindimwo said that even though water rates in Burundi were one of the lowest in the Great Lakes region, the poor could hardly afford the average cost of 233 Burundian francs (US \$0.23) per cubic metre of water.

"Only the rich can afford to buy the water, and the cost keeps on increasing," said Jeanne d'Arc Habonimana, a resident of Buyenzi.



Lake Gacimirinda in the north-western region of Bugabira in Burundi is slowly drying up due to over exploitation and poor water infrastructure.
Credit: Jocelyne Sambira/IRIN

In mid-July, Burundi's government hiked water rates to 354 francs (\$0.35) per cubic metre. Heavy users – including commercial, industrial and public institutions such as schools, military barracks and prisons – are now charged more than poor households, which usually consume

less than a cubic metre a day.

Burundi's water policy for 2004-2006 has the overall objective of supplying water in adequate quantities and quality to all socioeconomic sectors. It also includes taking measures to protect the natural resource, find new sources of water and manage them efficiently. "This will enable us to determine how much money we need to invest to deliver water to the public and to fix damaged water installations," said Gaston Ntawunkunda, the general manager of the Department of Hydraulics and Rural Energy, under the Ministry of Energy.

Another major constraint to providing safe water has been the public's attitude. Nsabimana said most consumers believed that water sources were infinite and did not understand that bringing the resource to them costs money.

"Water is to them a gift of God that should be supplied free of charge," he said. "The Burundian consumer finds it hard to spend half a dollar to buy more than six cubic metres of drinking water but spends a similar amount just to buy one bottle of beer."

Nsabimana said the tariffs were set at a level to dissuade public misuse of the commodity and to cover the cost of maintaining infrastructure.

No privatisation plan

To overcome inefficiency in the state-run water utility, the government considered privatising Regideso in 2000. However, the project stalled because the government of President Pierre Buyoya had allocated 50 percent of the country's budget to the military to fight rebels. The new government, in place since August 2005, has not ruled out the privatisation of the water utility.

"We have not abandoned it," Nsabimana said.

Privatisation was a condition set by donors before they would disburse financial aid to all sectors of the economy. Nsabimana said the better alternative to privatisation at this stage, however, would be to establish state-private sector 'partnerships' by assigning some water projects to private companies. This had been the case in the extension of the peri-urban water network at Sororezo in eastern Bujumbura and at Musaga, in the south of the city, he said. In the southern province of Makamba, private operators had been contracted to search for new water sources.

Ntawunkunda said privatisation goes against government's policy to provide water cheaply to the entire nation. "If water is systematically privatised, poor neighbourhoods will not get a drop," he said. "The cost for water will increase, prompting people to resort to unsafe sources."

Some consumers, however, believed privatisation would establish a more dependable water supply. "As the private companies target rapid profit margins, they would implement projects at once, and the beneficiaries would take advantage of this," said Jean de Dieu Habonimana, a teacher in Bujumbura's Bwiza commune.

Moves to boost access

With privatisation on hold, other efforts are being made to increase access to piped water.

Nsabimana said that in the wake of democratic elections in August 2005, donors were returning to the country and showing interest in the water sector. Some projects were already underway.

Work to rehabilitate dams in the countryside would begin "soon", he said, adding that lakes in the north could supply water to provinces such as Kirundo and Muyinga. There were other locations where hydro-electric dams could be built to pump drinking water, he said.

In addition, an eight-month, \$18 million national water supply and sanitation project is to be set up with support from the African Development Bank. It will evaluate the water and sanitation resources in Burundi and determine the funding needed to guarantee access to piped water in every province until 2015. The project will also provide money, pumping

equipment and maintenance training and suggest ways to decentralise water management and encourage community participation in maintaining water installations and ensure regular community contributions to maintain them.

A survey on the existing and potential drinking-water sources in rural and urban areas has already been prepared by the Energy Ministry. It includes information on the potential of tap and ground-water sources and rainwater stores, drinking-water networks and the administrative structure of communal water boards.

A \$12.8 million, four-year project is to be launched in August and financed by Germany to supply drinking water to residents in Rutana, Cankuzo and Kirundo provinces.

The provinces of Bururi, Gitega, Kayanza and Muramvya will also be served through a project of rehabilitation and extension of water infrastructures with a \$21 million disbursement from the African Development Fund.

Ntawunkunda said Belgium was set to invest \$2.4 million in drinking-water projects. The funding will support construction of 75 ground-water installations in Rutana, Ruyigi and Cankuzo provinces. The project, expected to take 16 months, will be completed at the end of February 2008.

Ntawunkunda's general water-management team for rural areas had already received \$800,000 under the World Bank's Highly Indebted Poor Countries Initiative. A five-month project, which would begin in September, will supply drinking water to the provinces of Gitega, Ngozi, Bujumbura Rural, Bubanza and Cibitoke.

The average cost for a rehabilitated water infrastructure is \$10,000 per kilometre, while the cost for a new water-pipeline infrastructure is \$18,000 per kilometre, Ntawunkunda said.

A law would be tabled in parliament to set guidelines for organisations and individuals investing in the drinking water sector, according to Ntawunkunda. "They will have to obtain a licence allowing them to work in the sector in a move to end to the existing anarchy in the water sector," he said.

CENTRAL AFRICAN REPUBLIC: Poor water provision harbours public danger



Dirty water can lead to many devastating diseases, and women and children are at the greatest risk. Half the incidents of infant mortality in CAR are due to contaminated water.
Credit: WHO/TDR/S.Lindsay

The provision of clean water is one of the greatest challenges facing the fledgling government of President Francois Bozize. Water scarcity is now a bigger problem for most of the CAR's 3.5 million people, who were better served before the six-month antigovernment rebellion that ended in March 2003 and brought Bozize to power. Today, the state water utility, Société de Distribution d'Eau de Centrafrique (SODECA), and

Rainfall may be ample in the Central African Republic (CAR), in the middle of the continent's vast rainforest, but most of its people still do without clean water.

village water-administration committees have not recovered from the looting of their warehouses for spare water-pumping equipment and other supplies.

Since village residents who contribute to the administrative committees now have far less money due to CAR's instability and poor economy, the committees can no longer afford to replace faulty equipment. In addition, the committees and the state utility do not have enough maintenance technicians to keep the few remaining facilities operating. Since 2003, SODECA has only been able to serve 22 percent of the nation's population.

Given these shortcomings, rural dwellers have turned to polluted backwaters, rivers, streams and wells to meet their domestic needs. These are often contaminated with animal and human faecal material. Hospitals reported that 41 percent of the patients who seek medical care have contracted diseases associated with drinking contaminated water. The most prominent of these, in order of frequency, are intestinal parasites, diarrhoea and digestive ailments.

Waterborne illnesses, such as Guinea worm, or *Dracunculus medinensis*, often affect people during peak agricultural periods, with serious economic and health consequences. "This can seriously affect their agricultural production and the availability of food in the household, and consequently the nutritional status of their family members, particularly young children," the United Nations World Health Organization has said.

[On the Net: Water-related Diseases: http://www.who.int/water_sanitation_health/diseases/guinea/en/]

Public sanitation and personal hygiene remain major problems affecting the health of the country's women and children. An evaluation seminar held in 1992 as a follow-up to the first UN International Decade for Clean Drinking Water (1981-1990) found that showed that half the incidents of infant and child mortality in CAR were due to water-related diseases. With today's compounded water problems, this situation can only have worsened.

Women and children are at greater risk than men because they deal directly with contaminated water at its source. Many must walk several kilometres a day, often along poorly accessible and even dangerous paths, to draw water. Obligated to help, children abandon school. According to the Bangui office of the UN Children's Fund (Unicef), half the nation's children die of water-related diseases and poor sanitation. Children constitute 60 percent of the population of CAR.

Remedial action

The CAR supports the goals of the UN's Return to Water Decade (2005-2015), which urges governments to implement good principles of integrated water-resource management. National and international nongovernmental organisations and the private sector have been urged to contribute.

For more than 10 years now, the government has worked to redress the chaotic management of water resources. It has improved technical training of rural water-management-committee personnel and of SODECA's pump-maintenance crews and built more potable-water installations. With the adoption of a national water and sanitation policy, the government, supported by development partners, is planning programmes to ensure that schools, markets, health centres and rural areas are provided with clean drinking water. According to the policy, priority will be given to urban areas of 4,000 to 10,000 residents, rural centres and then villages of fewer than 4,000 dwellers.

In urban areas, SODECA will implement a new system to charge consumers for water. While the utility will continue to charge customers who subscribe to its services directly, it will now levy charges on individuals who drill boreholes and sell water directly to the public as well.

Another reform under consideration is the privatisa-

tion of water-utility services, in hope that doing so would improve water supply, sanitation and protect the environment, which the government considers a development priority.

In spite of the programmes currently in place, water supply in the CAR has failed to meet the demand of its rising population. The director of the CAR chapter of the Regional Centre for Clean Drinking Water, Françoise Kiringuinza-Singa, said only 22 percent of the country's 2.4 million rural dwellers were provided with quality water.

Poor urban residents are no better off. Henri Mamolongo, 47, is a carpenter with five children who lives in the Nguitangola neighbourhood of Bangui, the nation's capital. He has never had a constant water supply. With earnings of about US\$90 a month, he cannot afford to live in the part of town that is served with piped water and must suffer the consequences.

"We drink well water, like the majority of my neighbours," he said.

The wells in his area are uncovered and at ground level. In close proximity to latrines and refuse, they are vulnerable to contamination. When Mamolongo's five-year-old child suffered fainting spells and felt itchy after bathing, and when one of his sons developed fever and started vomiting, he took them to the doctor.

"The medical examinations showed that our children were beginning to show the first symptoms of typhoid fever. As long as we do not change our source of water supply, our health will always be at risk," he said.

CENTRAL ASIA: Aral Sea crisis threatens public health

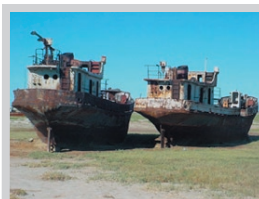


Satellite image of the Aral Sea, which was once the fourth largest lake in the whole world and has now sunk to one - quarter of its original size.
Credit: Danish Society for a Living Sea

The Aral Sea, located on the border of Kazakhstan and Uzbekistan, was once the fourth-largest lake in the world, but it has now shrunk to one-quarter its original size. The shrinkage, brought on largely by over-irrigation of rivers feeding the landlocked sea, and widespread pollution have led to grave health problems affecting millions of people and economic decline in the region.

Despite regional commitments to halt the drainage of the rivers that feed it, the Aral Sea continues to shrink. In addition, chemical waste from industrial projects and fertiliser runoff before and after the break up of the Soviet Union have poisoned soil and drinking water, posing a health hazard to those living in the area. Over the last 40 years, the shrinking shoreline has left behind an estimated 45 million metric tonnes of contaminated dust. The polluted air around the sea - a toxic cocktail of salt, pesticides and chemicals - has led to an increase in liver, kidney and respiratory diseases, experts said.

In 1994, the governments of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan established the International Fund for Saving the Aral Sea (IFAS) to address the environmental damage. Usman Buranov, a spokesman for IFAS, said health problems in the area were related to the poor quality of drinking water. Agriculture and cattle breeding around the sea had declined; unemployment was on the rise; and certain diseases had become more prevalent, he added.



The local fishing industry has collapsed due to decreasing water levels.
Credit: David Swanson/IRIN

Daphne Biliouri, an environment and development policy consultant and expert on the region said that without international intervention, health in the region would continue to deteriorate. "There has been no substantial attempt to help the people of the region by improving the quality of the water and provide them with the essential medical assistance to improve the quality of health," she said, adding that any local efforts to address the situation had been short-lived. "Current activities are localised and driven by the initiatives of people within the region. The problems of the Aral Sea have dropped down the list of priority from the international community," she said.

The United Nations World Health Organisation (WHO) has reported an increase in immune-system disorders, birth abnormalities and cancer rates in the Aral Sea area. The agency cited one problem specific to Uzbekistan, which was the high prevalence of bronchial asthma in Karakalpakstan, the autonomous region bordering the sea. Anaemia and tuberculosis were also widespread.

In Muynak, a former port that now lies some 150km from the water's edge, the number of tuberculosis cases had increased nearly 70 percent in the past decade, according to Médecins Sans Frontières (MSF), which has been active in the region since 1997. The agency reported that Karakalpakstan's 1.5 million residents had one of the highest rates of multidrug-resistant tuberculosis (MDR-TB) in the world.



"Pollution levels remain high... And there is no attempt to from governments or the international community to address this issue"
Credit: David Swanson/IRIN

MDR-TB is resistant to two or more of the primary drugs used for the treatment of the disease. Thierry Coppens, MSF's head of mission in Uzbekistan, said an agency survey in 2003 found 30 percent of new tuberculosis cases to be drug resistant. MSF, in cooperation with

Uzbekistan's Ministry of Health, launched a drug-resistance project in Nukus, the capital of Karakalpakstan, at the end of 2004. However, the treatment is demanding. Patients must take up to a two-year course of medicines to kill the TB, and there can be serious side effects.

IFAS said the region had also decline economically, leading to higher unemployment rates. The fishing industry, which once had an annual yield of 40,000 metric tonnes, collapsed in the 1980s. IFAS has set up the Social Assistance Fund (SAF), a support programme for those living around the Aral Sea, to try and mitigate the situation. Buranov said the fund provided micro loans to help create new jobs and rehabilitate the area.

Still, Biliouri remained sceptical. "The pollution levels of the water supply continue to remain high, and there are no attempts from the local authorities and the governments of the neighbouring states, as well from the international community, to address this issue," she said. "I am afraid that there has been very limited effort over the years. Unfortunately, the lack of a strategic significance of the region within the international political agenda will always keep the Aral Sea region on the bottom of the priority list."

CENTRAL ASIA: Lack of potable water forces families to move



Families have often been forced to walk many miles in order to access a clean water supply.
Credit: David Swanson/IRIN

Savitali, a middle-aged farmer from southern Kyrgyzstan, has moved his family north because there is no water.

"We had to carry water from a river

hundreds of metres away - going down and up a steep mountain slope for the past 10 years as the piped-water network installed in our village during Soviet times broke down," said the father of six. "You cannot have a normal life without water, and I had no other choice than to leave my home village. Many of my neighbours did the same, as there is no future in our village."

His family left Talaa, in the Kara-Kulja District of the southern Osh Province.

Access to safe water is a key problem in many parts of rural Central Asia, with poor regional cooperation on the management of cross-border water resources aggravating the situation.

For many villagers in the densely populated Ferghana Valley shared by Kyrgyzstan, Uzbekistan and Tajikistan, the lack of potable water is a growing concern. Many use water from irrigation trenches or other open sources that are vulnerable to waterborne diseases like diarrhoea and typhoid.

The World Bank estimates that only 30 percent of households in rural areas of Central Asia have piped water. The population of the region - which comprises the five former Soviet republics of Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan - is 60 million. Nearly 25 million people - comparable to the combined population of the Netherlands and Belgium - lack proper access to safe drinking water.

According to the Asian Development Bank, which supports many water-related and irrigation-rehabilitation projects in the region, Central Asia is relatively water-rich compared with many other parts of Asia, with annual per capita water use of 2,600 cubic metres.

"It has been said that Central Asia has enough available water resources to support a population of 35 to 50 million people, but that the water is so unevenly distributed as to be effectively in short supply," said a report by David Smith, assistant professor of Geography in Ohio Northern University's Department of History and Political Science.

Smith said the bulk of the region's water - more than

80 percent - was used for irrigation, with the rest utilised for personal and industrial consumption.

The Central Asian Alliance for Water, a nongovernmental organisation based in Osh, said little investment over the past two decades, a dependency syndrome inherited from the Soviet era and a perception that water was a free commodity had worsened the situation.

The World Bank said many rural water-supply services were in a state of total disrepair. Water management during Soviet times was highly centralised, with Moscow instructing the upstream republics of Kyrgyzstan and Tajikistan to accumulate water in their reservoirs in winter and to release it downstream at the beginning of the cotton-farming season to Uzbekistan, Kazakhstan and Turkmenistan. In return, the three Soviet states provided their upstream neighbours with the fuel and natural gas needed for energy during winter. However, when they all became independent in 1991, their interests started to clash. "Rising nationalism and competition among the five Central Asia states has meant they have failed to come up with a viable regional approach to replace the Soviet system of management," said a recent report by the International Crisis Group, an international thinktank. "The downstream countries require more water for their growing agricultural sectors and rising populations, while the economically weaker upstream countries are trying to win more control over their resources and want to use more water for electricity generation and farming."

Tensions focus on the region's two main rivers that flow into the Aral Sea - Kyrgyzstan's Syr Darya winds through Uzbekistan and Kazakhstan, and Tajikistan's Amu Darya through Uzbekistan and Turkmenistan. The disputes between the countries often result in a lack of drinking and irrigation water for villagers.

However, significant steps are being taken to tackle the issue.

A special United Nations-supported commission involving Kazakhstan and Kyrgyzstan was established in July, with the UN Economic and Social Commission for Asia and the Pacific (UNESCAP) saying the agreement provided a model for cooperation for other cross-border water issues in the region.

UNESCAP said that as part of the bilateral deal, Kazakhstan had agreed to pay part of the operating and maintenance expenses for a number of Kyrgyz dams and reservoirs. Kim Hak-Su, UNESCAP's executive secretary, said the deal was an "eloquent symbol" of cooperation to address such issues.

"It lays the foundation for future cooperation in achieving more sustainable growth in these two countries and in Central Asia," Hak-Su said.

CHAD-SUDAN: Sudanese refugees and Chadian hosts share scarce water



Sudanese refugee women from Darfur wait for water at Toloum refugee camp in eastern Chad. With the influx of refugees, competition is fierce for Chad's limited resources.
Credit: Liliane Bitong Ambassa/IRIN

Darfur region.

The refugees and the local population must share the region's limited resources, and competition over food, firewood and water has increased.

Most hosts and guests come from the Massalit and Zagawa ethnic groups. They are united by language and custom, but they are separated by an invisible line in the sand. Conditions in eastern Chad are hardly hospitable - the Sahel zone is one of the world's most marginal regions. The land is arid, the climate harsh. There is little vegetation.

A sudden influx of uninvited guests can tax even the most generous hosts, especially when they are among the world's poorest people and vastly outnumbered by their visitors.

To help protect the refugees and to prevent armed groups from seeking sanctuary among the refugees, the United Nations refugee agency (UNHCR) set up 12 refugee camps at least 50km from the border. The size and location of refugee camps, however, was determined by the availability of water. It is expensive to drill a well, and only about one-third of the wells drilled hit water and the quantity of water is often low.

"Water is one of the most important issues in eastern Chad," Monica Noro, UNHCR's senior technical coordinator in Abeche town, told IRIN. "Water projects are very complicated - it requires a lot of effort - and often water is not there; even after hydrological studies."

One of the camps in the northeast still depends on water that is brought in by trucks. Humanitarian agencies want to relocate the camp and are looking for a more suitable location with guaranteed water access.

Perhaps surprisingly, most of the villagers in eastern Chad initially accepted the newcomers. Following the dry conditions in 2005, however, water and pasture availability has become increasingly limited.

"Competition for water, firewood and grazing lands has led to increased tensions between the refugees and host communities. But very little funding is available to assist the host communities," Jan Egeland, the

Since 2003, some 200,000 civilians, many of them women and children, have crossed into eastern Chad, fleeing the ongoing violence in the western Sudanese

UN's Emergency Relief Co-ordinator, said about Chad in a briefing to the Security Council. "Unless we are able to provide relief equitably to both groups, our aid risks becoming another source of instability."

Aid officials have reported increasing incidents of violence against women refugees who venture outside the camps to find firewood. Conflicts among ethnic groups and between farmers and pastoralists are already common, and refugees in camps often outnumber the local population.

The Bredging refugee camp houses more than 27,000 Sudanese near the town of Adre - across the border from El Geneina, the capital of West Darfur State. Bredging is also the name of a village of 960 people just a kilometre outside from the camp. The hills are already being stripped of trees for firewood, and the refugees' cattle threaten to exhaust nearby grazing land.

To reduce the pressure on the environment, aid workers have taught the refugee women how to use fuel-efficient stoves called "save-80s" and improved mud stoves. "They save energy and avoid the erosion of natural resources," Noro said.



Water is hard to come by in the east of landlocked Chad. The land is arid, the climate harsh, and there is little vegetation.
Credit: IRIN

"We didn't have any conflicts so far specifically over water issues, [but] we are closely checking the water table and obviously during the dry season there are more shortages," she observed. "And we are involving all the local authorities in the planning of the camps."

Humanitarian organisations have also expanded their aid programmes in the region to provide additional assistance to help poor local communities adjust to the impact of refugees.

Water levels low

To provide the refugees with safe water, aid workers are digging new wells for the camps.

"There are tensions already between the local population and the refugees, which was not the case in the beginning; because the local population think there are a lot of refugees to share the resource with. After a while, it may become too much," said Cedric Fedida, a spokesman for Oxfam.

Acknowledging the problem of water access for the local population, a humanitarian agency has installed water pumps to improve water supply in towns, such as Abeché, Iriba, Tiné and Adré, which are near refugee populations.

In addition to diffusing local tensions, the local water sources will help meet the demands placed by a growing population of internally displaced persons (IDPs) who have entered the region as a result of violence spilling over the border from Darfur and targeting local communities.

"IDPs are not absorbed in the refugee camps," Noro explained. "They are mostly settling around the towns, and local authorities provide them with a place to settle."

Water is a complex issue, however. Refugees International was told that a village turned down an offer from an NGO to dig a well for them. A well, said the villagers, would attract nomads, and their flocks would trample the crops and cause conflict. The villagers believed it would be better to forego a well and provide for their modest water needs by hand-digging shallow seep holes in the 'wadi', or dry riverbed.

Avoiding local resource conflicts

The provision of water and humanitarian assistance to the local population must be complemented by appropriate environmental measures, as a sizeable refugee operation will invariably affect local livelihoods and welfare through the use of local resources.

"This can lead to strained relationships with the host communities. In extreme cases, the competition for natural resources can turn local communities or governments against refugees and threaten the very

institution of asylum," UNHCR's Assistant High Commissioner Kamel Morjane said.

As a result, the refugee agency is planning to distribute more than 300,000 seedlings from its nurseries during the rainy season so the refugees and host communities can plant trees in the camps and surrounding villages.

"The timing is very important," said UNHCR's environment expert, Valentine Ndibalema. "We distribute the seedlings when the rainy season starts so that the trees can sprout quickly. Each family is responsible for a few trees, and when the rains stop, we teach them how to use wastewater and kitchen water to maintain the trees. We're trying to promote simple techniques so everyone can participate."

"There are a lot of tree nurseries and plantations around the camps," Noro added. "This type of operation is carried out because of the particular nature of the situation in Chad - the environment is quite dry and desert-like. The camps are big, and the populations are staying for quite a long time."

CONGO: Rural residents left high and dry for lack of clean water



Clean tap water provided by a humanitarian NGO in Mindouli, a sub-prefecture of the Pool Department, about 140 km south of Brazzaville, the nation's capital.
Credit: Laudes Martial Mbon/IRIN

The state water utility, Société nationale de distribution d'eau (SNDE), lacks capital to improve the way it pumps, stores and distributes water through its 55-year-old network of decaying pipes to the growing population. As it stands, only 69 percent of ROC's urban dwellers receive water through SNDE. The

Although the Republic of Congo (ROC) is one of Central Africa's wettest countries, the majority of its rural population has no drinkable water due to a lack of infrastructure.

absence of a reliable means to deliver pipe-borne water means that barely 11 percent of the rural population has access to this precious resource - and even then only with great difficulty.

About 48 percent of the country's 3.1 million people live in rural areas, according to the Ministry of Population, and most of them do not have access to pipe-borne water. Although some average-wage earners buy bottled mineral water from Gabon, most rural folk use streams, rivers and rainwater.

ROC receives 1,700 to 2,000 millimetres of rainfall each year. If the country's water distribution problems were solved, said the Ministry of Energy and Water Resources, each person could be served between 20 litres and 30 litres of water a day.

A multifaceted problem

In Ewo, the main town in the northwestern administra-

tive department of Cuvette Ouest, the water-storage tower has a capacity of 100 cubic metres, which SNDE says is only enough to serve one-fifth of the town's 5,000 inhabitants. About 303 residents subscribe directly to SNDE for 50,000 francs CFA (US \$90), and in addition must pay a fixed monthly bill of 3,420 francs CFA (\$6).

Venance Bola, head of SNDE in Ewo, said that the company's rates do not cover its operating expenses. "This fixed charge means SNDE cannot make a profit and cannot provide water on a regular basis," he said. To fill Ewo's water tower, SNDE needs 72 litres of fuel to power its pumps each day. The utility, however, can afford to buy only six litres of gas oil a day. As a result, residents connected to the SNDE network in Ewo only have water three days a week. To supplement the SNDE supply, they must use a network of small streams around the town for bathing and drinking.

"We've become used to drinking spring water because it is natural. It is not often associated with chemicals," Romuald Onanga, an Ewo resident, said.

Unbeknownst to many, such water sources pose a myriad of health risks.

"Stream water is infected. The majority of the patients whom we receive in our hospital suffer from malaria, or diarrhoeal and skin diseases," Gervais Serge Marcelin Kionghat, the chief medical officer of Ewo Hospital, said.

One 35-year-old patient, who did not wish to be named, said she did not believe that polluted water was the cause of her stomach problems, despite using streams for drinking and cooking.

"I do not think that my problem is related to bad water," she said. "If it were so then the entire inhabitants of the smallest villages would suffer."

Mercellin said people contracted diseases because they did not boil the stream water before drinking it. Making matters worse, he said, was the fact that there was no permanent government programme to inform the rural public of the dangers inherent in consuming untreated water. However, in hospitals pregnant women are always informed of these dangers.

The privileged few in Ewo who can buy imported bottled water pay 600 francs (\$1) - for a one-litre bottle. Most cannot afford the luxury.

An integrated approach

An abundant water supply is worthless without the means to deliver it to consumers. Because water pumps require energy to operate, the key to solving the problem lies in the provision of electricity.

Rural areas in the ROC have approximately 5 percent electricity coverage, compared with 50 percent in urban areas.

Bolo said Ewo's water woes could be overcome. The town, which lies 700 km north of Brazzaville, is divided by the River Kouyou, one of the tributaries of the River Congo.

"If the government could build us a small dam on the Kouyou, 90 percent of the water supply problem would be solved," he said.

The SNDE grid is currently operated by a 40-kilovolt power-generating unit which, because of a fuel shortage, only operates for three hours a day and is insufficient to meet public demand. A dam would increase power supply considerably and enable the water utility to boost its output. While an improvement, increased output would only be helpful if storage capacity are also increased.



Approximately 3.1 million people in Congo live in rural areas, and most do not have access to clean water. Forced to use polluted water, many people are infected with water borne diseases including malaria and diarrhoea.
Credit: IRIN

In other parts of the country, the situation is hardly better. In the Pool Department, for example, civil war from 1998 to 2002 destroyed almost the entire infrastructure.

Under these conditions, access to drinking water - already problematic before the conflicts - has become increasingly difficult. In its 2005 report "Pool, a Forgotten Humanitarian Crisis", the UN Office for the Coordination of Humanitarian Affairs (OCHA) said: "The population, in a general way, does not have access to drinking water except for some hospitals, thanks to the intervention of humanitarian actors."

OCHA reported that most people used stagnant ponds, river and swamp water, resulting in a high prevalence of waterborne diseases and gastrointestinal infections. Polluted water is one of the leading causes of mortality in the region.

Possible solutions

Since January 2005, the UN Children's Fund (UNICEF), in partnership with the ROC Ministry of Energy and Water Resources, has been developing a \$470,000 emergency clean-water-provision programme for the Pool Department funded by the Norwegian government.

This financing followed a government and UNICEF effort in 2004 to provide water and electricity to various towns. The southern Department of Kouilou, whose capital is Pointe-Noire, was the first to profit from the project.

Although progress has been made, Alphonse Koya Djeré, SNDE director in Kouilou, is not entirely satisfied with the work so far.

"The output out of drinking water has certainly

improved, but the production itself is intermittent and makes delivery difficult," he said.

The company said it was hard to know exactly how many litres of water each person needed each day but that it would like to be able to provide each person with 25 litres to 30 litres daily.

The minister of energy and water resources, Bruno Jean Richard Itoua, said the government was committed to providing clean water to all departmental and district urban centres in the country, that is to say 86 localities. The administration hopes to provide clean water to 75 percent of the country by 2015.

"This rate will be higher than that set by the UN within the framework of the objectives of the Millennium Development Goals," he added.

To this end, the government signed a deal with China in June to improve the provision of drinking water to the Brazzaville neighbourhoods of Kombo, Massengo and Moukondo. This will require building three reservoir tanks able to hold up to 10,000 cubic meters of water for the 160,000 people in these neighbourhoods.

In addition, the ministry said that 416 water storage facilities had been rehabilitated in the departments of Niari, Cuvette and the Plateau between 1997 and

2005. The work was achieved through support from the government, UNICEF and the International Committee of the Red Cross and Red Crescent Societies.

According to Itoua, the government invested approximately 21 billion francs CFA (\$37.28 million) during the period of 1980-1990 for the provision of water. From 1995 to 2004, it pumped in another 20 billion francs (about \$36 million).

"All these investments came mainly from government funds and with the help of the African Development Bank and the Agence française de développement [the French development agency]," Itoua said.

Once the country returns to full stability, the task of rehabilitating and building drinkable water infrastructure in urban areas will be a priority as the provision of water is crucial in the fight against poverty.

CONGO: Thirsty for infrastructure?



Children drinking and washing in a stagnant pool in Paris, Congo. Barely 11 percent of the rural population has access to pipe borne water. Credit: IRIN

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A view over Brazzaville. The government of Congo recently signed a deal with China, to improve the provision of drinking water to several Brazzaville neighbourhoods. This will require building three reservoir tanks able to hold up to 10,000 cubic meters each, which will serve 160,000 people in these neighbourhoods.
Credit: Laudes Mbon/IRIN

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COTE D'IVOIRE: Keeping it flowing during conflict



Children pumping water from the only well operating in a northern village. The lack of a proper administration in the rebel held north of the country, since the start of the conflict has resulted in tens of thousands of residents in the north having free access to drinking water and electricity, crippling the infrastructure of the national water distribution company. Credit: IRIN

Weeks after insurgents had seized the northern half of Cote d'Ivoire in a bid to topple the West African nation's president, the water and power companies sent an internal memo to their 1,560 employees.

clean drinking water and electricity are still trying to preserve an image of neutrality, despite numerous attacks on their staff and facilities by both rebels and government supporters. In October 2003, pro-government mobs besieged the consortium's headquarters in the main city of Abidjan and destroyed several cars. Later that year, an employee and his wife were beaten so brutally by rebels that the woman died of her injuries two weeks after the assault.

"You could say we haven't received much recognition for our efforts," said the general manager of the utilities companies, Marcel Zadi Kessy, with a wry smile.

Neutral utilities

The Water Distribution Company of Cote d'Ivoire (SODECI) and the Ivorian Electricity Corporation (CIE) are owned by the France-based Bouygues conglomerate. The companies have been targeted in Cote d'Ivoire because they continued to supply water and electricity to the north after the rebels took over the area.

It was strictly and formally forbidden, the consortium's briefing said, for any workers to get involved in the political problems that had split the country in two and caused the exodus of almost 2 million people towards the government-controlled south.

Nearly four years later, the country's providers of

With most of their workers having fled the north, and

with the absence of a proper administration in rebel territory, SODECI and CIE had no means of forcing subscribers to pay their monthly bills. As a result, tens of thousands of residents in the north have had free access to drinking water and electricity since September 2002. This sparked rumours among government supporters that the utilities companies were siding with the rebel movement. As a cabinet minister of the ruling Ivorian Popular Front (FPI) once said, "If we had cut off the north and starved the population, we could have won this war a long time ago."



The arid north of Cote d'Ivoire has been hardest hit by the water crisis. In the northern town of Korhogo in 2005, poor rains, coupled with maintenance problems at the main dam, left taps dry for nearly a month.
Credit: IRIN

The rebels, on their side, accused SODECI workers who had remained in the north of spying for their foe, President Laurent Gbagbo.

New battles

Now that the fighting has stopped, public animosity towards the utilities companies has faded. However, they now face a host of fresh, even more serious, problems: massive leaks and spills, a crumbling infra-

structure, a lack of maintenance and huge financial losses. Power and water cuts, which were extremely rare in the not-too-distant past, now occur frequently in both the government-controlled south and the rebel-held north.

In the mid-1980s, Cote d'Ivoire was one of the most prosperous nations in sub-Saharan Africa, with an urban infrastructure nearly equal to that of a European country. The economic and political crises that eventually led to civil war, however, have put the water and power systems under increasing pressure.

"The revenues we get from customers in the south cover our losses in the north to a certain extent," said Kouadio Amani, vice-manager of SODECI. "But we're losing massive amounts of money every year, and we are not able to invest in maintenance until people in the north start paying up."

Rebel-held Korhogo in the arid north of Cote d'Ivoire has been hardest hit by the crisis, despite a public-awareness campaign against wasting water and a rebel-imposed ban on car washing. In 2005, the International Committee of the Red Cross (ICRC) and the United Nations Children's Fund (Unicef) helped provide clean water to the city's women and children, as poor rains, coupled with maintenance problems at the main dam, left taps dry for nearly a month. Even today, households have water only twice a week, and the supply is switched on in different neighbourhoods on different days of the week. The dam still needs repairs, but SODECI said it would not do any major work until the political crisis is resolved.

In the rebel capital of Bouake recently, residents were without running water for six weeks after a main hydraulic pump broke down. SODECI refused to foot the bill until customers had paid their invoices. The situation was resolved when the minister of infrastructure reinstalled the pump - against the will of SODECI.

Although the water shortages have never sparked outbreaks of cholera or other life-threatening diseases, local and foreign nongovernmental organisations have had to step in to guarantee people a steady supply of water. "During the last shortage, we managed to get clean water from the reservoirs of a nearby textile factory," said Virginie Briet of Médecins Sans Frontières, which runs Bouake's main hospital.

Changing mentality

The most pressing issue now facing the utilities companies is figuring out how to persuade consumers to pay for a commodity they have been getting for free for four years.

Some people in the north have complained that they simply do not have the money, pointing out rising poverty and rampant unemployment. However, others have said that most monthly water bills are actually much lower than the amount people spend on other commodities, like a recharge card for a mobile phone. Ivorians pay on average about US \$30 per year for access to clean water.

"Once the administration is redeployed in the north, people will start paying their bills," said Benoit Soro of the Korhogo-based organisation ARK, which has been involved in distributing clean water. "If they get fined, or if they have to go to court, they will realise soon enough that it is their duty to pay."

Observers, however, said it would not happen anytime soon. The rebels still refuse to hand in their guns, and presidential elections slated for October - which are crucial to sealing peace - are likely to be postponed again. The European Union has pledged \$1.7 million to help repair the aging infrastructure - provided the country is reunited.

Against all odds, the water and power consortium tries to remain optimistic. A recent series of talks with rebel leaders and representatives of civil society convinced general manager Kessy that "there is no longer any opposition to paying".

"Mentalities are changing," he said. "People are beginning to understand that the future of our company is at stake."

GHANA: To protect or not to protect water resources – Cape Coast learns the hard way



Water operator Ekow Addae at one of Cape Coast's water treatment sites.
Credit: Justin Moresco/IRIN

Water shortages during the annual dry season in this city of 100,000 people have become so acute in the last six years that schools have temporarily shut down, sanitation has deteriorated and waterborne diseases such as cholera have proliferated. For an area blessed with abundant freshwater sources, it is an irony that stings.

As Ghanaian water scientists and environmentalists have warned for years, it is only when taps run dry that people start taking water supply seriously. However, it will take more than an annual awakening for Cape Coast in particular and Ghana in general to overcome its water crises.

Ghana's water resources are stressed, as they are in much of the developing world. Increasing population and pollution, inefficient water management and people's ambivalent attitudes have all contributed, experts said.

Monitoring is sparse and accurate statistics are unavailable, but according to Ghana's Water Research Institute, at least seven of the country's 16 major river systems are classified as "poor quality" as a result of pollution. There has also been widespread deforestation on the banks of rivers and lakes. This vegetation forms a protective shield around natural water bodies, without which water evaporates much more quickly. The lack of vegetation also leaves water bodies more susceptible to silting materials and pollutants, which then promote the growth of aquatic weeds and reduce the amount of water held in the system.



Adisadel club moderator and physics teacher John Majorm grabs one of the 6,000 tree seedlings the club has planted along streams feeding Kakum River.
Credit: Justin Moresco/IRIN

As global attention has focused on the provision of clean water - through mega waterworks projects or community-based solutions - some experts argue that the long-term sustainability of water resources has been overlooked.

"We have emphasised water and sanitation [provision] to the detriment of looking at the total water resource, including forestry and pollution," said Abdul-Nashiru Moham-

med, policy director for WaterAid Ghana.

About 50 percent of Ghanaians have access to clean water. The rest depend on water from lakes, streams or hand-dug wells that is often unsafe for human consumption. For this West African country of 21 million to reach the United Nation's Millennium Development Goal for water, coverage will need to increase to about 75 percent by 2015.

The Ghana government has chosen to be more ambitious and aims to reach 85 percent by 2015, at an estimated cost of US \$4.2 billion over the next 10 years.

This pricetag could increase if the country's water resources are not protected. More infrastructure will have to be built to collect, treat and distribute water. Three hours east of Cape Coast, in the capital, Accra, water from a heavily polluted reservoir costs three times more to treat than water from a cleaner site.



A woman plants a tree seedling during one of Green Earth Organization's tree planting exercises in the Songor Wetland, about an hour from Ghana's capital, Accra.
Credit: Justin Moresco/IRIN

The country should focus on bringing clean water to homes, but there also must be an equal emphasis on education, improved management of water resources and law enforcement, said Yaw Opoku-Ankomah, deputy director of the Water Research Institute,

Ghana's Water Resources Commission was formed in 1998 with these goals in mind. It regulates water-resource use and licenses water abstraction and wastewater discharges. The commission's impact and political muscle, however, is still uncertain.

"We need capacity building at the local level to have effective water-resource management," said Opoku-Ankomah. "You can't enforce the laws from Accra. You need local people, the stakeholders, involved. Let them know that they derive maximum benefit from it."

Green Earth Clubs

In an effort to take environmental conservation to the local level, the Ghana-based Green Earth Organization has formed 175 environmental clubs in schools around the country. There are now eight of these Green Earth Clubs in Cape Coast alone.

The club at Adisadel secondary school in Cape Coast has 60 members and meets weekly to discuss environmental issues and plan activities, such as tree planting, garbage clean-ups, awareness building and park visits.

"I've learned to conserve the environment," said club president Vincent Osam, 17. "It's important because if we conserve what we have now it will benefit us and the next generation to come."



Cape Coast, the former capital of the Gold Coast, is a city of 100,000 people set on the Gulf of Guinea about three hours west of Ghana's capital, Accra.
Credit: Justin Moresco/IRIN

One of the club's most successful efforts, said club moderator and physics teacher John Majorm, has been the planting of more than 6,000 tree seedlings along streams feeding Kakum River, from which Cape Coast's water-treatment plants take their

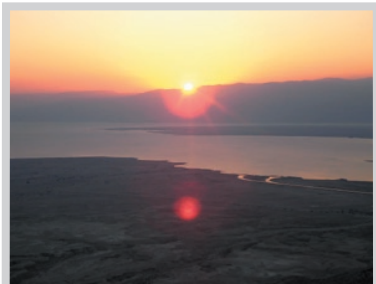
water. Deforestation around the Kakum River basin has been a major problem. Farmers clear the forests near streams, where the richest soil is found. Laws are in place to deter this practice, but they rarely are enforced.

"If the trees were there, water shortages would not be as much of a problem," said Majorm.

The club, in conjunction with the forestry service, has helped educate local farmers on the importance of protecting the ecosystem around water sources. The education, however, was too late for the Kakum reservoir. It became clogged and was not deep enough to collect sufficient water to sustain Cape Coast through its dry seasons. As a result, \$2 million was spent last year in a Dutch-funded project to dredge the dam of 350,000 cubic metres of waste materials and silt.

"If the resources are not maintained," said Kwesi Anderson of the Green Earth Organisation, "it doesn't matter how many millions of dollars you invest in [water infrastructure]."

ISRAEL: "Water is almost as difficult an issue as the refugees," says NGO



The Dead Sea.
The Dead Sea and the Jordan River have long been sources of tensions in the Middle East. Only 10 percent of the Jordan water goes to the Dead Sea, dropping the sea's water level a meter every year. For many years Jordan continues to argue that Israel is consuming too much water from the river on which they depend.
Credit: Tom Spender/IRIN

Israel has denied accusations it is siphoning off more than its fair share of water from the Jordan River basin.

Under the terms of the 1967 peace treaty between Israel and Jordan, the

two countries agreed to share the waters of the Jordan River as well as the Yarmouk, a tributary river. However, ordinary Jordanians have complained that Israel has been consuming more water from the Jordan River than the kingdom.

Uri Schor, spokesman for the Israeli water commissioner, said Israel had heard no official criticism from Jordan. "The agreements suit both sides pretty well. There are no complaints," he said.

Schor said the average Israeli citizen consumes between 120 litres and 200 litres of water per day. Nongovernmental organisation Friends of the Earth Middle East (FOEME) put the figure at 300 litres, an amount that includes municipal water use, such as in parks or for street cleaning.

Mira Edelstein, who heads FOEME's campaign to rehabilitate the Jordan River and is an Israeli, said that regardless of the peace treaty with Jordan, Israel was taking a disproportionate amount.

"We are taking more water than anyone else. It's more than our share, and it's something we need to fix. It will have to be part of a final peace treaty with the Palestinians," Edelstein said. "Israel knows it will have to change its ways when we start talking about peace. Water is almost as difficult an issue as the refugee issue."

According to FOEME, about 100 million cubic metres of water a year now flow into the Dead Sea from the River Jordan – about 7 percent of the 1.3 billion cubic metres that flowed into the Dead Sea before 1964, when the first stage of Israel's national water carrier project was completed. The carrier connects the Sea of Galilee with Israel's water system. The original goal of building the carrier was to irrigate the Negev region.

Today, 80 percent of the water drawn from the lake is utilised for Israel's domestic consumption.

Only 10 percent of the water in the River Jordan gets to the Dead Sea. As a result, the sea's water level is dropping by about a metre a year and it has lost about 30 percent of its surface area.

"South of the Sea of Galilee, the Jordan River doesn't flow anymore. All of the water is diverted for domestic use and agriculture. What goes into it is raw sewage and agricultural runoff from all sides," Edelstein said.

Gideon Bromberg, director of FOEME's Tel Aviv office, said it was impossible to calculate how much water Israeli industry takes from the Jordan River, although he said most of the water it takes is used in agriculture.

"Israel has a fully integrated water system, which means that the three main sources – the Sea of Galilee, the mountain aquifer [which runs under most of the West Bank] and the coastal aquifer – are all connected through the national water carrier," said Bromberg. "But more and more of the country's drinking water is coming from the groundwater and less from the Sea of Galilee, most of which is going on agriculture."

Schor told IRIN that Israel recognises the region's water problem requires international cooperation. "From the Israeli point of view, although we have a continuing intifada, we continue speaking and solving problems. We meet with the Jordanians and the Palestinians on a monthly and sometimes weekly basis," he said, referring to discussions on the water issue.

"In five to 10 years, this whole area will need water badly. The only solution is to create new sources of water. You can do that by treating sewage - which can be used in agriculture, so freeing up more fresh water - and by desalination," he said.

Despite these efforts, Israelis and Palestinians remain at loggerheads over important water issues.

"The main water problem for Israel is the Palestinians," said Schor. "Under the terms of the [1991] Oslo agreement, Israel must provide the Palestinian Authority with 57 cubic metres of water per year for each Palestinian. We actually give them more than that amount.

"Israel is offering the Palestinians desalinated water. Our plant at Ashkelon is the biggest of its kind in the world and produces 100 million cubic metres of water a year," he said.

"In Gaza, the groundwater is now too salty to drink because the Palestinians have pumped out too much and the sea has seeped in. We are offering them desalinated water. When you mix the salty groundwater and the desalinated water, you get drinking water," Schor said. "But they don't want it. It's the same in Judea and Samaria [the West Bank]. The Palestinians are not willing to take desalinated water from our plant near

Hadera."

Nader Al-Khateeb, director of FOEME in the occupied Palestinian territories and of the Water and Environmental Development Organisation, said the cost of piping the desalinated water from the coastal plant into the West Bank could be too expensive for many Palestinians. "The best thing is to let the Palestinians use the water resources near them," he said.



A shepherd in Negev, Occupied Palestinian Territory, Israel, draws water to give to his goats. Palestinians have been struggling over water access for many years, especially in areas where water resources are controlled by Israel. Credit: Edward Parsons/IRIN

According to Al-Khateeb, the Palestinians were simply being denied water from sources they have a right to access. "Since 1967, the Palestinians have had no access to the River Jordan because it is a closed military area. All the water resources, including those in the West Bank, are under Israeli

control," he said.

Currently, Palestinians do not take any water from the Jordan River.

"Palestinians should be able to take 250 million cubic metres a year from the Jordan basin. We are unhappy that Israel is diverting water out of the basin and into its national water carrier, despite developments in desalination techniques," Al-Khateeb said. "Since 1967, Palestinians have not taken a single drop from the Jordan because the area has been declared a closed military zone. Even the irrigation pumps that were there have either been destroyed or abandoned."

Now, Palestinians have access to 20 percent of the water in the mountain aquifer, and the rest of their water is supplied to them by Israel under the terms of the Oslo agreement.

"Israel has more access to desalinated water than the Palestinians because they live more in coastal areas and the Israelis can afford to pay for it," said Al-Khateeb.

The average Palestinian living in an urban area uses between 50 litres and 70 litres of water a day – less than half the 120 litres to 200 litres per day the Israeli government says its citizens use, Al-Khateeb said. Furthermore, Israel also takes about 80 percent of the groundwater from the mountain aquifer, leaving just 20 percent for the Palestinians.

According to Al-Khateeb, the 1967 bilateral water agreement between Jordan and Israel would have to be renegotiated into a bigger regional water agreement in the future.

"Will the Israeli-Jordanian water agreement be sustainable? The Lebanese are also in the Jordan basin – they are not even part of any agreements. One day it has to

be reconsidered. We need a regional solution – a bilateral one cannot solve the problem,” he said. “Soon the Jordanians and the Syrians will complete a dam across the River Yarmouk, one of the Jordan’s main tributaries. The main victim will be the Palestinians.”

Despite the differences between the Israelis and Palestinians over water, Al-Khateeb said there were some encouraging signs. The Israelis, Palestinians and Jordanians have signed the terms of reference for a big project that will use the difference in altitude between the Red Sea and the Dead Sea to generate electricity

to desalinate water, he said.

“The Red Sea-Dead Sea Water Conveyance Project is costly and will not happen in the near future. But having all three sides sign the terms of reference was a major breakthrough,” Al-Khateeb said.

JORDAN: The death of the Dead Sea



In the last 40 years, the water level of the Dead Sea has fallen more than 20 meters, seriously impacting the economic and social livelihoods of people in the area.

Credit: Tom Spender/IRIN

As the Dead Sea slowly shrinks towards extinction, fears are growing that the saltiest body of water on earth will not disappear without taking a few lives along with it.

The Dead Sea has fallen more than 20m over the past 40 years. Studies by scientists at the University of Jordan have shown that the sea now drops one metre in depth each year. The water level has declined faster than ever since Israel took control of the water resources that feed the Jordan River after occupying the West Bank after the 1967 Arab/Israel war.

“For at least 30 years, Israel diverted most of the Jordan River tributaries and controlled water coming from Tiberias Lake [the Sea of Galilee] in a way that the river level was heavily effected,” said Najib Abu Karaki, head of the geology department at the University of Jordan .

Israel, however, has insisted that its dispute with Jordan over the use of the river was settled in peace agreements, which state that Israel will supply water to Jordan. Israel pumps water from the Sea of Galilee through its Movil Artzi water carrier to be used for irrigation of the Negev and other areas in Israel.

Although the problem of the Dead Sea’s decline starts at the northern borders of Jordan, villagers at the southern edge of the Dead Sea are bearing the full brunt of the problem. Farms have been disappearing to sinkholes caused by the shrinking sea. Villagers lost their homes, cattle and their lives.

“It’s like living on a landmine,” said Jaber Abu Jarrar, 46, a farmer from Ghour Al Haditha village. He lost half his farm to emerging sinkholes.

Areas around the sea are dotted with black holes and

snaking crevices.

“Two donkeys of mine and a cow died after they fell in deep holes,” said Abu Jarar, adding that many villagers had perished during the past 10 years due to sinkholes.

Community leaders said residents were no longer able to move about freely at night for fear that sinkholes might swallow them. “You could be driving to visit a friend in a nearby village and the road is fine. Suddenly, on the way back, huge holes appear in the middle of nowhere. It is very scary,” said Salem Abu Hatab, 27, a teacher at a government school.

Sinkholes appear when influxes of fresh groundwater, triggered by a decrease in the sea level, gradually dissolve surface areas until they collapse. What villagers call ‘death traps’ have been piercing the surrounding grounds of the Dead Sea for the past 20 years, but the phenomena has increased significantly in the past few years as the sea level has declined. Some of the sinkholes are a few metres wide and up to 20m deep.

The Jordanian government has been practicing emergency first aid on areas plagued by sinkholes, said Abu Karaki, who has been involved in some of these projects. “We will always have these sinkholes appear as long as the decline in the sea level continues,” he said, adding that the situation is turning into a cat-and-mouse chase.

Officials from the Ministry of Agriculture said they had no choice but to continue with the “cosmetic surgery”.

“Sinkholes appear because the sea level is declining, but we cannot do anything to stop this decline, simply because the issue is out of our hands,” said a senior official from the Water Ministry who did not wish to be named. “Israel is creating the problems, and we have to cover for them,” he said.

“Few things are being done to tackle the problem. We are filling sinkholes with different kinds of material.

But whenever you fill a hole it reappears within a year or more," said Abu Karaki, who has been conducting research on sinkholes for years.

Although he is a regular visitor, Abu Karaki admitted that going to the Dead Sea is very risky. "Now we avoid going there frequently - we want to study them by remote-control techniques," he said.

Sinkholes have also had a serious economic impact on the region. Hundreds of millions of dollars have been lost when construction sites unexpectedly collapse, Abu Karaki said. In one instance, the Jordanian Potash Company, one of the country's largest firms, lost an equivalent of US \$130 million when one of its dykes collapsed overnight.

Other incidents included the collapse of the social-security station, homes, restaurants and rest houses.

Abu Karaki would like to develop an early-warning system to monitor the shores and predict where sinkholes could appear. However, he lacked sufficient funding for his pioneer project, which, he said, could save hundreds of millions of dollars and priceless lives.

"The aim is to focus on the areas where most of the deformation is taking place to better understand the phenomena, to give better information for constructors to ensure sustainability in the area. If we do not take this into account, we might risk having collapses," he said.

The shores of the Dead Sea are currently witnessing a construction boom on its northern and eastern shores, with hotels, large malls and housing complexes being built with views of the mystical place.

Officials from the Ministry of Environment said regulations have been put in place to guarantee safe construction that is not harmful to the environment.

"You cannot eliminate natural hazards, but you can predict the consequences and minimise them," Abu Karaki said.

Recent figures from the Ministry of Water and Irrigation showed that water inflow levels to the Dead Sea have taken a nosedive to 10 percent of their original level prior to the 1960s. Experts predicted that future inflows would decline further, from 375 million cubic meters to 135 million cubic meters a year.

Jordanian officials have privately blamed Israelis for siphoning off the Jordan River's resources by diverting its tributaries to quench farms in settlements that have mushroomed since Israel occupied the West Bank.

"How Israel uses the water is madness," said Abu Karaki, adding that Israeli cows were able to produce the same amount of milk as those in Europe because they are given four showers a day.

However, Uri Schor, spokesman for the Israeli Water Commissioner, has denied that Israel uses more than its fair share of water from the Jordan River. He said Israel was not violating the agreement between the two countries on the use of water from the Jordan River.

"There have been no complaints from Jordan," he said.

According to Wadi Araba Peace Treaty, signed on 26 October 1994, Jordan is entitled to 3 percent of the total flow of the Jordan River, while Israel retains the right to use 97 percent.



An example of a sinkhole, several of which are now appearing near the Dead Sea. "It's like living on a landmine,"
Credit: Tom Spender/IRIN

The industrial use of the sea has also been blamed for the shrinking water levels. Officials from Friends of the Earth environment group said solar evaporation ponds The Southern basin of the Dead Sea was converted to shallow salting lakes (evaporation

ponds). The total surface area of approximately 255 square kilometers where water is pumped from the Northern Dead Sea Basin to the Salting lakes to extract minerals such as potassium, magnesium and many others. The evaporation ponds are responsible for 25 percent to 30 percent of the total evaporation of Dead Sea waters.

There may be a glimmer of hope. Officials and scientists have been upbeat about a proposed project to inject life into the Dead Sea by linking it with a canal to either the Red Sea, in the south, or the Mediterranean sea, in the west. The multi-billion-dollar project, which was proposed when Jordan and Israel signed their peace treaty in 1994, could help Jordan put an end to its chronic water shortage and return the Dead Sea to its normal level.

However, environmentalists are concerned the project could bring other problems to the region.

"The canal could cause a massive disruption of natural landscapes, transport saline seawater over areas containing freshwater aquifers and disturb the natural qualities of the sea," said Ahmed Abdul Rahman, Dead-Red project manager at Friends of the Earth.

The Dead Sea is 75 km long and ranges in width from 6km to 16km. It is entirely devoid of plant and animal life, due to an extremely high content of salt and other minerals. The Dead Sea contains 350 grams of salt per kilogramme of water, compared with about 40 grams per kilogramme in the world's oceans.

JORDAN: Water shortage remains a constant headache



Thousands of acres of agricultural land in the Kingdom of Jordan are fed by Zarqa River's polluted waters.
Credit: Maria Font de Matas/IRIN

Although the kingdom of Jordan takes its name from the Biblical Jordan River, which streams along its western border with Israel, the name hardly reflects the reality of the water situation.

Jordan is one of the most stable countries in the Middle East, but it lacks enough water to quench the thirst of its citizens, let alone its farms and wildlife, said Salameh Hiaria, a water expert and former member of parliament.

A shortage of the precious resource will become one of the most vexing conundrums facing Jordan in the not too distant future, he warned. By 2010, the kingdom will need about 1.54 billion cubic metres of water to meet the needs of its population - and fall short by 319 million cubic metres.

However, senior government officials have said there is no need to panic. "We should look to the future with confidence, because the government has developed a strategy that concentrates on the future," said Nael Zu'bi, a spokesman for the Ministry of Water.

Two large water projects are currently in the works to provide Jordan with an abundance of water for domestic and agricultural use by 2020. The first project is a multi-billion-dollar undertaking to link the Dead Sea and the Red Sea with a 325km canal.

An official from the World Bank said on 22 August that a group of donor countries, including France, the United States, the Netherlands and Japan, had signalled their willingness to help fund a US \$15 million feasibility study on how to carry out the project.

"Our hope is that in the next two to three months we can have all the agreements in place and we will launch this study," said Vahid Alavian, who is in charge of the project at the World Bank.

The 'Red-Dead' project includes the construction of a hydroelectric-power plant and a desalination facility to provide Jordan with 850 million cubic metres of potable water a year, or half of its projected 2010 needs.

However, the canal project is facing a mountain of challenges, including Israel's desire to link the Dead Sea with the Mediterranean Sea instead. Officials in

Amman fear Israel could persuade donor countries to support the Mediterranean Sea canal, a project which has yet to receive the green light from Israel policy-makers. Because the mouth of the proposed canal would be on the Israeli side of the Dead Sea, Jordan would not have access to it.

The second project is a \$600 million plan to pull water from the Disi aquifer in the south. The government is currently examining tender offers from several companies, and construction could commence by the end of the year.

Officials estimated it would take about 14 years to get the project up and running. Once completed, it would supply Jordan's capital, Amman, and the southern governorates with some 170 million cubic metres of water per year for the next 100 years. By 2020, the water share per capita would nearly double, according to Zu'bi, the Water Ministry spokesman.

However, a number of multimillion-dollar agricultural projects in the Disi area are siphoning off the aquifer's resources. These farms, which are owned by former senior government officials, cannot exist if the Disi project is to be successful, said Elias Salameh, who headed a study at the Ministry of Water on the impact of agriculture on Disi reserves. Farms in Disi consume more than 80 million cubic metres of water a year, nearly a one-third of the kingdom's total supply of 260 million cubic metres a year.



Jordan's once fertile land has painfully turned into hostile terrain. Experts predicted that by 2010, Jordan will need approximately 1.54 billion cubic meters of water to meet the needs of its population.
Credit: Maria Font de Matas/IRIN

"In Disi, fuel is imported, machinery is imported, seeds, fertilisers, manpower are imported. The only input from Jordan is water, and we are one of the poorest countries of water in the world - effectively we are exporting water," said Salameh.

As the government works on a plan to save the country from an imminent crisis, citizens suffer.

Ahmed Abdullah, 46, is a professor at the University of Jordan. During the dry season, he has to drive around 50km from where he lives to collect gallons of spring water, which he needs for his newborn baby and to keep his little garden alive.

"This should not be happening. Jordan does not lack water, but the problem is that politicians do not have the will to help their people," said Abdullah.

From May through August, the Ministry of Health warned Jordanians to conserve water in their tanks. Jordan employs a water-rationing system during the hot, dry season, in which water is pumped to citizens

once or twice a week.

"Less water means a deterioration of living standards and health," said Ali Abdul-Rahman, a doctor from Al Bashir Hospital, in the heart of Amman. Cases related to lack of hygiene among children and even adults increase as the mercury rises, he said.



Fig. (5): Groundwater basins in Jordan.

Health officials feared more health problems could occur if the water problem is not solved.

Adding to Jordan's ever-increasing water crisis is an influx of hundreds of thousands of refugees from neighbouring countries. The

water-impo- ver- ished kingdom, known for its political and economic stability, has fallen victim to its geographical location. It is surrounded by some of the most troubled countries in the world - including the occupied Palestinian territories and Iraq - and millions of people have taken refuge in Jordan over the past few decades.

"Refugees have put big pressure on water resources. Unless this population decreases, the country will be facing a big problem," Salameh said.

Official figures put Jordan's current population at 5.7 million, not including hundreds of thousands of Palestinian and Iraqi refugees. There are more than 600,000 Iraqi refugees, nearly 250,000 Egyptian workers and

hundreds of thousands of other Arab nationals - including Syrians, Palestinians and Lebanese - already in Jordan.

However, environmentalists and observers said it would be unfair to blame Jordan's water shortage entirely on the refugees. The Israel-Jordan Peace Treaty, signed at Wadi Araba in 1994, dictates the amount of water to which each nation is entitled. As the two countries share the Jordan River, one of Jordan's main water resources, one of the articles of the treaty indicates how much water each country can draw from it.

Jordanian authorities said their country receives much less water than Israel. According to the historic agreement, Jordan gets around 35 million cubic metres, which is equivalent to 3 percent of the total amount of streaming water. Israel gets the other 97 percent. Figures from the Ministry of Water and Irrigation in each country show the water consumption of one Israeli citizen to be equal to that of five Jordanians.

Government officials and observers ruled out the possibility of war in the Middle East over water, despite the importance of the resource.

"The disputed amount of water is very small; it's not worth a conflict," said a senior official from Jordan's Ministry of Foreign Affairs, who requested anonymity because of the sensitivity of the issue.

KENYA: Kibera, The Forgotten City

"We don't have proper toilets here. Some good Samaritans and NGOs have put in toilet facilities of sorts, but it is very difficult. People just go on the roadside or riverside," said Kennedy, a 24-year-old student volunteer who has lived in Gatwikira for the last 12 years. Gatwikira is a village in Africa's largest urban slum: Kibera, in the Kenyan capital of Nairobi.

"We do have some water taps around, but the pipes are plastic and have holes, so the water becomes mixed with the sewage and becomes contaminated, and then people drink it. It is a very big issue," he said.

The problems described by Kennedy are not exclusive to Kibera. The world is turning into a predominantly

urban environment, with every-increasing numbers of people living in urban slums and shanty towns.

According to the second United Nations World Water Development Report, half the world's population now lives in urban areas, compared with less than 15 percent in 1900. Furthermore, the world's urban population increased more than tenfold in the twentieth century. Today, 930 million people - nearly one-third of all urban dwellers - live in slums.

People living in urban areas contend with numerous disadvantages, especially in relation to water. In an urban slum, a family would use on average between five and 10 litres of water per day. A middle- or high-

income household in the same city, however, would use between 50 and 150 litres per day, according to the UN report.

This lack of access to water has a knock-on affect on health. Of the 1.8 million people who die of diarrhoea each year, 90 percent are children under age five. According to the UN Education, Cultural and Scientific Organization, this figure could be cut by 45 percent with improved access to water, particularly in slums like Kibera.



Women of Kisumu Ndogo Usafi na Maendelo Group become empowered managing water tanks in Kisumu Ndogo village that are used by men.
Credit: Ross Hudson/IRIN

Kibera

Kibera, which is located 7km southwest of Nairobi, is the largest and most densely populated informal settlement in sub-Saharan Africa.

Predominantly made up of members from the Luo ethnic group, it covers an area of approximately 250 hectares (4sqkm), with a population density of more than 2,000 people per hectare, according to a report by the Water and Sanitation Programme (WSP), an international partnership working to improve water and sanitation policies and practices to serve the poor.

The sprawling, unregulated slum originated during World War I, when the land was a temporary residence to the Nubian (Sudanese) soldiers from the Kings African Rifles. Kibera is now made up of 12 interlocking villages, with approximately 8,000 dwellings per village. The name 'Kibera' comes from the Nubian word 'kibra', meaning forest or jungle.

A dirty and forgotten place, Kibera does not appear on many maps, even though it is home to 800,000 people, or one-third of Nairobi's population.

Many problems

The majority of people living in Kibera have no title deed to the land they live on. Crime and disease is rife, and unemployment is rampant. Those who are employed spend many hours, usually on foot, travelling to and from their low-paid jobs in Nairobi.

"I usually walk into work in the mornings. It takes me two hours, but it's downhill and I save 10 shillings [US\$0.14] on the fare," said Julius Mzembe an assistant in a wholesale shop in the city centre. He earns 5,400 shillings (\$75) a month and supports a wife and two daughters.

In the absence of almost all government services, the

issue of refuse is a particular hazard in Kibera.

"We have been trying to clean the rubbish, but it is very difficult, because tomorrow there is even more rubbish around. There is nowhere to throw the rubbish. We are trying to input collection programmes, but I don't know whether it's going to work. It is very bad for the water around here," said Kennedy

Water and sanitation are fundamental concerns to the residents of Kibera. The insufficient amount of available water is of very poor quality. Kibera's 800,000 residents must share 600 toilets, meaning that on average one toilet serves 1,300 people.

Since the introduction of new water legislation in 2002, which gave control of Kenya's water services to local institutions, the Nairobi Water and Sewerage Company has been responsible for providing water to the city, including Kibera. However, there are only 25km of pipes in the whole of Kibera. The huge deficit in supply means the vast majority of residents are forced to buy water from private vendors, who allegedly pilfer the water from the water company.

According to WSP, 98 percent of the 650 water kiosks in operation in Kibera are run by private entrepreneurs; the rest by community organisations or NGOs.

Catherine Mwangi, executive director of the Kenya Water for Health Organisation (KWAHO), a national NGO based in Nairobi, told IRIN: "The problems of the slum are very complicated, as people often hook up to the water lines coming from Nairobi Water and Sewerage Company and divert the water along the way. So the water doesn't reach the destination. Sometimes the community know the person who is doing this, but they feel they can't tell the water company, in case [the person] cuts their supply."

Private vendors charge high prices, which are driven even higher in times of drought or when the city's water supply is diverted elsewhere.

"When there is the Nairobi show on, which happens every year, all the water goes there. At times like this, when there is a water shortage, I have to walk for 40 minutes to get water. And the water I would normally buy for 2 shillings (\$0.03) comes out at being 20 shillings (\$0.27)," Kennedy said.

As is detailed by WSP's 2005 report, even at the lower price of 2 shillings per 20 litre jerry can, the rate is eight times that of the lowest tariff for domestic connections, and four times the average tariff in Kenya.

Even when water is available, either from private vendors or water tanks from humanitarian organisations, it is often unsuitable for human consumption. Many people do not know how - or cannot afford - to treat their domestic water.

"People here are not used to boiling water, and paraffin is very expensive. The pipes should be metal, and

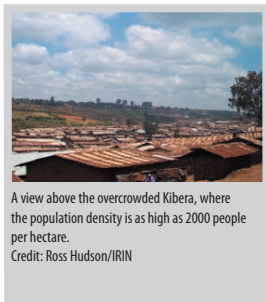
we need more education and information about sanitation," said Kennedy.

Several organisations, including the UN, have tried in the past to implement projects to improve water supply and sanitation in Kibera. However, given the scale of the problem, some areas are inevitably chosen over others. Furthermore, mismanagement of past projects - which often did not involve communities in their design and implementation - has led to a buildup of community mistrust for outsiders and the projects they implement.

"People around here don't really trust the UN or the government," Kennedy said. "People around here have their own way of doing things. It's very important to get communities involved, as they know it better than everyone else."

KWAHO

Despite this grim picture, there has been some improvement in access to water and sanitation in some areas of Kibera, thanks to organisations like KWAHO, an NGO that has worked in the sector for 30 years.



A view above the overcrowded Kibera, where the population density is as high as 2000 people per hectare.
Credit: Ross Hudson/IRIN

KWAHO runs projects in Kisumu Ndogo village in Kibera, all of which are managed almost entirely by local women's groups. The programmes - which operate three 10,000 litre water tanks and two VIP latrines of four stalls each - are currently in their second year of operation.

One tank is installed at Makina Baptist School, and the remaining tanks, plus the two latrines, are run jointly by Darajani Women's Group and Kisumu Usafi na Maendelo Women's Group. Water is sold from the tanks at a fixed price of 2 shillings (\$0.03) per 20 litre jerry can. A visit to the latrines costs 3 shillings (\$0.04).

KWAHO also runs regular classes on hygiene and sanitation, and members of the women's groups conduct fundraising "merry-go-round" activities, which provide financial assistance to members. The project has had great success.

"Before, we had big problems," said Venice, who lives in Kisumu Ndogo village and is a member of the Darajani Women's Group. "We didn't know how we could get clean water. There was diarrhoea and other diseases. We used to travel to areas very far away - at least 10km each time - to get any water, and it was very expensive - even as much as 20 shillings per jerry can.

"But now, there has been a very great change. There is increased supply of water, and there is improved quality. We have water points just around the corner, and there is no problem. People save time and money,

and the money from merry-go-round can help the member start a small business," she said.

KWAHO also subsidises and helps run a local solar-disinfection project (SODIS) that employs local people. The water-treatment programme promotes the use of plastic bottles and solar energy to disinfect water.

"SODIS sells bottles at 10 shillings [\$0.14]. The bottles allow penetration of ultraviolet rays from the sun. Once you have the water, you expose it to the sun for a period of six hours - but if the sun is coming and going, then we expose the bottle for a period of two days. The sun inactivates the pathogens in the water," explained Paul Ogwala, a local resident and member of SODIS.

Now in its fifth year, SODIS has reached more than 30,000 local households. Its success, Ogwala believed, is down to several factors: "It is low cost, available easily, and the taste of the water remains the same. Boiling water is expensive and changes the taste. SODIS peer promoters go door-to-door to promote the technology. Most of the promoters are women, because the issue of water impacts more on women's side of things.

"We work closely with other groups in the area, such as Darajani. Most of the people working for us come from the local community. They are known by those living around, so people have confidence in them," he said.

KWAHO's director believed that involving the community in the organisation and management of local water projects is essential to their success. The vested interest of a community protects the projects from vandalism, especially in poverty-stricken areas like Kibera.

"If you put in a water tank and do not explain to the community why it is there, then you will not even find it the next day. But if you make them own it themselves, then they will also protect it," Mwango said.

The future

Despite the success of some programmes, there is still a great deal of work to be done to provide water and sanitation to millions of people living in urban slums around the globe. Insufficient funding ties the hands of many organisations, whose limited finances force them to limit the number of people they can help.

Such limitations are particularly daunting in a place like Kibera, whose needs seem limitless.

"No NGOs - nobody - are building any toilets in our village. The UN doesn't even have any projects here. The situation is very bad," Kennedy said.

LIBERIA: The post-conflict water-sellers



Many former combatants are employed carrying water from the reservoir to homes. "Private individuals gave us contracts to supply them water every morning, and we are really gaining from it, because it is better to do something than sitting down idle just thinking about war." Credit: IRIN

R a g - t a g fighters who smashed up and looted L i b e r i a ' s water infrastructure during the civil war are now making a living selling water by the bucket to residents of the sea-front capital,

combatants are doing this business of carrying water from the reservoir to homes. Private individuals gave us contracts to supply them water every morning, and we are really gaining from it, because it is better to do something than sitting down idle just thinking about war," he said.

However, young men like Lamine could soon be out of a job. The post-war elected government has promised to urgently restore the country's running water, and in July, President Ellen Johnson Sirleaf turned on the tap, providing the first running water in the capital in more than 15 years.

Hun-Bu Tulay, managing director of the Liberia Water and Sewage Cooperation (LWSC), told reporters that water has been piped to about 50 percent of Monrovia's residents since the end of July. "We have repaired the main pipes that pumped water into central Monrovia and beyond, as far as the eastern side of the city, through the assistance of the European Commission. We are not going to stop there - gradually everyone will have access to safe drinking water," he said.

The next hurdle for the LWSC will be securing payment from consumers.

"The LWSC wants customers to start paying water bills. This is very important to sustain and maintain our water supplies and facilities. The water we are providing is very expensive because we are paying for high-quality materials and chemicals to treat the water to make it safe for drinking," Tulay said.

Unemployment rumbles at about 85 percent, according to United Nations estimates, and even those lucky enough to have a government job struggle to make ends meet. Civil servants are paid only \$30 a month.

Monrovia.

After Charles Taylor's rebel forces invaded Liberia in December 1989, triggering the civil war, one of their first targets was the sole water and power dam, the Mount Coffee Water Plant.

"Some of our fellow former combatants helped to loot the Mount Coffee Water Plant," said Lamine Lahai, an ex-fighter who was recruited as a child soldier to fight for Taylor. "We were taking it at the time for joke, and now our people are feeling the effect of what we did during the war."

Before the war, Monrovia was a gleaming icon of economic development in West Africa. New, white hotels grew up on the hills overlooking the bay, and presidents from across the region sought to imitate Liberia's example. The 14 years of conflict and neglect have left the country without any basic infrastructure or services.

Lamine is among a new army of young men who earn money hauling handcarts of drinking water in jerry cans and buckets to homes and businesses across the capital. One man can earn as much as US \$2 a day - more than most labourers in what is one of the world's poorest countries. "Now, most of the former

NEPAL: Hydropower could help alleviate poverty



Water is a precious commodity in Nepal and many people share each tap. Nepalese women, often with their young children, may spend hours fetching water each day.
Credit: Naresh Newar/IRIN

Nepal's water resources are second only to Brazil's, but according to the Independent Power Producers' Association (IPPA) 60 percent of Nepal's population is without access to electricity. A joint study by the Nepalese government and the World Bank published in 2004 said that close to 30 percent of its people live below the poverty line.

According to a local analyst, the Himalayan kingdom of Nepal has developed only 1 percent of its hydropower capacity.

Taranath Sharma, an expert with Himal Hydro, one of Nepal's leading hydropower construction companies, said there was "huge potential", but little had been achieved.

Hydropower engineers and companies estimated that Nepal could generate 83,000 megawatts (MW) of electricity per year by using hydropower stations - enough to meet the domestic demand for electricity and provide a surplus that could be exported, helping transform the country's economy. Experts said there is a growing regional demand for electricity, especially from neighbouring India's capital, New Delhi, which could take up to 6,000 MW annually.



The Maoist rebels have been involved in the peace process with the interim government to end the decade long armed conflict. Now the conflict is over, the country aims to focus more on developing the energy sector. "There is now a good environment - especially for the private sector - to work in developing the country's hydropower."
Credit: Naresh Newar/IRIN

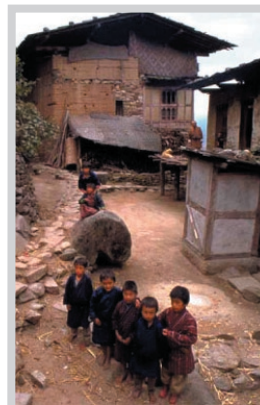
At present, however, Nepal has not generated any export revenue from hydropower, and most of its urban areas suffer from regular power cuts. Sultan Hafeez Rahman, the Asian Development Bank's (ADB) mission head, said major

By using its vast water resources to develop hydropower, Nepal could alleviate poverty and reap huge economic benefits, development and water experts have said.

policy and management reforms were needed at the government level.

In recent years the ADB helped provide a US \$360 million loan to the government to construct the country's largest hydroelectricity plant, the 144 MW Kali Gandaki A, in western Nepal. It has the capacity to generate more than 840 gigawatt (GW) hours annually and aims to supply at least 1.3 million people this year, according to the Nepal Electricity Authority (NEA).

Experts hope an end to the country's decade-long conflict will result in further development of the energy sector. The Maoists, who had waged an armed rebellion against the absolute monarchy of King Gyanendra, have been engaged in peace negotiations with the interim government formed by the country's seven national parties after widespread protests ended the king's direct rule in April.



30 percent of Nepal's population lives under the poverty line, and 60 percent of the population has no access to electricity. By building hydropower stations in several regions, the country hopes to alleviate poverty.
Credit: WHO/UNICEF

"There is now a good environment - especially for the private sector - to work in developing the country's hydropower," said Surya Shrestha, an hydroelectric expert working with the NEA.

Sharma said the private sector has a significant role to play in alleviating poverty and stimulating economic growth. Himal Hydro had constructed the \$138 million, 60 MW Khimti Khola plant, which employed more than 3,000 people between

1996 and 2000. during its construction.

"The government does not have enough resources and always needs to depend on loans and donor assistance," he said.

Experts in the field are concerned that development is happening too slowly. "This will take a long time and depends on the government, but the new leadership seems quite committed, especially on reforming the policy and management," Rahman said. "It would be very costly - socially and economically - if Nepal still did not invest in hydropower now. This is a very significant segment of the country's economy."

NIGER: Water, water everywhere but few have access



The Saheal Twareg and Pleu herders extract water from a rare well for their cattle. Only 60 percent of rural population in Niger has access to water. The UN Development Programme ranked Niger as the World's poorest country.
Credit: Edward Parsons/IRIN

water to sate the thirst of the entire population and their land.

Niger has an estimated 2.5 billion cubic metres of underground renewable water, but only 20 percent is currently exploited, according to the United Nations children's agency, Unicef. Each cubic metre of water contains about 1,000 litres. In addition to its underground water sources, Niger also has the Niger River, the Komadougou River and Lake Chad.

Despite the abundant freshwater resources, only 60 percent of Niger's rural population has access to potable water. The figure is only slightly higher – 70 percent – for Niger's urban population, according to the Ministry of Water, the Environment and the Fight Against Desertification. Access to water has been an ongoing struggle for this country, ranked as the globe's poorest by the UN Development Programme. It has the highest birth rate in the world, with women bearing on average eight children. This rising population adds extra stress to an already short water supply.

There are several other factors that have put Niger's water supply in a precarious state, including poverty, environmental issues and poor infrastructure. This has resulted in devastating consequences for the population, including a severe hunger crisis in 2005 and life-threatening health problems, such as typhoid and diarrhoea.

Shrinking waters

Nearly 80 percent of Nigeriens rely on subsistence farming as their main food source. In the past, seasonal monsoons provided sufficient water for farmers to plant and harvest enough crops to last them through the year. However, rainfall in the region has decreased between 20 percent and 50 percent in the last 30 years, according to France's National Centre for Scientific Research. Several years of drought helped trigger the 2005 food crisis.

Desertification has compounded the problem of poor precipitation. With lakes and ponds lacking replenishment and arable land being overcultivated, more

The desert is fabled for creating mirages, the false appearance of a body of water amidst the sandy plains, but it is no illusion that beneath the deserts of Niger lies enough

and more of the country's fertile lakeside plains are transforming into barren deserts, with soil stripped of nutrients.

The area around Lake Chad has particularly suffered from this phenomenon. Divided between Niger, Chad, Cameroon and Nigeria, this lake was once the fourth largest in Africa. It has shrunk dramatically since the 1960s. A study published in 2001 in the *Journal of Geophysical Research* concluded that in 40 years, Lake Chad had constricted from 25,000sq km to only 1,500sq km – a surface-area reduction of 94 percent. The study attributed the drastic shift to changes in climate, as well as poor irrigation planning, which has diverted too much of the lake's water supply. The shrinkage has stranded some communities far from the shores of the lake. N'guimi, for instance, located 1,500km east of Niamey and once a lakeside town, is now more than 100km from the lake.

Archaic agricultural practices

Conversely, experts said farmers had yet to realise the full potential of the Niger River for irrigation.

The areas surrounding the river, which include the regions of Tillaberi, Niamey and Dosso, are densely populated. Farmers have cultivated the fertile land for subsistence use, growing rice, millet, sorghum and cassava. Because they use archaic agricultural methods, however, harvests are poor.



Two young Nigerien slaves collect water from a traditional well in the far west of Niger, a great distance from their home. Water is scarce in the desert region of Tillaberi and these traditional wells only touch the surface level of the water bed.
Credit: G. Cranston/IRIN

Only 54,000 hectares of land in the Niger River Basin are irrigated, although the potential is 222,000 hectares, according to the Food and Agriculture Organisation (FAO). Developing the irrigation potential of the river would widely benefit local farmers and allow for the cultivation of robust commercial

crops, including cotton, corn and groundnuts, the agency said. In 2003, FAO showed local farmers how to improve their irrigation and cultivation techniques, and they produced cash-crop onions that were sold as far as 800km away in Cote d'Ivoire.

Sharing water

The competition for water has triggered conflict in many communities across Africa over the years.

Niger shares Lake Chad and the Niger River with several countries, including Mali, Guinea, Nigeria, Benin, Cameroon and Chad. All of these nations have a vested interest in the vital resources provided by these waterways.

Recognising the need for cooperation, two bodies emerged to manage the growing problems faced by the people who rely on shared water sources for survival. Both the Niger Basin Authority (NBA) and the Lake Chad Basin Commission work towards promoting the healthy development of Lake Chad and the Niger River so that all countries can benefit.

In conjunction with international bodies, many projects have been implemented to try to alleviate some of the stresses that have been placed on these two crucial resources. The Niger Basin Initiative was

launched in July, bringing together the World Wildlife Fund, the NBA, Wetlands International and the Nigerian Conservation Foundation for a two-year project to ensure that environmental concerns are considered when developing the basin.

PAKISTAN: Water scarcity and contamination



For centuries women in Pakistan have toiled in carrying water from one place to another.
Credit: Kamila Hyat/IRIN

Some wear the bright orange, yellow and red skirts and white bracelets typical of the Thar Desert, in the heart of the southern province of Sindh, while others dress more drably in thick, enveloping chadors. Most expertly balance earthen or metal pitchers on their heads. They collect it from trickling streams, from wells where wheels are turned by cattle, or from water holes that suddenly appear, shimmering like a mirage, on the browned moonscape of southwestern Balochistan Province.

For these women, obtaining water is a struggle that consumes many hard hours of their daily lives; most have never seen water running from a tap.

A question of access

Pakistan's Ministry of Environment maintains that 70 percent of the population has access to piped water, but experts such as Q. Isa Daudpota dispute the figure. Daudpota, founding director of the Sustainable Development Networking Programme project within the United Nations Development Programme (SDNP/UNDP), wrote in 2005 that only 30 percent of the population had access to piped drinking water, while "70 percent of the population drank water of

unknown quality."

Pakistani women are always walking in search of water. They walk across parched desert sands, along steep mountain paths and through newly furrowed fields.

There is little evidence that this has changed significantly, and arguments over water are often the source of trouble.

In June 2006, 12 people were injured in a clash between rival clans over water in Parachinar, a town in Pakistan's North West Frontier Province (NWFP). The dispute started over allegations that people from the Malikhel clan had attempted to divert water to their own area.

The situation is no less strained in other parts of the country. There were scuffles at municipal water taps in Islamabad, the capital, where prior to the monsoon season people often had to wait overnight for a few precious drops.

The SDNP/UNDP and the Pakistan Meteorological Department warned in June that the country was in the grip of severe drought conditions. Zafar Iqbal, the assistant resident representative of the UNDP's crisis prevention and recovery unit, said that weather-system studies suggested below-average rainfall the previous year had placed portions of the country at "severe risk of drought".

Early monsoon rains offered some relief in NWFP, but the shortage remains acute in desert areas of Sindh and across much of Balochistan – the country's largest province.

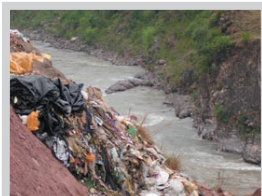
Balochistan, covering an area of 347,000 sq km, has faced severe periodic drought over much of the last decade, which has displaced thousands of people. Experts fear drought is returning to the province, which continues to demand a larger allocation of the national share of water – a hot political issue.

Pakistan is classified by the World Bank as a "water-stressed" nation. However, the government's eco-

nomic survey for 2005-2006, regarded as the most comprehensive official analysis of the situation, reported that annual per capita water availability had dropped to 1,105 cubic metres, just above the "water-deficient" level of 1,000 cubic metres.

Water politics

The management of the country's water resources is a politically divisive issue, according to experts.



Municipal waste is being dumped into the Neelum River in Muzaffarabad. Many rivers in Pakistan are now polluted with factory waste and sewage. However, no effective law has been implemented to protect rivers or other water resources. Credit: David Swanson/IRIN

Plans to construct large, new reservoirs, particularly the Kalabagh Dam in NWFP, are opposed by all provinces except the Punjab. Politicians, environmentalists and activists in these provinces have argued the dam would exacerbate the loss of agricultural land and further reduce water flowing downstream in

the Indus River, the country's longest river, towards the Sindh coastal delta.

A significant portion of the water problems in Pakistan is also linked to growing levels of pollution. The ineffective enforcement of laws regarding the dumping of effluent, factory wastes and sewage into rivers has led to large-scale pollution of many water sources. In major cities, untreated sewage and toxic waste deposited onto open ground have increasingly contaminated water sources, causing sickness and death.

Arshad Abbasi, a visiting research fellow with the independent Islamabad-based Sustainable Policy Development Institute, which has worked extensively on issues related to water, said the government was discussing mechanical filtration of water, when natural filtration systems, such as forest cover, were best. Abbasi said the destruction of forests and other environmental degradation was a major factor in the rapidly worsening water quality.

A serious health issue

According to the United States Agency for International Development (USAID), an estimated 250,000 children in Pakistan die each year due to waterborne disease. Infections from water, including cholera, typhoid and dysentery, burden the public health system, with government reports stating 40 percent of hospital beds annually are taken up by people suffering from such diseases.

USAID said safe water would reduce the incidence of diarrhoea and other related diseases by up to 50 percent. It is engaged in a US \$1.4 million project to test a new water-purification system in three countries, including Pakistan. Islamabad has based its planning along similar lines and pledged to set up 6,500 purification plants across the country over the next few years.

Abbasi, however, believed such plans miss the point. "Even in New York, it's an accepted fact that there is no replacement for natural recharge areas through which water can pass," he said.

Meanwhile, the perils posed by water remain an ever-present part of people's lives.

"We can't wait till the government can make water safer. We need water now," said Rehmat Masih, who lives in a "katchi abadi", or shantytown, in the Shahdra area on the outskirts of the eastern city of Lahore. Masih said families like his could not boil water, as the authorities suggested, because rising fuel costs had made it impossible to boil large amounts on a tiny kerosene stove.

For others, the cost of contaminated water is even higher.

"My infant son died last year after suffering acute diarrhoea. He was four months old. I can never forget the agony he suffered," Abida Bibi, 22, told IRIN in the Punjabi town of Gujranwala. She and her husband, Jamil, an unemployed labourer, said such tragedy was what "poor people have to live with".

"It will be a miracle if our daughter, aged two, survives this summer. She has been sick with dysentery for two months now, and we have no money to treat her," she said.

SOUTH AFRICA: HIV/AIDS and water privatisation: the human impact



A tap in Soweto, Johannesburg. "Water has become an expensive commodity for the poor people, but it remains cheap for the rich. It is surprising that costs that are being recovered from the poor are used to subsidise cheaper supplies to the rich." Credit: Obi Anyadike/IRIN

simply flow out to every South African who turns a tap. That is my dream."

These were the words of poet Antjie Krog on the promulgation of South Africa's post-apartheid national water policy in April 1997. Nine years later, her dream has not materialised, and the water is not flowing modestly to the poor communities in the townships and informal settlements.

Commodity for the privileged

The government introduced limited free water and prepaid meters in many municipalities as part of its cost-recovery measures in 2002, but experts and affected residents argue that the 6,000 litres of free water per household per month is too little to meet the most basic needs. Besides the inadequacy of free supplies, the cost of supplementing supplies has shot up and fuelled a general resentment of the cost-recovery measures.

"Water is now a commodity for the privileged. The 6,000 litres supplied free often run out in 11 days for those with big families like me. After that, the meter cuts the supply, and I have to pay more for additional water. On average, the household can go for up to six days per month without water because we do not have the money. We are all unemployed," said Soames Manyathi, a resident of Phiri in Soweto.

Manyathi said his 12-member family has adopted stringent water-conservation measures like flushing the toilet one or two times a day, sharing baths and reusing water for washing clothes and kitchen implements. Before the arrival of water meters in 2002, many families in Phiri had adequate supplies for a flat rate of 110 rand (US \$15) per month. "Water has become an expensive commodity for the poor people, but it remains cheap for the rich. It is surprising that costs that are being recovered from the poor are used to subsidise cheaper supplies to the rich," he said.

"Water, gathered and stored since the beginning of time in layers of granite and rock, in the embrace of dams and the ribbons of rivers - will one day, unheralded, modestly, easily and

HIV/AIDS and special water needs

Most of the families in Phiri are big, and there is widespread unemployment and poverty. Because of the high rate of HIV/AIDS in the community, restrictions imposed on access to water have badly affected the provision of care for the terminally ill. Sonia Phukubje, who cares for a terminally ill sister, said the 590 rand (\$82) foster-care grant she receives each month is insufficient to provide the basic needs and pay for adequate water supplies.

"The free supply of water lasts only six days, but that is only if we try our best to save it. The patient needs more water for regular bathing, and they drink a lot per day. The grant cannot buy us enough food. Starvation is a big problem now because it has become impossible to operate the family gardens we depended upon for nutritional supplements," Phukubje said.

When the water runs out, residents are forced to hire vans for up to 20 rand (\$2.75) per person to bring water from wherever they can successfully beg for it. However, the age-old tradition of community compassion has unravelled, and many neighbours are less willing to share. According to a report entitled 'The Struggle Against Silent Disconnections: Pre-Paid Meters and the Struggle for Life in Phiri', relations between neighbours have deteriorated as people have begun to steal water from each other.



A view into Soweto "Total water loss in the high consumption areas is estimated [...] at 225 megalitres per day. Approximately 83 per cent of these losses occur in Soweto." Credit: Obi Anyadike/IRIN

According to an assessment by Desmond James Martin, a doctor and the president of the Southern African HIV Clinicians Society, the high cost of water has far-reaching implications on HIV/AIDS prevention and care. Martin said water is essential for the

preparation of food to minimise the risk of infection by intestinal infections, to which HIV/AIDS patients are more vulnerable.

He added that water is essential for the enhanced hygienic standards required by caregivers to lower the risk of contracting infections from their patients. "Because PLWHA [people living with HIV/AIDS] are susceptible to frequent bouts of diarrhoea, infected individuals require additional drinking water to avoid dehydration. Frequent bathing is also necessary, because PLWHA are susceptible to a variety of skin infections. Additional drinking water is necessary for taking medicines and for making foods easier to patients suffering from mouth ulcers or thrush," Martin said.

HIV/AIDS patients approaching the terminal stage often use toilets more frequently, a situation that

demands frequent flushing of the toilet. Martin said patients in the advanced stage of illness soil their clothing and beds more frequently, imposing the additional needs of washing the patients and the laundry regularly. He added that the cultivation of nutrition gardens to provide a healthy diet, which is critical for the terminally ill, depended on unlimited access to sufficient and readily available water.

"In HIV/AIDS-affected households, access to additional water is not only critical for the infected individuals, but also for caregivers and for the whole household in order to lessen the burden of caring for the ill and to ensure that other members do not have to forgo their basic water requirements in order to care for those infected with HIV/AIDS," Martin said.

HIV/AIDS and water privatisation

According to Dale McKinley of the Coalition Against Water Privatisation, privatisation has aggravated the suffering of HIV/AIDS patients and bred a number of social health problems in the townships and informal settlements. "The commodification of water also presents a serious challenge to under-equipped HIV/AIDS caregivers working under difficult conditions in the poor areas," said McKinley.

He said privatisation has led to the rise of various limitations that were in conflict with the notions of water as a human right, the provision of basic needs, and the stated goal of free basic services for all. McKinley said the poor had been reduced to "customers" who were expected to take responsibility for key needs that had previously been protected by the government.

"In addition to entrenching the logic of payment for a basic resource, the prepaid meter individualises the relationship of people to water and makes any notion of individual right to access dependent on individual ability to pay. Water provision has been made the responsibility of a private company, but only to a paying individual," he said.

Efforts to get a comment from the City of Johannesburg were fruitless, but a report posted on its website

said the installation of water meters in areas defined as high-consumption zones would go ahead until 2007. The exercise is part of the city's cost-recovery measures being enforced under Operation Gcin'amanzi (Zulu for 'save water'). Soweto was targeted because it is a high-water-consumption area.

Future savings?

"Total water loss in the high consumption areas is estimated at 82000 mega-litres per annum, or 225 mega-litres per day. Approximately 83 per cent of these losses occur in Soweto. Soweto also consumes 30 per cent of the water purchased by Johannesburg Water from Rand Water and 90 per cent of the water purchased for deemed high consumption areas, so targeting Soweto for the implementation of a Water Demand Project could yield significant savings in the future," the report said.

The report added that the city expected more than 160,000 households to be covered by Operation Gcin'amanzi when it ends in 2007. The only tangible benefit so far is that many households that were not paying for water previously are now being billed. However, the council is yet to investigate the full impact of the imposition of water meters on poor households.

"What requires further investigation is whether the full level of service leaves sufficient water for health and hygiene purposes for poor households who may be unable to pay for water consumption above the Free Basic allocation. It is not clear whether the basic allocation of 6 kilolitres is too little, and whether this needs to be increased to 10 or 12 kilolitres per month," read part of the council report.

SUDAN: Controversy surrounds new dam that will displace 50,000

The Merowe/Hamadab dam being built on the River Nile in northern Sudan is the largest hydropower project under construction in Africa, but observers have warned that the venture, which is expected to displace 50,000 people from the fertile Nile valley to arid locations in the Nubian Desert, might lead to community violence.

Currently, most communities - on a very narrow stretch along the Nile - cultivate date palms as their main source of revenue and grow crops for their own consumption. The 67m-high Merowe dam, once completed in 2008-2009, will create a 200km-long reservoir and flood an area of 476sqkm. It will have

the capacity to produce 1,250 megawatts of power, roughly doubling Sudan's current power-generating capacity.

"It is clear that there is a great need for electricity generation in Sudan, and the affected residents in the area acknowledge that," said an observer who has been closely following the project.



10 camels compete to drink water out of one bucket near Eid El Nabak, North Darfur, Sudan.
Credit: Derk Segaar/IRIN

The Sudanese government has offered the affected families cash compensation for lost assets, a new house, land at resettlement sites and free utility services for two years

after resettlement.

Since June 2003, about 10,000 affected people have been resettled from the Nile Valley to the El Multaga resettlement site in the Nubian Desert. Ibrahim Mahmud Hamid, the Sudanese minister of humanitarian affairs, told IRIN in an earlier interview: "I think this is one of the best-organised projects with the best-organised response for those that have been affected.

"I have been there to see their places. They have proper houses, they have proper facilities, they have farms, everything. And even it is better than the old villages," Hamid said. "The have been compensated generously."

Tensions have risen, however, after a number of communities complained about the quality of the resettlement areas and refused to relocate. Whereas the communities demand to be resettled around the new reservoir, the dam authority insists on resettling the remaining people in the Bayouda Desert. Affected communities allege that the dam authority has sold their land to wealthy Arab investors.

As a result, about 40,000 people - predominantly members of the Manasir and Amri communities - are still holding out in the Nile Valley while the dam construction progresses.

Water level rises

Despite the obvious advantages for the Sudanese economy as a whole and a large resettlement and compensation programme, relations between the authorities and the affected residents have grown increasingly tense, and violence has erupted on various occasions.

An International Rivers Network (IRN)/Corner House report on the environmental impact of the dam said

the soil at the resettlement site was so poor the farmers could not grow produce to sell on the market.

"Those that have been resettled in El Multaga simply can't make a livelihood," said Peter Bosshard, IRN policy director. "The land is desert, and the soils are extremely unproductive. The only crops they can produce there are fodder crops of low quality, which don't generate enough income."

After meeting with the affected communities and visiting El Multaga, the two organisations said most of the free services, such as water, electricity and fertiliser, were not in place.

When asked about people who complained that they had not received the compensation and free services they had been promised, Hamid said these measures had been provided for in the compensation programme.

"They [free services and compensation] will come, but they will come later. They will come in phases. Some groups in the opposition want to use it as a political issue," the minister said. "All the problems now are with those who are very far from the dam, and they will be affected later on, in 2007. They think that they have to get the same things as those who are in the direct site of the dam."



Children collecting water from a puddle in Aweil North, Bahr el Ghazal, Sudan. The Sudanese government has promised compensation to families who are affected by the Merowe/Hamadab dam, although many have not received anything.
Credit: Derk Segaar/IRIN

Water levels rose unexpectedly on 7 August, and on 12 August, severe flooding in the Amri area reportedly forced up to 2,723 households to abandon their homes.

Some observers claimed the flooding was a natural occurrence and a result of the rising Nile waters, but Bosshard stressed that the flood-

ing was localised and in the direct vicinity of the dam. "I can't imagine there were natural causes," he said.

"We heard both versions of the story, but we weren't in a position to establish how the flooding happened. But the fact of the matter is that people have been affected," said Radhia Achouri, spokeswoman of the United Nations Mission in Sudan (UNMIS).

An UNMIS humanitarian mission that tried to visit the affected area and assess the damage on 14 August was prevented from entering the Amri area by Sudanese authorities. "We are discussing the issue with the authorities right now," Achouri said.

"The dam authority has refused relief workers and press access to the area," a local source said. "It is not known if some people died under the collapsing houses or not. However, the denial of access reasserts

the widely circulating suspicions that some people may have died and the dam authority is trying to conceal the extent of the disaster.”

History of violence

The Amri people represent 25 percent of the communities that will be affected by the Merowe Dam and have been extremely resistant to being moved to resettlement sites outside of their traditional lands.

In November 2002, violence erupted in the Amri area after dam authorities refused to recognise the elected committee representing the communities. Further unrest followed attempts by the dam authorities to conduct a socioeconomic survey against the wishes of the affected communities.

In April 2006, special forces, reportedly linked to the dam authorities, opened fire on a peaceful gathering of villagers who were meeting to discuss the planned survey, killing three people and injuring 47. According to witnesses of the shooting, the armed men opened fire without warning on the school where the meeting was taking place, using 16 vehicles equipped with heavy artillery and machine guns.

The April shootings led to negotiations between the Amri and a ministerial committee, headed by Bakri Hasan Salih, an advisor to the President of Sudan, Umar al-Bashir. They reached an agreement in early May, under which the Sudanese government undertook to look into the communities' grievances, while the affected people resolved to allow the socioeconomic survey to take place.



Some people in the Amri area of Sudan have refused to move to the new settlements. Tensions have increased between the government and the local communities, and violence has occurred in several places.
Credit: Derk Segaar/IRIN

The results of the survey, which is being used by the authorities to set compensation levels, have provoked further outrage among the communities. Despite Sudanese law requiring that the loss of land that has been farmed for 10 years or more be compensated, the dam authorities have refused to compensate land that has been farmed for

fewer than 20 years. No - or minimal - compensation will be paid for the loss of fruit-bearing trees, such as mango and lemon, or for fodder crops.

On the basis of the survey, two-thirds of the affected people will be ineligible for any compensation, IRN estimated.

Although the authorities had intended to move the Amri to Wadi Al Mugadam by the end of December 2005, the resettlement site is not ready and insufficient land is available to meet the legal resettlement entitlements of the affected communities. Following

the August flooding, the communities are accusing the authorities of breaching the May agreement with the high ministerial committee.

The villagers have made it clear that no official will be allowed to enter the Amri area. An armed group - the Amri Martyrs Front - has been established to defend the people against anticipated attacks by the dam militia. "If the dam authorities insist on going ahead with their plans to move the people forcibly, a violent clash appears inevitable," an observer said.

Impacts of the dam

The IRN/Corner House report found that once completed, the dam was likely to cause "sedimentation of the reservoir due to massive erosion, evaporation from the reservoir and infestation of the reservoir by water hyacinths.

It could also lead to "massive daily fluctuations of the water level downstream of the dam, with corresponding impacts on downstream agriculture and the spread of waterborne diseases."

In addition, the report said, the reservoir would inundate an area rich in history and antiquities dating back 5,000 years, "from the time of the ancient Nubian civilisation that preceded Pharaonic Egypt."

According to the Minister of Humanitarian Affairs, however, the project was one of the most important projects in Sudan that would change the situation in the whole area. "I was there, and they are now constructing an airport, a bridge, roads, everything. The whole area is moving now. About US \$2 billion will be spent in that area, and it will bring it alive," Hamid observed.

The Merowe/Hamadab dam, budgeted at a total cost of \$1.2 billion, was financed by China's Export Import Bank and several Arab financial institutions.

According to the IRN/Corner House report, Sudan's electricity-generating capacity before the project consisted of about 760 megawatts of thermal power and about 320 megawatts of hydropower. In a country with a population of close to 40 million, the national power utility had only 700,000 customers. About 70 percent of the electricity was consumed in the capital, Khartoum.

3. Interviews - Catherine Mwango, executive director of Kenya Water for Health Organisation



Catherine Mwango
Credit: Kenya Water for Health Organisation

Catherine Mwango is the executive director of the Kenya Water for Health Organisation (KWAHO), a nongovernmental organisation founded 30 years ago. KWAHO aims to provide sustainable water and sanitation facilities to disadvantaged communities in Kenya, and its work has touched the lives of more than two million people in the East African country. The organisation currently runs programmes in the Coast, Nyanza and Western provinces of Kenya, as well as in the Kibera informal settlement in the capital city of Nairobi. Kibera is home to 800, 000 people; one third of Nairobi's population; most of whom lack even the most basic water and sanitation facilities, which poses a grave threat to public health. Mrs. Mwango has been KWAHO's executive director since 2003.

QUESTION: Do women living in Kibera use KWAHO's services more than men?

ANSWER: The women get involved from the identification-of-sites stage, as there is the issue of security: Women feel they can't go to the toilets at night.

It is often the men who own the plots of land, so we have to involve the men so they can either donate [property] or agree for the facilities to be put on their plot. This is in the Kibera setting, but even in a rural setting men have to be involved, as it is the men who own the land.

Both men and women will use the services, but the women will manage them. They make decisions and identify needs to us. In most cases, they say that water is a priority. Because it is not readily available, they spend a lot of time going far away to look for water. The closer you bring water to them, the more time you give them to do something else. They can get involved in petty trade and activities such as selling vegetables. You give them much more capacity.

Water doesn't flow to the slums regularly, so KWAHO gives villagers the ability to store water in the water tanks. If you don't give them the water tanks, the minute the water comes to the community the water is only available through private vendors, from whom water is very expensive.

Q: How much do the private vendors charge?

A: Prices range from 5 Kenya shillings to 20 shillings [US\$0.06 – 0.27] per 20 litre jerry can in the dry season, between January and March. KWAHO regulates the price at 2 shillings [\$0.03] year round. They regulate what hours of the day people are available to manage the water taps.

Q: Are people happy to pay for their water through your organisation?

A: Yes, they are very happy, because somehow the water will be available. The problems for the slum are very complicated, as people often hook up to the water lines coming from Nairobi's water company and divert the water along the way. The water doesn't reach the destination. Sometimes, the community knows the person who is doing this, but they feel they can't tell the water company, in case [the person] cuts their supply.

In 2002, there was an act of parliament, which regulated the development and management of water in Kenya. It created several different institutions so that decisions regarding water could be devolved to different actors. Seven water boards were set up around the country and expected to form water companies. These companies are meant to put in place regulations to increase success to the consumers, but the company is large. If we leave it on its own, it can't meet the needs of communities such as Kibera. Organisations like us set up the community to manage the water itself.

Q: Is it very important to get communities involved in these projects?

A: Yes, completely. If you put in a water tank and do not explain it to the community - explain why it is there - then you will not even find it the next day. But if you make them own it themselves, then they will also protect it.

Q: Do you have vandalism problems?

A: Vandalism is common, but this is because of the poverty. If there are PVC pipes, then there is a tendency for them to burst and become infected with sewage. But when you try to put in metal pipes, they want to take the

pipes for themselves. You have to do things to try and help them protect the facilities and cope with some of the issues.

Q: Women's groups are often the managers of water tanks and other services in Kibera. Have the men been upset that the women have taken over?

A: What we have noticed is that in the urban areas, the men would be concerned if the profit from water services was going to individual pockets. But the communities have set rules and punish those who try and do this. It is women's responsibility to ensure that water is available at the domestic level. Unlike the case with KWAHO projects, if the water is being viewed as a commercial source of income, then the men feel as though they should be involved so they can also benefit.

Q: Has there been a noticeable improvement in health because of these programmes?

A: Yes. The women say they don't take their children to the clinic as often as before. They are very, very happy.

You and I may be able to boil polluted water if we have polluted water, but people here cannot. So we provide cheaper technologies with the help of organisations like SANDEC [the department for water and sanitation in developing countries at the Swiss federal institute for aquatic science and technology] help make the water more pure, such as the SODIS [Solar Disinfection] plastic bottles.

Q: Do you think Kenya can meet its Millennium Development Goals concerning water by 2015?

A: We have made a lot of progress, but it is almost impossible, as the gap is still very wide. There are still many areas that don't have water. There is also a lack of funding. There isn't enough money to reach the development goals.

Q: Are you associated with any UN agencies?

A: We used to be - with Unicef [UN children's agency] and UN Habitat [UN housing agency], but through problems along the way we are not. We had problems where the communities were mismanaging the projects the UN had funded. There were issues with accountability. If organisations like KWAHO are not properly involved, then there are often missing links, and this causes problems. I would very much like to get back into the UN system.

Q: Do you think the UN should do more?

A: The UN should be more receptive. There is a missing link. We don't have a good relation to be able to know what is going on with the UN system that we can tap into, but this is the fault of KWAHO. Our projects - particularly in rural areas - are working well. We do lots of training and get involved inside the household. KWAHO relies on donor support, so the more we have, the more we can do.

In rural settings, if water is available it gives women extra chances. They have more time to go to the market, and to develop income-generation activities. KWAHO taps into local knowledge and trains people to use local resources to generate income.

Q: Why is it always the women who provide water in the home?

A: Tradition. It was always the woman and the girl child providing the water because of the cooking. These traditions persist. Water is often far away, but now we try and tell the men that they don't have to carry the water on their head. We tell them that they can use wheelbarrows and put the jerry cans in there, so they can become involved. The girl now can wake up in the morning and go to school, whereas before she would have to wake up, get the water and arrive at school late. Or she would be so late she wouldn't go to school at all. So it empowers the girl child.

Carlos Linares, Senior Water Policy Adviser of the Energy and Environment Group, Bureau for Development Policy at the United Nations Development Programme



Carlos Linares, United Nations Development Programme

Carlos Linares has 30 years' experience in international development and environmental management. The managing of water resources has been a "common thread" in both fields. He is now the Senior Water Policy Adviser of the Energy and Environment Group, Bureau for Development Policy at UNDP Headquarters in New York, where his responsibilities include overseeing the water programmes of UNDP on trans-boundary issues, on water-resource management and on water supply and sanitation at the community level.

QUESTION: The Millennium Development Goals (MDGs), which were adopted by 189 countries at the United Nations Millennium Summit in September 2000, include a target of halving the number of people without access to safe drinking water and sanitation by 2015. Do you believe that can be achieved?

ANSWER: What one needs to understand is that even if the MDGs are met in 2015, there will still be about 900 million people without access to water and about 1.6 billion without access to sanitation, because of population growth. Even if the world meets the target, there will still be a deficit in coverage of water and sanitation around the world. Having said this, every expert will tell you that sub-Saharan Africa is falling behind and there are at least 20 countries that will not meet the MDGs. However, if you look at remote regions of Peru, you will see the indicators for access to water and sanitation are very similar to those of sub-Saharan Africa.

We have a problem of measurement in terms of the MDGs. Reporting is not uniform or standardised, and different countries are using different units of measure to indicate coverage. The international agencies are having a very difficult time figuring out the data for each country. Remember also that the MDGs report on national averages. Disparities between regions within each country will not be reflected in achieving the MDGs. The problem of measurement is a real constraint for knowing whether we have achieved the MDGs or not.

Q: Do you feel they are realistic targets, or are they something to aspire to?

A: They are aspirational, and they are motivational. They have been motivational for donors to increase their funding for water and sanitation. In that respect, the sector - and the population of the world - has benefited, because we are seeing increases since Johannesburg in levels of funding and ODA [overseas development assistance] for the sector. That is certainly a positive development, whether we achieve the MDGs or not.

Q: Water is obviously a necessity to all human life. But how important do you feel good water management is in reducing poverty and achieving the MDGs?

A: Service-delivery will always run into constraints regarding water availability and water-resources management.

The way that country governments are organised - and, correspondingly, the way development agencies are organised - there are often different departments or ministries that take care of water resources, and others that take care of water supply and sanitation. The synergy between the two is not very smooth. Sometimes they don't even talk to each other, so it is very important that water-resource management and water and sanitation delivery go hand-in-hand.

Latin America is already mostly urban, and Asia is on its way, and Africa will be in 2020 a mostly urban continent. So supplying the needs of the population will be beyond the challenges the water-supply and sanitation sectors are already facing, especially with regard to who pays for water services, and who pays for watershed management.

Q: Is there anything more you feel the UN or UNDP could do?

A: UNDP is probably - in the minds of the general public - not a strong water agency. But, in fact, it is. UNDP supports about 200 water projects in 66 countries worldwide, and we have a budget of about US\$350 million of active water portfolio. This is very similar to what Unicef [the United Nations children's agency] is doing. However, UNDP is the capacity-development agency of the UN system, and certainly we do more capacity development at the local and national level than any other agency. So the issue of capacity is essential to achieving coverage and proper management of water resources.

The mistakes of the past related to the implementation of mega water projects: there is a lot of money for infrastructure and very little funding available for social components. Participation, training and organisation don't get funded by these large investment projects - and community participation, training and organisation are the key elements of sustainability in the water sector, as well as in many other sectors.

These large projects have not promoted ownership locally, and we really don't know if they are benefiting the poor, because they are so large and they go through so many agencies for implementation. They are using cookie-cutter approaches in places where local knowledge and technologies would be more appropriate and affordable. The projects are very complex, and when they end, the experts leave. There are no human or financial resources left in-country for operation, maintenance or replacement due to obsolescence of these systems. We wonder, with the increased levels of funding for meeting the MDGs, especially for sub-Saharan Africa, whether the mistakes will be repeated. Informed and active participation of stakeholders is the key to sustainable solutions; there is no doubt about that. And by saying that, I think UNDP has the right approach in focusing on capacity-building issues.

Q: Do you think women have a greater role to play - and burden to bear - than men in development programmes, given their central role in domestic water supply in rural areas and their subordinate status in many cultures?

A: There is a very simple statement I am going to make that holds true for every continent. Women are the managers of the water resource at the household and village level, especially in rural areas. They take care of the children and the sick, and they prepare the food. They fetch water and firewood for cooking. Therefore, in the health, nutrition and livelihood aspect - they are the managers of the water resource.

Projects that do not include women are not as successful as those that do. Already, the IRC [International Red Cross] in the Netherlands has done a study that included several countries and many projects, which proved that projects which are designed and run with full participation of women are more sustainable and more effective than those that are not.

You think about these large projects that are coming in with investments of billions of dollars between now and 2015, and you have to wonder if participation of women will be included for sustainability and effectiveness purposes. There is no doubt that at the local level women need to be involved, not just for humanitarian reasons, but for project effectiveness and sustainability.

Q: The UN World Water Development Report of 2003 says that the world will need 55 percent more food by 2030, and that two billion people still lack access to reliable forms of energy. It seems the logical solution would be to further expand the number of dams under construction, despite their well-documented negative cultural and environmental impacts. Would you agree?

A: Nobody has ever proven that the benefits of large dams go to the poor, and I don't think it can be proven. I believe that storing water at the community level to prevent and to prepare for the impacts of climate variability is very important. I believe communities can build small dams at the community level to control floods and to store water in times of drought.

There is no doubt that there is a need to conduct water-resource-management practices that involve catchments of different sizes. But to fulfil the local needs of communities around the world, I don't think that large dams will necessarily imply direct benefits to the poor. They may reflect well on GNP and other macroeconomic indicators and increase production, but that doesn't really give us any idea of the equity aspects of large dams. Nobody has proven that yet.

Q: So as far as filling this 55 percent gap for more food, you believe that more local dams are the answer, rather than big irrigation projects?

A: Yes, exactly. Large irrigation projects have not been proven to reach the poor with any kind of benefits. They usually go to large plantations. But having said this, I really believe that the combined uses of water for domestic consumption and for kitchen gardens will allow for improved livelihoods at the community level in rural areas. These are called hybrid systems. Studies have shown that combining productive uses of water with water for drinking purposes can improve livelihoods and can help the poor come out of poverty.

Q: Nongovernmental organisations have criticised the prices private vendors charge for water, yet people still buy it.

A: People actually buy less water. They consume less water to offset high prices.

The studies that we have done show that private-network operators - people that actually drill a well, put in a pump, a tank and distribute water to neighbours by hose - actually charge the same rates as the public utilities, and without subsidies. It's not just one type of vendor - such as tanker trucks - there are many types of water vendors.

Q: UNDP obviously sees cooperation on shared water resources as critical, hence their Trans Boundary River Basins Initiative. Do you feel the management of freshwater supply could trigger conflict in the future?

A: Yes, certainly. Let me tell you about three approaches that we have been following. The first one is to link diplomatic to development efforts. Ministries of foreign affairs are in charge of making decisions about trans-boundary water issues, because of sovereignty issues. There are tensions with respect to management of trans-boundary waters.

We have been supporting (for more than 10 years now) the Nile River Basin Initiative dialogue at ministerial level. This is the second approach that I would like to mention. Ten years of negotiations have resulted in very close to meeting agreement on a cooperation framework document, to regulate the use and the management of the Nile River basin. I think this is the most exciting and interesting achievement that we can talk about. Progress is being made. UNDP has been supporting this process, assisting riparian countries to come together and agree on a common framework for the management of the Nile River. Again, it takes time - 10 years' work - to reach agreement. So, these are very important issues and certainly there is potential for conflict, but also there is potential for development.

The third approach is being implemented on the Mekong River basin, where we are working directly with communities, again building capacities and promoting active and informed participation of communities that live along the Mekong River, adopting common practices, for instance, under the principle of do no harm to other parties/stakeholders. We are just beginning this process, and these communities are beginning to lobby local governments and district governments upstream and downstream for the proper management of their livelihood, which is the Mekong River. So, this a bottom-up approach, we are implementing that has proven very successful. So, in trans-boundary waters, let me say that we are working from the top down and from the bottom up, to eventually merge at some point in the future.

Pierre Ndikumangenge, Burundi's minister of agriculture and livestock



Pierre Ndikumangenge.
Credit: IRIN

Pierre Ndikumangenge was Burundi's minister of agriculture and livestock during its post-civil war transition period, which ended with general elections in 2005. He is now a consultant at the United Nations Food and Agriculture Organisation.

QUESTION: Does Burundi have enough water?

ANSWER: Burundi has more water than needed. The dry regions of Burundi record levels of rain nearing 900ml per year. Some zones have even more than 1,200ml of rain per year. Burundi geography is also favourable to the mastery of water, as many rivers' sources are at about 2,000m of altitude. All the rivers that pour into Lake Tanganyika take source at the Congo Nile peak.

In other words, water comes from more than 2,000m of altitude and runs down to 1,300m in the north and about 800m in the west. That entire curve offers many potentialities for the use of water if need be. Burundi is therefore one of the rare countries in Africa where the availability of too much water has become a problem. In March and April 2006 for instance, rainfall has been a serious problem to Burundi and destroyed several infrastructures.

Q: If the problem is too much water, why do some people lack even drinking water or face a food crisis after only one year of drought?

A: It is a problem of conception and planning. All those rivers crossing Bujumbura capital, for instance, should be diverted upstream and their waters used. But following bad agricultural techniques, the deforestation, the erosion by water runoff, all the forest cover is swept away all along those rivers' paths.

If it was possible to cut the water current upstream so that water passes through the irrigation channels and then returns to the riverbed, there would be no problem of erosion downstream as we witness on the outskirts of Bujumbura capital, and Lake Tanganyika would not be full of sand as it is now. And even more, it would allow Burundians to dig their gardens all the year long, 12 months out of 12.

Q: You're saying that water exists but is not well used, then?

A: It's very badly used. Take the example of the land where the rice-growing company in the Imbo region, (SRDI) is growing rice now. It was initially a dry and arid area. With a dam at the River Gatura, the whole area is now irrigated. There are many other rivers in the area, which should also be used in the same way, instead of destroying the infrastructure in the rainy seasons.

Q: Do you mean the implementation of the national water policy would change something?

A: Absolutely. With the increasing population, even with regular rains we are no more able to produce enough food for Burundi's population. If we wait for rains to plant and then go on vacation during the dry seasons, we could not face the situation.

It is therefore important to ensure that we use the water even in dry season. It is the only way we can nourish all the Burundians.

Q: Do you mean the food crisis we have witnessed these last years in the north and east of Burundi could have been avoided?

A: It should not exist. People tend to believe that the region of Bugesera covering a part of Muyinga and Kirundo provinces has not enough water, but it is not true. The region has many rivers – eight to be exact – which constitute a permanent sheet of water. We have also good rainfall and a geography favouring large-scale irrigation.

All it needs is to ration the water and use it all along the year to curb the food crisis. We should even go beyond this, since we don't only need to put an end to the food crisis but also allow agriculture to be a sector allowing people to earn money - not just to produce for self-sufficiency. If people invest money in the sector, it will not be for growing sweet potatoes or cassava, but crops allowing them to earn money. It is a matter of financial means and planning.

Q: You were minister of agriculture for sometime. What did you do in this capacity?

A: I sent some government agents to learn agricultural techniques in Egypt and Israel. I also led a delegation of

Burundi experts to Burkina Faso to see how they manage without rains. I wanted to propose that starting in 2005 we test all the irrigation techniques seen in those countries - such as water pumps, the different kinds of dams - to see what is suitable for Burundi.

Next, a study was to be carried out to know what could be done for better water management in the whole territory.

Unfortunately, the whole team is no more in place. The whole operation has been suspended.

Q: People go but policies remain. Why is it not implemented now if it is a good strategy? Is it a matter of lack of will or means?

A: Here in Burundi, we lack a long-term vision. We should have a framework so that if people leave their post, the successors do not have to begin afresh. We have the impression to be turning around, because there is no clear orientation to follow.

Newcomers first take stock of the situation, acquire experience in the field, etc. By the time they are settled, they sometimes move, are called to other tasks or simply go to look for better working conditions abroad. Experts in this sector, for instance, are working in neighbouring Rwanda, not because they do not like their countries but because they are better paid there. This bears a serious prejudice to water management.

Q: What are the concrete proposals?

A: I believe the first step should be to make an inventory of all water resources, to know all the areas favourable to great-scale or small irrigation. The next step could be the training of people in water management or to give refresher courses to others.

Since so few techniques are in use here, it would be to identify all the appropriate techniques for a better management of water to ensure that water arrives where we want it at whatever time we need it. Finally, we should choose crops liable to profit farmers.

Parallel to this, Burundi should think about stopping the brain drain and improving workers' conditions. Many of the experts have gone where they are better paid.

Q: Do you think Burundians would be open to the new techniques?

A: In the overcrowded regions as Ngozi and Gitega, wetlands have been prepared for farmers to grow rice. When they saw that rice was bringing in money, they totally adopted rice farming. Everywhere water is available; they now grow rice and vegetables. Some have even switched to rice and vegetables to the detriment of beans because rice and vegetables are more profitable to them. So farmers could also adopt the new techniques to ensure them food security.

Burundi is emerging from a civil war. It is the best time for investment. That is the time when the international community has a keen interest in Burundi. The Burundi government should seize the opportunity to bring donor countries to support the agriculture sector to ensure not only food self-sufficiency to Burundians but also to get those millions of Burundians living on agriculture to improve their living conditions.

Alexander Likhotal, president and CEO of Green Cross International



Alexander Likhotal.
Credit: Green Cross International

Green Cross International is an international non profit organisation, based in Switzerland, which works to provide “unbiased environmental analysis and expertise, information dissemination, education, objective evaluations for public debate, scientific studies, and social and medical support to help ensure a just, sustainable and secure future for all by fostering a value shift and cultivating a new sense of global interdependence and shared responsibility in humanity’s relationship with nature”. In 2005, Green Cross launched a [<http://www.greencrossinternational.net/en/programs/water.htm>] global campaign for the Right to Water, to raise public awareness concerning the current water crisis, and to urge national governments to negotiate and adopt an International Convention on the Right to Water.

Alexander Likhotal has been the president and CEO of Green Cross International (GCI). Formerly the deputy spokesman and advisor to President Gorbachev, he continued to work with Gorbachev at the Gorbachev Foundation as the International and Media Director. Subsequently he has been the CEO and President of the Green Cross since 1996, after it was launched by Gorbachev in 1993. Dr Likhotal is the author of several books and many articles.

QUESTION: Can you tell us about Green Cross International?

ANSWER: GCI is an international, United Nations-affiliated non-profit environmental organisation that promotes sustainable development and specialises in providing practical expertise and post-conflict environmental assessment, particularly in ensuring clean water supplies in many areas throughout the world where this is a significant challenge. Green Cross International contributes to reconciliation and proposes viable solutions for river- basin water management to avoid conflicts and to build up cooperation.

Green Cross implements major projects in many parts of the world, such as in the Middle East, South Africa, in South America, Asia and in Europe. We try to provide integrated water-management solutions for the countries which are involved in disputes. Basically, Green Cross believes that one of the reasons we have problems of water shortages in the world is the inefficiency of the water management. There is plenty of water on the planet, but we fail to distribute it evenly and efficiently. It is therefore the strong conviction of Green Cross International that the only practical way of redressing the water crisis is through consolidation of civil society and the creation of a legally binding mechanism for resolving all water-related issues.

This is why Green Cross International, together with other international, national and local organisations, has launched an international public campaign to convince national governments to start the negotiation of the Global Treaty on the Right to Water.

Q: Do you agree on the Dublin statement, which was issued in 1992 by the International Conference of the Environment, that access to affordable clean water and sanitation is a basic human right?

A: The right to water is defined in the General Comment Number 15 of the International Covenant on Economic, Social and Cultural Rights and entitles every human being to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic use. The right to water includes the right to sanitation. Yes, of course we agree with that, and we consider that this is one of the most important principles that need to be reinforced on the international agenda.

Q: There are many acts, conventions and declarations explicitly or implicitly on the right to water, yet many water experts and politicians think international water laws are still inadequate. Do you agree with them? What do you think should be done to improve the situation?

A: I think the key stakeholders in this issue need to understand the rules of the game. For the time being, there are hundreds and hundreds regional agreements on distribution of water, water management, etc. However, there is no mechanism of law enforcement. What we need is a document that could become a guiding principle for the key stakeholders: the governments, the regional communities and the users of the water resources. It is clear that water should be provided for everybody at a reasonable price and that water should be safe and clean. Water and sanitation are the basic needs everybody should have.

Q: There was conflict in Sri Lanka over water in late July this year. Do you think that in the future wars will be fought over water instead of oil?

A: I think the situation can be opposite if water is turned into a source of cooperation. It depends on how you

deal with this issue. Clearly, water could become the source of conflict, but if we shape correctly the relationship between the countries and the people who are involved in the relevant water issues, water can be the strongest element of cooperation and peace-building. When countries and people start working together on the solution to the problem, they will forget about fighting and focus more on cooperation.

Q: The convention on the elimination of all forms of violence against women (CEDAW), adopted by the UN General Assembly in 1979, explicitly mentioned access to water. What improvements do you think have been made since then?

A: I think there are some encouraging developments even in the most arid regions of the world, for example, in sub-Saharan regions. But all of them are far behind the benchmarks of the Millennium Development Goals [MDGs].

Q: MDG target 10 specifically states the need to have access to clean water and sanitation. Do you think that meeting this goal would help achieve the other MDGs?

A: I think water deprivation is one of the most traumatic experiences for a human being. Access to water is literally a question of life and death. This is why water management has such a high 'price of a mistake'. Unsubstantiated water management decisions destroy lives and leave environmental wasteland. On the other hand, changing water policies for the better can have a positive effect on the environment, public health and education; give people jobs and the chance to lead fulfilling lives.

Even for gender issues: women walk long ways to get water and have to carry the water back to their homes. For instance, in Africa women need to walk approximately 6km to fetch water. As a result, they cannot attend school and they cannot get the necessary education. This situation complicates the equality of gender. If this condition continues, gender equality is unachievable.

Q: There are approximately 1.4 billion people without access to clean water and 2.2 billion people without access to basic sanitation. Do you think these numbers are going to rise in the future?

A: Judging by absolute figures, the situation is becoming more dramatic. Though significant improvements have been made in rural access in all regions, only a few countries have achieved improvement at a sufficient rate to meet the MDG water goal. However, one should not forget that even if the MDG for water supply is met, it will have improved the situation for less than half of those in need!

Today more than 30 countries—most of them in Africa and the Middle East—have fallen below even the most conservative benchmarks for sufficient per capita crop land [0.07 hectares] or renewable freshwater [1,000 cubic meters]. Worldwide, 434 million people face water scarcity, and if current trends continue it is estimated that by 2025 between 2.6 billion and 3.1 billion people will be living in either water-stressed or water-scarce conditions.

The sceptics say that the MDGs are overambitious and that the targets set are unreachable in such a short time. Lack of funds is often given as an excuse for not coping with the current water crisis. This is not true. If we lack anything to resolve this shameful situation, it is not money but values and clear priorities. At the end of the day, the solution to this crisis is not about charity, no matter what form it takes; this is about the EQUALITY of all people and about the RIGHT of every person to have access to clean, drinkable water and basic sanitation.

Q: Do you think privatisation is a solution to improve access to water and sanitation?

A: Privatisation is often a stumbling block in discussions about the water crisis and the management of water resources and services, be it at the level of governments or among the concerned nongovernmental organisations. I would like to state clearly that Green Cross International is totally against the deregulation of water resources and services management. GCI recognises that national and local companies, as well as international corporations, may contribute to overcoming the water crisis, as they steadily diversify their offer of water services. However, they should do it only when those immediately concerned consider it the most reasonable option from the ecological, social and economic standpoints.

The implementation of such projects and works must be placed under the control of public authorities, with full respect for the fundamental principles of the human right to water. Corruption, disregard for the interests of the poor and failure to inform the different participants of the process by public or private water providers must be immediately and severely sanctioned in each particular case. Green Cross International believes, however, that the issue of involving the private sector is not the most important one and does not hold the key to providing water to all those who are currently deprived of it.

Q: The European Union water framework directive of 2000, sets a framework for comprehensive management of water resources in the European Community, including addresses inland surface waters, estuarine and coastal waters and groundwater, with the objective of achieving at least 'good status' for all waters by 2015. What improvements do you think have been made since this directive?

A: I think the idea was very good and the goals were excellent, but unfortunately, as it happens in many cases, we lack visible enforcement of mechanisms to make area of law for everybody. Only a coherent alliance of politicians, business community and citizens, based on shared concerns, will make success possible. We need an innovative international legal mechanism to differentiate between the many types of water use and the related rights and obligations of stakeholders at the local, national and international levels.

Q: Do you think similar directives should be created in particular regions, like sub-Saharan Africa or Asia?

A: Let me give you a specific example. About a year ago, the French government adopted a new programme to help developing countries improve access to water and sanitation. The French government provided the possibility for the local authorities to spend 1 percent of their water bill on assistance programmes. This is just a contingency - it is not legally binding. It is not a requirement; it is a possibility which depends, of course, on the willingness of specific local authorities to deal with the programmes.

Green Cross convened a meeting of representatives of 21 regional authorities of France. We convinced the leaders of the governments to use the opportunity to channel the necessary finances to the poor regions. We think that decentralising cooperation in water management can really contribute to the solution to water problems. It is best to have cooperation from person to person, city to city, village to village rather than a centralised approach from the government. A decentralised approach is much more effective.

For instance, as we work on the case of the Okavango and the Jordan rivers, we see the limitations of the centralised approach that creates the lack of 'bankable' projects. Large donors like the EU and the development banks claim that more funds would be available if governments prioritised water and sanitation in their poverty-reduction strategy papers and more bankable projects were presented. But there is clearly a problem here, as developing governments have a host of priorities - transport, health, education - and many have not placed water at the top of the list. The preparation of projects itself requires a huge amount of resources. Such resources may only be available for large-scale infrastructure projects, whereas there is a clearly expressed need for more small- and medium-sized community-level initiatives. The procedures for receiving development financing favour large projects, but it is increasingly believed that smaller scale actions close to the target communities are far more effective and likely to be sustainable in the long term.

For example, in Burkina Faso, communities are not ready even to contemplate these projects, because they badly need a simple water well, which will cost US\$5,000 to \$10,000. There is no mechanism to aggregate the requirements that exist in the most poor areas of the world in order to match the macro operating level of big donors, like European Community, and the World Bank to name a few. This gap could be at least partly filled by more effective and coordinated decentralised cooperation. And along with these working solutions must come the financial measures to make them happen. But, as with all the new initiatives being proposed, there are many issues of stakeholder participation, cost-recovery, sustainability and funding to be considered.

Gerald Rukunga, AMREF programme manager of water and sanitation



Gerald Rukunga.
Credit: African Medical and Research
Foundation

Gerald Rukunga is the programme manager of water and sanitation of the African Medical and Research Foundation (AMREF) in Kenya. He has been with AMREF for eight years and worked on many water and sanitation projects in Kenya such as Makueni Water and Sanitation, Kitui water and Sanitation Project, and Magadi Water, Sanitation and Hygiene Promotion Project to name a few. AMREF is a non-governmental organization that works to alleviate poverty. AMREF has 40 years experience in developing economically viable and sustainable solutions to the everyday challenge of safe water and sanitary living conditions.

QUESTION: What does AMREF do?

ANSWER: AMREF works to improve health and improve the quality of people's lives in Africa. Its mission is to improve the health of the disadvantaged people in Africa as a means for them to escape poverty and improve the quality of their lives. We have 5 regional offices in South Africa, Uganda, Tanzania, Ethiopia, and Kenya as the headquarters. We also have 2 field offices in Sudan and Somalia. At the moment we have six areas of focus, or priority intervention areas (PIAs): HIV/AIDS including TB and sexually transmitted diseases; malaria; water and basic sanitation; family health; clinical services, disaster management and emergency response; and training and development of health learning materials.

As for the water and sanitation programme, AMREF's focus is to increase access to safe and adequate water, sanitation and hygiene with a view to mitigating against water sanitation and hygiene related diseases and poverty alleviation. Improvement in access to water and sanitation will improve the lives of people in Kenya. We concentrate on three approaches, which are capacity building, operation research and advocacy. Our role is to support the communities to do it themselves. Capacity building particularly focuses on the local communities to give them skills and knowledge that enables them to develop and maintain water sources, improve their sanitation and practice good hygiene.

As for operation research, we test and apply innovative approaches that are acceptable and cost effective and document and share with the communities, Government and other actors any new experiences and best practices.

AMREF also looks at the area of policy. Using new lessons learnt and best practises; we approach the government and other institutional bodies to share these with a view to developing new policies or improving on existing ones in order to improve service delivery in this sector.

Q: As you have mentioned before, AMREF has six priority areas. Do you think success from water programmes would have a positive impact on other areas?

A: Yes, definitely. There are strong linkages among water and other sectors. For instance, safe and adequate water, sanitation and hygiene certainly will benefit people who are infected with HIV/AIDS to live in better and healthier lives. Better management of water and sanitation would also reduce malaria outbreaks. Adequate water coupled with good hygiene will help control trachoma. Safe and adequate water, sanitation and hygiene will help control most diarrhea diseases particularly among children under five, control parasitic infestations and disease vectors among others. Water can also be a source of livelihood as it can generate income for families and be used to improve nutrition.

So basically, we need to think of the package as one. Water can be a component to address other problems.

Q: The World Health Organization has stated that 1.1 billion people do not have access to water, and 2.6 billion people do not have access to basic sanitation. Looking at these vast numbers, do you think the Millennium Development Goals (MDGs) will be achievable, especially in African countries?

A: As I mentioned before, water and sanitation are interconnected with the other sectors of MDGs. I feel that unless the other issues are being addressed at the same time, these MDGs will not be achievable. We are experiencing climate change, desertification, people cutting down trees - and at the same time water sources become limited. These matters and many other aspects which include lack of appropriate policies, inertia, and poverty will affect the achievement of the MDGs.

Therefore, we need to focus on water management alongside other related programmes, where we can use water more effectively and efficiently. I also believe charging people for water would make people appreciate the resource more and be more responsible when they use it.

Q: Do you feel like privatization of water is a way forward?

A: Yes, that is one way of improving water management. It is more efficient and improves conservation of water sources while ensuring people have access to water that they pay for and their money is used to sustainably operate, maintain and manage the water sources. The current government policy focuses on decentralization of water sources through formation of community owned water companies. These companies provide water to towns and villages, and people use the water for their households, farms and for industry. For instance, Nairobi Water Company subsidizes the cost of water for the most disadvantaged in the informal settlements while ensuring the rest of the city inhabitants pay promptly for their water services.

People appreciate and use water properly when they are charged for it. The problems we are facing in the informal settlements at the moment are corruption, theft and vandalism. Sometimes people steal the water from the company water pipes and nobody will report due to fear of reprisals from the thieves. This deprives the water companies of the much needed revenue for operation and maintenance. Therefore, the best way to ensure water is managed and used properly is through privatization that will ensure people pay their fair share of the water they consume.

Q: Do you think community involvement is the key to success in water management?

A: Yes, it is very important to involve the community. They run and maintain the water sources, which means they are going to make sure that everybody pays for water at a price affordable to all.

In the past, government controlled the water management without involving the community. This is a top-down approach, which failed. Therefore, it is best to apply top-down and bottom-up approaches at the same time. This ensures community demand and gets services with their full participation and ensures communities properly manage those services for sustainability. Where possible communities are encouraged and enabled to invest their own resources to initiate and manage their water and sanitation programme.

Q: Do you think the government has done enough regarding water management?

A: Yes and No.

Yes because it has developed a new water policy targeting decentralization that has led to enormous developmental activities including formation of water companies in pursuit of increasing access to water and sanitation.

No because it has not availed adequate resources to ensure the new water policy is enacted more rapidly.

Q: How important it is to involve women?

A: It is very important. Most of the time, women are the ones who are responsible for fetching the water. Men always control the water sources. But now, the situation has changed. Women are involved also in water management. For example, in the Maasai community, there are at least four women in each water committee. Often, they become the treasurer because women are good at it and men are irresponsible. When men are in charge of the money, they will spend it on alcohol or lend it to their friends and forget about it.

Q: Do you think that water shortages could cause conflict in the future?

A: As freshwater resources are decreasing, competition over water is getting higher. More and more people need water. Water becomes a very valuable resource at the moment. Therefore, I believe effective water management is important to avoid conflict in the future. Government needs to enforce water laws within the country. Also, international water law should be improved particularly for riverine countries. Cooperation between countries is important to conserve and maintain water resources.

Q: Do you think large dams are a way to store water and to fulfill water demand?

A: Yes this will trap and store the valuable rain water that will be used to supplement other sources. This practice even though not widespread and is being conducted in a small scale should be part of the way forward and AMREF is one of the NGOs spearheading this process.

Water expert Dr Walid Saleh



Dr Walid Saleh, Regional Coordinator for the Middle East and North Africa at the United Nations University.

Water availability in the Middle East will continue to remain problematic and a potential source of conflict, according to water expert Dr Walid Saleh.

Dr Saleh has worked with the United Nations University/International Network on Water, Environment and Health in Abu Dhabi since 1996.

In excerpts from an interview with IRIN, he said while some efforts were ongoing to improve supplies, better water management was essential.

QUESTION: How severe is the problem of water scarcity in the Middle East?

ANSWER: It's widely recognised that the Middle East North Africa [MENA] region is by far the driest and most water-scarce in the world, and that this is increasingly affecting the economic and social development of most countries in the region. MENA has 5 percent of the world's population with less than 1 percent of the available freshwater resources.

Today, average per capita water availability in the region is about 1,200 cubic metres per year, while the world's average is close to 7,000.

The annual water availability in the region ranges from a high of about 1,800 cubic metres per person in Iran to less than 200 cubic metres per person in Jordan, the West Bank/Gaza and Yemen. By 2025, regional average water availability is projected to be just over 500 cubic meters per person per year.

While conventional water availability remains relatively constant, the demand is increasing sharply as a result of population growth, increases in household income and irrigation development. Population growth and rapid development are constantly placing increasing demands on the limited water resources.

It is estimated that the need for water supply in the region will increase from 170 billion cubic metres in 2000 to 228 billion cubic metres in 2025.

Q: Why is the Middle East's problem particularly serious?

A: Ninety percent of the region is classified as arid and hyper-arid. The region has low average rainfalls, high summer temperatures and high evaporation and transpiration rates. The limited surface water has to be shared between different countries. Groundwater, the main source of water in many countries, is also being extracted well beyond its renewal rate in some areas.

In some cases, governments are tapping into fossil groundwater resources and, where feasible, have initiated sea water desalination projects. But worsening water quality further reduces the availability of freshwater suitable for domestic and agricultural use and increases the cost of treatment and reuse.

Increased water contamination due to inadequately treated wastewater is also affecting public health – particularly of children – in rural areas, where access to clean water and sanitation is still lacking in most countries of the region.

What's more, the water resource situation is becoming bleaker due to droughts occurring with greater frequency and of longer duration. Droughts have affected almost every country in the region over the past decade.

Q: What are the major problems resulting from water scarcity?

A: Unless improved water management plans are put in place, a series of water-related issues will interact to cause major environmental problems in the future.

These issues include an escalating demand for water; the deterioration of water quality; inefficient methods of wastewater treatment and solid waste disposal; and escalating conflicts over shared surface and groundwater resources if agreements are not reached on equitable allocation.

Q: Which countries in the region are worst affected and why?

A: Jordan and Yemen are the worst affected by water scarcity due to their limited water resources, limited rainfall and lack of finances.

While water resources in Jordan have fluctuated around a stationary average, the country's population has continued to rise. A high rate of natural population growth, combined with massive influxes of refugees, has transformed the comfortable balance between population and water in the first half of this century into a chronic and worsening imbalance in the second half.

The situation has been exacerbated by the fact that Jordan shares most of its surface water resources with neighbouring countries, whose control has partially deprived Jordan of its fair share of water.

The most serious problem in Yemen, meanwhile, is the rapid depletion of groundwater resources. Almost all the important groundwater systems in Yemen are being over-exploited at an alarming rate.

The socio-economic consequences are dramatic and will make groundwater too expensive for use in agriculture in the future. The agricultural economy based on groundwater irrigation is doomed to collapse if water resources are not adequately controlled.

Q: What current means are being employed to address the issue?

A: Several countries have embarked on reforming their water sector and some others have made a good start. Many countries, in partnership with donors and financial institutions, are taking steps in water sector reforms. A shift in thinking and action in water management is slowly taking place in the region.

Q: What methods would be more effective in improving the situation?

A: Despite the efforts being made, the complexity of the water and environmental issue calls for a stronger commitment, especially with regard to legislative frameworks, resources allocated to ensure environmental protection, coordination between policies and strategies and the availability of a comprehensive environmental database.

Water will continue to be a major challenge in the MENA countries. In order to remedy this, governments need to make additional efforts to ensure greater cooperation among their ministries and agencies.

The impending crisis requires a new strategy to alleviate the impact of development activities on freshwater resources and to identify a means of reconciling competing demands for water.

Q: How big a factor is pollution in the shortage of water in the region?

A: The main challenge for the sustainability of water resources is the control of water pollution. Pollution of ground water with heavy metals, the loss of natural ecosystems, the depletion of ground water, pollution of water bodies, and the salinisation of soils are all factors contributing to water scarcity.

Q: What are the solutions to the problem of water pollution?

A: The treatment of industrial and domestic wastewater. Also, advocating organic farming and limiting the use of chemical fertilizers and pesticides to reduce crop, soil and water pollution.

Q: How committed are the region's governments to finding a permanent solution?

A: Generally, all governments in the region are committed to water reforms. However, the level of commitment from one country to another varies depending upon available solutions and finance.

4. References - Related links

The following section outlining links and references is divided into several categories.

- International Organization working on water issues
- National Organizations
- United Nations Organizations working on water related issues
- Non-governmental Organization working on water related issues
- Declaration's Covenants and Goals concerning water
- Reports/Publications concerning water
- Summit and Meetings covering water related issues
- News
- Campaigns

International Organisation working on water issues

World Commission on Dams

The WCD was an independent, international, multi-stakeholder process which addressed the controversial issues associated with large dams.

<http://www.dams.org/>



International Rivers Network

International Rivers Network protects rivers and defends the rights of communities that depend on them. IRN opposes destructive dams and the development model they advance, and encourages better ways of meeting people's needs for water, energy and protection from damaging floods.

<http://www.irn.org/>



Asian Development Bank

ADB adopted a strategy to guide its work with developing Asian nations. The strategy is designed to support ADB's overarching goal of poverty reduction through regional collective actions that foster economic growth.

<http://www.adb.org/>



International Development Studies Network

IDSNet was created to enable individuals and organizations to communicate, provide information services and enhance the delivery of International development educational programs in Canada and around the world.

<http://www.idsnet.org/>



Green Cross International

Green Cross International provides unbiased environmental analysis and expertise, information dissemination, education, objective evaluations for public debate, scientific studies, and social and medical support.

<http://www.greencrossinternational.net/>



Transboundary Freshwater Dispute Database

A project of the Oregon State University, Department of Geosciences in collaboration with the Northwest Alliance for Computational Science and Engineering [<http://www.nacse.org/>] to aid in the assessment of the process of water conflict prevention and resolution.

<http://www.transboundarywaters.orst.edu/>



Global Forum Policy

Monitors policy making at the United Nations, promotes accountability of global decisions, educates and mobilizes for global citizen participation, and advocates on vital issues of international peace and justice.

<http://www.globalpolicy.org/>



Water and Sanitation Program (WSP)

An international partnership to help the poor gain sustained access to improved water supply and sanitation services.

<http://www.wsp.org/>



The World Bank

The World Bank is a vital source of financial and technical assistance to developing countries around the world. Their mission is to alleviate global poverty and to improve standard of living.

<http://www.worldbank.org/>



Oxfam

Oxfam is a UK based organization. It is a development, relief, and campaigning organisation that works with others to find lasting solutions to poverty and suffering around the world.

<http://www.oxfam.org.uk/>



National Organisations

Nepal Electricity Authority

<http://www.nea.org.np/>

Netherlands Development Assistance

<http://www.onderzoekinformatie.nl/en/oi/nod/organisatie/ORG1234952/>



University of Sussex
<http://www.sussex.ac.uk/>

The Pacific Institute
<http://www.pacinst.org/>

United States Agency for International Development (USAID)
<http://www.usaid.gov/>



United Nations Organisations working on water related issues

United Nations Development Programme (UNDP)
<http://www.undp.org/>

United Nations Children's Fund (UNICEF)
<http://www.unicef.org/>

United Nations Educational, Scientific and Cultural Organisation (UNESCO)
<http://www.unesco.org/>

United Nations Environment Programme
<http://www.unep.org>

Food and Agriculture Organisation of the United Nations
<http://www.fao.org/>

World Health Organization
<http://www.who.int/>

UN-Water
<http://www.unwater.org/flashindex.html>



Non-governmental Organisation working on water related issues

Women's Environment and Development Organisation (WEDO)

WEDO is an international organization that advocates for women's equality in global policy. It seeks to empower women as decision makers to achieve economic, social and gender justice, a healthy, peaceful planet and human rights for all.
<http://www.wedo.org/>



Gender and Water Alliance (GWA)

The mission of GWA is to promote women's and men's equitable access to and management of safe and adequate water, for domestic supply, sanitation, food security and environmental sustainability. GWA believes that equitable access to and control over water is a basic right for all, as well as a critical factor in promoting poverty eradication and sustainability.
<http://www.genderandwater.org/>



Kenya Water For Health Organisation (KWAHO)

Kenya Water for Health Organisation (KWAHO) is a national non-governmental organisation based in Kenya. Its efforts are geared towards providing sustainable water and sanitation for the disadvantaged communities in Kenya.
<http://www.kwaho.org/>



African Medical and Research Foundation (AMREF)

AMREF's mission is to improve the health of disadvantaged people in Africa as a means for them to escape poverty and improve the quality of their lives.
<http://www.amref.org/>



The Water Page

The Water Page is an independent initiative dedicated to the promotion of sustainable water resources management and use. A particular emphasis is placed on the development, utilization and protection of water in Africa and other developing regions.
<http://www.africanwater.org/index.htm>

Water Aid

WaterAid is an international NGO dedicated exclusively to the provision of safe domestic water, sanitation and hygiene education to the world's poorest people.
<http://www.wateraid.org/international/default.asp>

Declaration's Covenants and Goals concerning water

Universal Declaration of Human Rights
<http://www.unhchr.ch/udhr/lang/eng.htm>

International Covenant on Economic, Social and Cultural Rights
http://www.unhchr.ch/html/menu3/b/a_cescr.htm

Rio Declaration on Environment and Development
<http://www.unep.org/Documents/Default.asp?DocumentID=78&ArticleID=1163>

Millennium Development Goals
<http://www.un.org/millenniumgoals/>

Water For Life Decade
<http://www.un.org/waterforlifedecade/>

World Water Forum
<http://www.worldwaterforum4.org.mx/home/home.asp>

Reports/Publications concerning water

Rogues No more? Water Kiosk operators Achieve Credibility in Kibera, Water and Sanitation Program, June 2005
<http://www.wsp.org/publications/Rogues%20No%20More-Water%20Kiosk%20Operators%20Achieve%20Credibility%20in%20Kibera.pdf>

Untapped connections Gender, Water and Poverty: Key issues, government commitments and actions for sustainable development, Women's environment and development organization, 2003,
http://www.wedo.org/files/untapped_eng.htm

Water – A Shared Responsibility – The United Nations World Water Development Report 2, 2006
<http://unesdoc.unesco.org/images/0014/001431/143120E.pdf>

Dams and Development – A new framework for decision making – the report of the World Commission on Dams, 2000
<http://www.dams.org/report/>

Meeting Safe Drinking Water and Sanitation Target, WHO/UNICEF Joint Monitoring Programme Report 2004
http://www.who.int/water_sanitation_health/monitoring/jmp2004/en/

UN-Water thematic Initiatives, Coping With Water Scarcity, August 2006
<ftp://ftp.fao.org/agl/aglw/docs/waterscarcity.pdf>

UN-Water Policy Brief, Water Hazard Risks
 WHO report on Asia Water Watch 2005: Setting the Scene: Water, Poverty and the MDGs
http://www.who.int/water_sanitation_health/publications/aww1.pdf

UNICEF publications on water, sanitation and hygiene
http://www.unicef.org/wes/index_documents.html

WHO, 2004: "Sanitation challenge: Turning commitment into reality"
http://www.who.int/water_sanitation_health/hygiene/envsan/sanitchallenge/en/

WEHAB (water, energy, health, agriculture and biodiversity), 2002: A Framework for Action on Water and Sanitation
http://www.johannesburgsummit.org/html/documents/summit_docs/wehabpapers/wehab%20water%20sanitation.pdf

UN-Water Policy Brief: "Water Hazard Risks"
http://www.un.org/waterforlifedecade/pdf/un_water_policy_brief_1_disaster.pdf

Managing Risks: Securing the Gains of Development, Chapter 10 in the World Water Development Report 2
http://www.unesco.org/water/wwap/wwdr2/table_contents.shtml

Global Water Quality Data and Statistics (GEMStat)
<http://www.gemstat.org/>

Water Without Borders - a backgrounder on trans-boundary water issues
<http://www.un.org/waterforlifedecade/pdf/waterborders.pdf>

Conflict Resolution Support System, A Software for the Resolution of Conflicts in Water Resource Management, UNESCO International Hydrological Programme (IHP), World Water Assessment Programme (WWAP), From Potential Conflict to Co-operation Potential
<http://www.unesco.org/water/wwap/pccp/phase2/crss.shtml>

Gender and IWRM Resource Guide
<http://www.genderandwater.org/page/2414>

Interagency Task Force on Gender and Water April 2005 report: Gender and Water Perspective
http://www.un.org/esa/sustdev/csd/csd13/documents/bgground_2.pdf

Summit and meetings covering water related issues

World Water Forum
<http://www.worldwaterforum4.org.mx/home/home.asp>

World Summit on Sustainable Development
<http://www.un.org/events/wssd/>

UN Conference on Environment and Development
<http://www.unep.org/Documents.multilingual/Default.asp?DocumentID=78&ArticleID=1163>

International Conference on Sustainable Development and Water
<http://www.iisd.ca/sd/frh2o.html>

World Bank Seminar Series: The Global Water Challenge
<http://siteresources.worldbank.org/EXTABOUTUS/Resources/WaterPaper.pdf>

News

All Africa Global Media

All Africa Global Media is a multi-media content service provider, systems technology developer and the largest electronic distributor of African news and information worldwide
<http://allafrica.com/>

BBC News In depth: Water running dry?

<http://news.bbc.co.uk/2/hi/science/nature/3747724.stm>

Campaigns

The Global Water Challenge

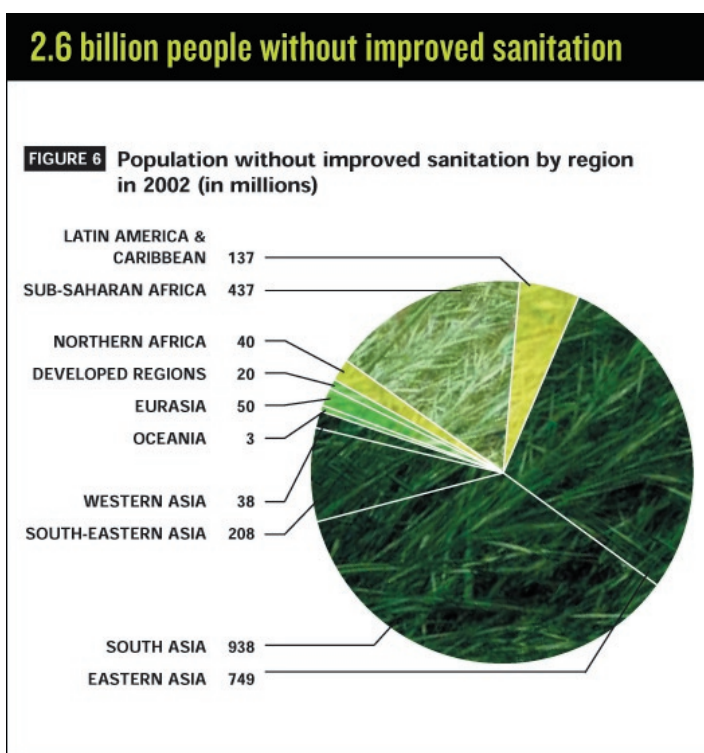
The Global Water Challenge (GWC) is a campaign to save lives and reduce suffering in the developing world by providing safe drinking water, sanitation and hygiene education.
<http://www.globalwaterchallenge.org/>

Green Cross International: Global campaign for the Right to Water.

<http://www.greencrossinternational.net/index.ht>

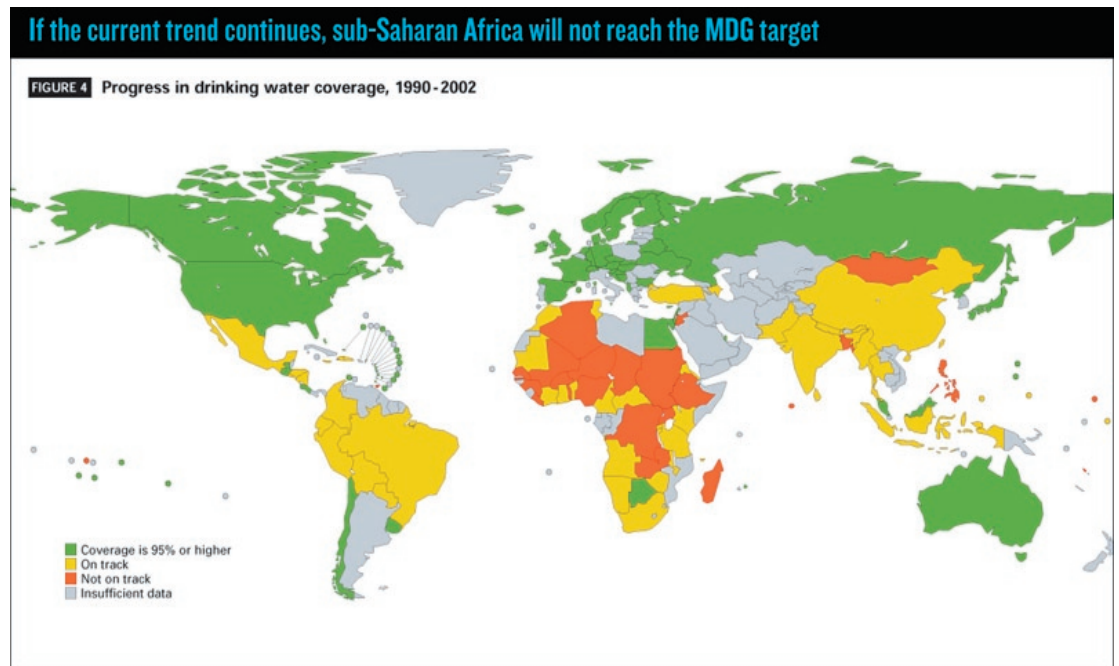
5. Illustrations

World population without improved sanitation



Credit: WHO/UNICEF

Progress in drinking water coverage



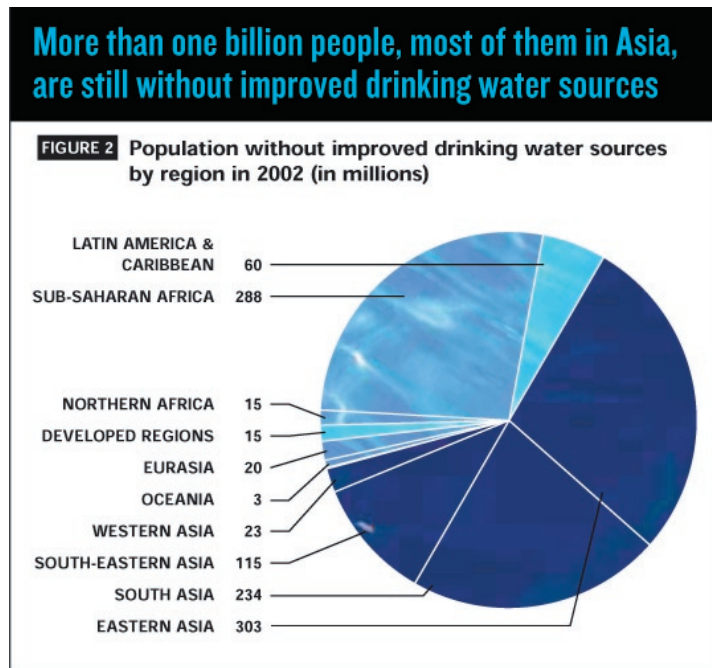
Credit: WHO/UNICEF

Sanitation coverage around the globe



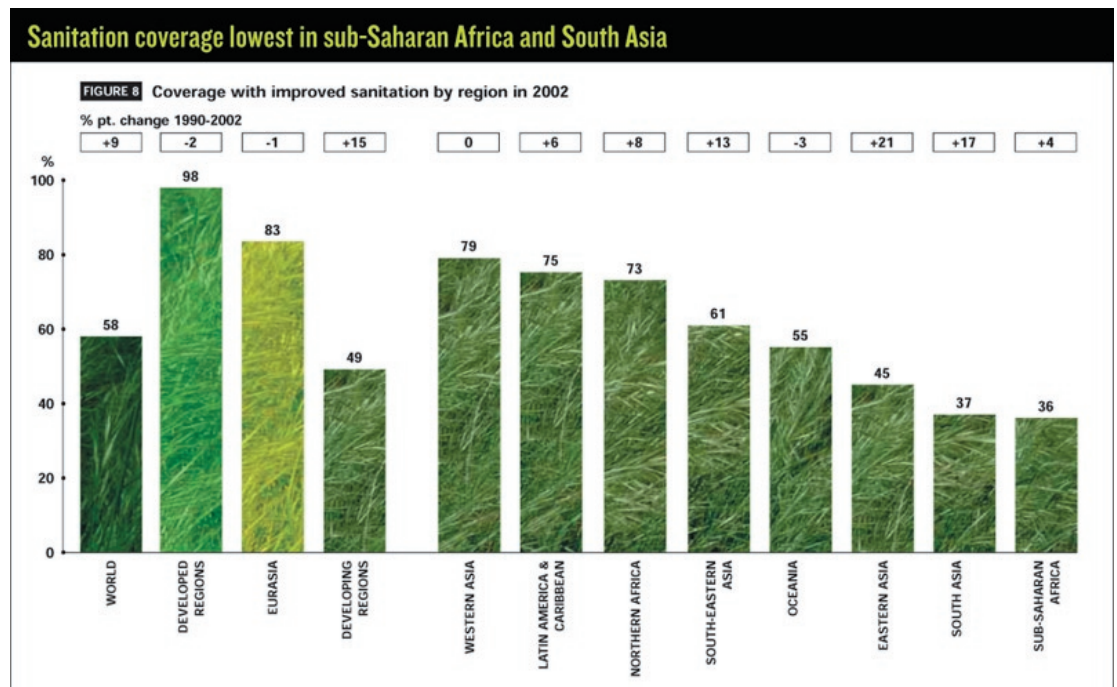
Credit: WHO/UNICEF

Population without improved drinking water sources by regions



Credit: WHO/UNICEF

Improved sanitation coverage by regions



Credit: WHO/UNICEF

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