WATER AND THE LEAST DEVELOPED COUNTRIES (LDCS)

REPORT PREPARED FOR THE UNITED NATIONS OFFICE OF THE HIGH REPRESENTATIVE FOR THE LDCS, LLDCS AND SIDS

BY

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Summary

The LDCs are a group of 49 countries considered to be the world's poorest as they have a per capita Gross Domestic Product (GDP) under US$900 and they have very low levels of capital, human and technological development. These 49 countries have a combined population of 614 million, which is equivalent to just over 10% of the world's population, but their share of the world's GDP is less than 1%. During the 1980s the real GDP per capita growth rates of the developing countries was only double that of the LDCs. In the 1990s, the real GDP per capita in the LDCs grew at only 0.9% per year, but if Bangladesh is excluded, this figure becomes only 0.4% per year. For the other developing countries the real GDP per capita growth rate was 3.6% per year during this period (four times higher than that of the LDCs). This indicates that the gap in average per capita income between the LDCs and the other developing countries is growing.

The Government of Benin organized the Ministerial Conference of the Least Developed Countries in Benin in August 2002 where the progress in the implementation of the Brussels Plan Of Action(POA) by LDCs and their development partners was reviewed. In the outcome document "Cotonou Declaration", the Ministers called on LDCs and their development partners to effectively implement their commitments made in the Brussels POA. Article 22 of the Cotonou Declaration states that the Ministers 'welcome the proposals of the UN Secretary General that WSSD should make progress in five key areas: water, energy, health agriculture and biodiversity'.

The distribution of both surface and groundwater resources amongst the LDCs is uneven. For example in Africa, the Democratic Republic of Congo is the wettest country with average annual internal renewable water resources of 935km^3 and the region's driest country is Mauritania, where the annual average is 0.4km^3.

Dams and engineering works have strongly or moderately fragmented 60% of the world's large river systems. River modification has affected the natural flow of rivers to a point where many, such as the Ganges, Nile and Amu Darya rivers, which flow through LDCs, no longer reach the ocean during the dry season. Water quantity is further reduced by the fact that people now withdraw annually about half of the water readily available for use from rivers. This is projected to increase to more than 70% of

runoff by 2025. Water also takes longer to reach the sea due to the impact of engineering works. The average age of river water worldwide has tripled to well over one month, particularly in basins such as the Nile and the Volta Rivers basins in Africa.

Deteriorating water quality and dams or engineering works cause loss of habitats and environmental degradation. This affects inland fisheries, which are a major source of protein and other nutrients for a large proportion of the world's population. For example, the population of Cambodia gets roughly 60% of its total animal protein from the fishery resources of Tonle Sap, a large freshwater lake, and the freshwater catch in Malawi provides about 70% - 75% of animal protein for both urban and rural low-income families.

Poor water supply and sanitation lead to high rates of water-related diseases such as cholera, diarrhoea and dysentery. Most rivers in Nepal's urban areas have been polluted and their waters are now unfit for human use, while drinking water in Kathmandu is contaminated with coliform bacteria, iron, ammonia and other contaminants. About two billion people, approximately one third of the world's population, depend on groundwater supplies, but issues of groundwater use and quality have received less attention, particularly in developing countries. For example in Bangladesh, 73% of total water withdrawal comes from groundwater. In the Pacific Islands, use of polluted groundwater for drinking and cooking had lead to health problems such as diarrhoea, hepatitis, and occasional outbreaks of typhoid and cholera.

Even after the United Nations 'Water Decade' (1981 to 1990), and Safe Water 2000, more than one billion people in the LDCs lack access to safe, clean water, and three billion to adequate sanitation. The conferences in Dublin (Water and Environment) and Rio (Environment and Development) in 1992 explicitly linked these issues to environmental concerns, and the 1997 White Paper of the Department for International Development (DFID) further linked water and sanitation to the goal of poverty elimination. LDCs on average use per capita about 1%-2% of the water used in Canada, but despite this, they still face formidable obstacles with regards to water, and globalisation appears to be deepening their vulnerability. These challenges could be met through effective national and international policies anchored firmly in long-term development strategies aimed at the implementation of the Brussels POA.

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Background of the Least Developed Countries

The LDCs are a group of 49 countries considered to be the world's poorest as they have a per capita Gross Domestic Product (GDP) under US$900 and they have very low levels of capital, human and technological development. These 49 countries have a combined population of 614 million, which is equivalent to just over 10% of the world's population, but their share of the world's GDP is less than 1%. During the 1980s the real GDP per capita growth rates of the developing countries was only double that of the LDCs. In the 1990s, the real GDP per capita in the LDCs grew at only 0.9% per year, but if Bangladesh is excluded, this figure becomes only 0.4% per year. For the other developing countries the real GDP per capita growth rate was 3.6% per year during this period (four times higher than that of the LDCs). This indicates that the gap in average per capita income between the LDCs and the other developing countries is growing.

In 1981, the first UN Conference on the LDCs was held in Paris by the UN General Assembly. At this conference the Substantial New Programme of Action (SNPA) for the 1980s for the LDCs was adopted. This contained guidelines for domestic action by LDCs that were to be complemented by international support measures. However, despite the many reforms preformed by the LDCs to carry out a structural transformation of their domestic economies, their economic situation did not improve during the 1980s. For this reason a second UN Conference on the LDCs was held in 1990 in Paris. This conference formulated national and international policies and measures to help accelerate LDC development processes for the 1990s. The outcome of the conference was the Paris Declaration and the Programme of Action for the LDCs for the 1990s. A mid-term review of the implementation of this programme showed that the LDCs continued to be marginalized, and so in 1997 the UN General Assembly decided to convene a third UN Conference on the LDCs in 2001 in Brussels. The Brussels Declaration and the Programme of Action (POA) for the Least Developed Countries for the Decade 2001-2010, was adopted at this conference (box 1).

Box 1: The Brussels Programme of Action

The Brussels POA is articulated through a set of seven specific commitments made by the LDCs and their development partners. These commitments relate to the following areas:

1. Fostering a people-centred policy framework;
2. Good governance at national and international levels;
3. Building human and institutional capacities;
4. Building productive capacities to make globalisation work for the LDCs;
5. Enhancing the role of trade in development;
6. Reducing vulnerability and protecting the environment; and
7. Mobilizing financial resources.

Source: http://www.un.org/special-rep/ohrlls/ldc/default.htm

In its capacity as Chairperson of the LDC Group, the Government of Benin organized the Ministerial Conference of the Least Developed Countries in Benin (5-7 August 2002). The purpose of the meeting was to review the progress in the implementation of the Brussels POA by LDCs and their development partners. In the outcome document "Cotonou Declaration", the Ministers called on LDCs and their development partners to effectively implement their commitments made in the Brussels POA. Article 22 of the Cotonou Declaration states that the Ministers 'welcome the proposals of the UN Secretary General that WSSD should make progress in five key areas: water, energy, health agriculture and biodiversity'.

Water and the Least Developed Countries

The distribution of both surface and groundwater resources amongst the LDCs is uneven (table 1). For example in Africa, the Democratic Republic of Congo is the wettest country with average annual internal renewable water resources of 935km^3 and the region's driest country is Mauritania, where the annual average is 0.4km^3.

Table 1: Water Resources in LDCs

Country	Average precipitation (1961-90) (mm/year)	Agricultural water use (%)	Domestic water use (%)	Industrial water use (km^3/year)	Total water use (km^3/year)
Afghanistan	327	98	2	0	23.26
Angola	1010	61	22	16	0.34
Bangladesh	2666	96	3	1	79.39
Benin	1039	74	15	11	0.25
Bhutan	1667	95	4	1	0.42
Burkina Faso	748	88	11	0	0.78
Burundi	1218	82	17	1	0.23
Cambodia	1904	98	2	1	4.09
Cape Verde	423	83	15	3	0.03
Central African Republic	1343	4	77	19	0.02
Chad	322	80	19	1	0.23
Comoros	1754	-	-	-	-
Democratic Republic of the	1543	31	52	16	0.36

Congo					
Djibouti	221	89	11	0	0.01
Equatorial Guinea	2156	1	83	16	0.11
Eritrea	384	95	4	1	0.30
Ethiopia	848	93	1	6	2.65
Gambia	836	67	22	11	0.03
Guinea	1651	90	8	2	1.52
Guinea-Bissau	1577	91	9	1	0.11
Haiti	1440	94	5	1	0.98
Kiribati	-	-	-	-	-
Laos	1834	90	4	6	2.99
Lesotho	788	19	40	41	0.05
Liberia	2391	56	28	15	0.11
Madagascar	1513	96	3	2	14.97
Malawi	1181	81	15	5	1.01
Maldives	1972	-	-	-	-
Mali	282	99	1	0	6.93
Mauritania	92	88	9	3	1.70
Mozambique	1032	87	11	2	0.64
Myanmar	2091	98	1	1	33.22
Nepal	1321	96	3	1	10.18
Niger	151	95	4	1	2.19
Rwanda	1212	39	48	14	0.08
Samoa	2992	-	-	-	-
Sao Tome and Principe	2169	-	-	-	-
Senegal	687	90	6	4	1.59
Sierra Leone	2526	93	5	2	0.38
Solomon Islands	3028	-	-	-	-
Somalia	282	100	0	0	3.30
Sudan	417	97	3	1	37.31
Togo	1168	47	45	8	0.17
Tuvalu	-	-	-	-	-
Uganda	1180	39	45	15	0.30
United Republic of Tanzania	1071	93	6	1	2.00
Vanuatu	-	-	-	-	-
Yemen	167	95	4	1	6.63
Zambia	1020	76	16	8	1.74

Source: http://www.fao.org/ag/agl/aglw/aquastat/dbase/index2.jsp

Several LDCs suffer water scarcity or stress, and many coastal cities such as Dhaka, Bangladesh, suffer from saline intrusion and ground subsidence due to excessive demand for groundwater (UNEP 2002). In Dakar, Senegal, water supplies have had to be drawn from ever more distant sources because groundwater supplies are fully used (and polluted) and local aquifers are over-pumped resulting in saltwater intrusion. A substantial proportion of Dakar's water is now brought in from the Lac de Guiers, 200km away (UN-HABITAT 2003). Many experts predict that the lack of clean water is likely to be one of the key factors limiting economic growth in the 21st century. World Resources (2000) states that as of 1995, more than 40% of the world's

population lived in conditions of water stress (less than 1,700 m^3 of water available/person/year) or water scarcity (less than 1,000 m^3 of water available/person/year). It adds that this percentage will increase to almost half the world's population by 2025. However, other experts state that effective management of available water resources is more important than the absolute quantities of water available (UN-HABITAT 2003), and table 3 illustrates that drier countries have greater percentage water use efficiency than wet ones.

The seasonal availability of water also varies amongst LDCs. For example, Bangladesh has one of the highest annual precipitation levels, but suffers water shortages for several months each year until the monsoon season arrives. During this season, the threat of floods and cyclones becomes very real, particularly in coastal areas. Rural people have adopted coping and adaptation strategies to mitigate the effects of such natural disasters, but they still disrupt livelihoods and in extreme cases, destroy many thousands of lives. Floods in 1987 and 1988 and the cyclone in 1991 provided the impetus needed for the construction embankments, cyclone shelters, water supply and a government-initiated disaster management and relief system. Recent major disasters, such as the floods of 1998, have demonstrated the effectiveness of this system in dealing with the immediate warning and relief process (WWAP 2001).

Lakes and River Water

Dams and engineering works have strongly or moderately fragmented 60% of the world's large river systems. River modification has affected the natural flow of rivers to a point where many, such as the Ganges, Nile and Amu Darya rivers, which flow through LDCs, no longer reach the ocean during the dry season. Water quantity is further reduced by the fact that people now withdraw annually about half of the water readily available for use from rivers (World Resources 2000). This is projected to increase to more than 70% of runoff by 2025 (Postel et al. 1996). Water also takes longer to reach the sea due to the impact of engineering works. The average age of river water worldwide has tripled to well over one month, particularly in basins such as the Nile and the Volta Rivers basins in Africa (World Resources 2000).

Water is shared widely among nations, regions, ethnic groups and communities, particularly river water. Disputes over shared water resources have a long history, but shared waters can also be a source of cooperation, as demonstrated by the increasing numbers of initiatives related to river basin management, many of which involve LDCs (box 1). In the 1990s new efforts were made to monitor water quality institute better policies and programmes for water management in whole river basins. For example, water quality monitoring programmes have been established for certain international river basins such as the Mekong (UNEP 2002). Box 3 further describes some of the successes and challenges of managing this international river basin.

Box 2: Integrated Water Resources Management Involving LDCs

The Nile Basin Initiative, launched in 1999, is a joint programme of action between 10 Nile countries, many of which are LDCs. In Southern Africa, the eight basin states of the Zambezi have been cooperating under the Zambezi River Systems Action Plan but efforts have been slow. Another example of regional cooperation is in the Lake Victoria area, where in 1995, a GEF-funded project was established to focus primarily on fisheries management, pollution control, control of invasive weeds, and catchment land use management. In Asia, the acclaimed Water Sharing Treaty between India and Bangladesh, the India-Bhutan cooperation on hydropower development, and India-Nepal cooperation in harnessing transboundary rivers are all examples of transboundary cooperation on water management.

Source: UNEP (2002); WWAP (2001)

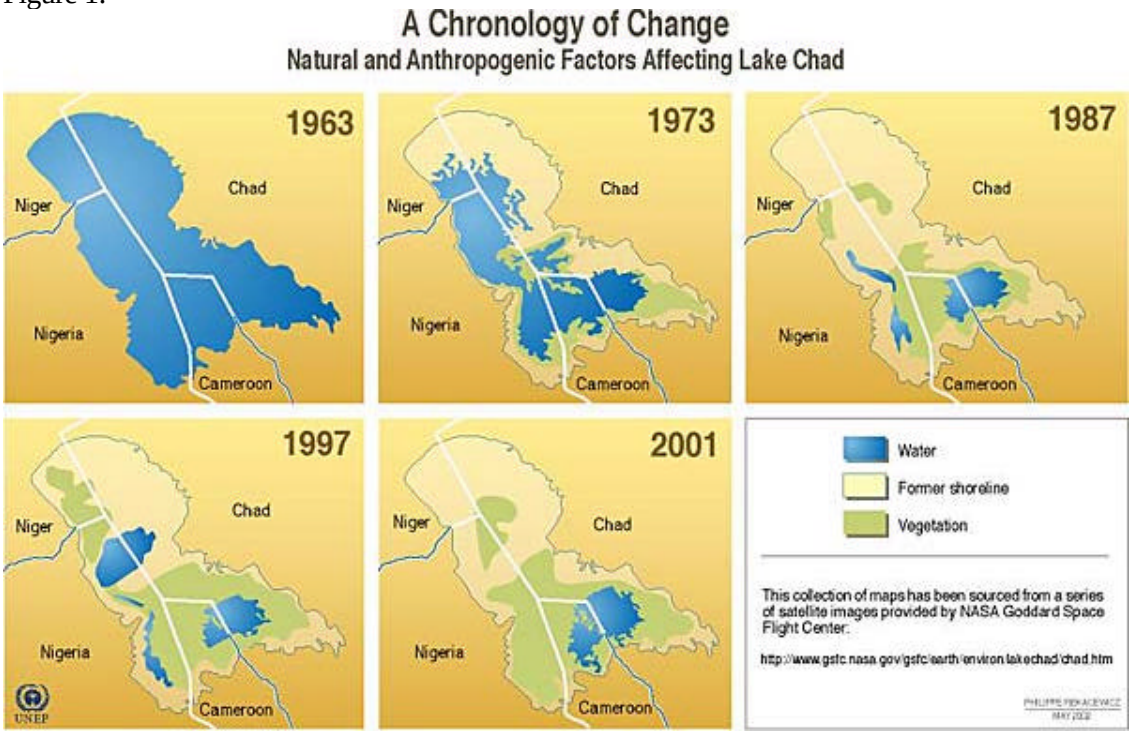
Box 3: Management of The Mekong River

The Mekong's 795,000km^2 watershed includes three LDCs, namely Cambodia, Lao People's Democratic Republic and Myanmar. These and other non-LDC governments are eager to promote economic development using the Mekong's water resources. The drive to dam and divert the Mekong threatens traditional uses of the river as a source of fish and a barrier to salt water penetration into the rich Mekong delta soils. Ideally, a new model of coordinated regional water management will preserve those benefits while sharing new ones. The Mekong River Commission (MRC) was established among the basin countries in 1957 to address potential conflict over hydropower development and provide a vehicle for joint management of the river and for the coordination of development strategies. In 1995, after almost four decades of political turmoil had hampered the Commission's effectiveness, the basin countries reaffirmed their interest in working together, and many signed the Agreement on Cooperation for the Sustainable Development of the Mekong River basin. However, China has much to gain from dam construction on the river and has retained observer status on the MRC. The MRC also lacks any real power to develop or enforce a unified vision of sustainable water use in the basin, and it remains to be seen whether a truly regional approach to Mekong management will evolve in time to influence the basin's environmental future. Scores of dams with massive hydroelectricity generating potential are under serious consideration in response to increase regional demands for electricity and a desire for foreign exchange from the international sale of hydropower. Such plans will affect the livelihoods of the 52 million people currently using river resources, many of whom live below the poverty line. Dam construction will prevent fish migration, and yet Mekong fish provide 40% - 60% of the animal protein consumed by the population of the lower basin. The nine proposed mainstream dam projects alone would also displace 60,000 rural people.

Source: World Resources 2000; MRC 1997; Abramovitz 1996

Lakes have also been under increasing pressure. For example Lake Chad has shrunk to nearly a 20th of its original size in 1963, in part due to high demands for agricultural water. Changes in the lake have contributed to local lack of water, crop failures, livestock deaths, collapsed fisheries, soil salinity, and increasing poverty throughout the region (figure 1).

Figure 1:



Source: http://www.unep.org/vitalwater/27.htm

Water quality is also important, and can be particularly problematic in developing regions. Pollution sources include untreated sewage, chemical discharges, petroleum leaks, dumping in old mines and pits, and agricultural chemicals seeping in from fields. In Eastern and Southern Africa, the widespread invasion of water hyacinth (*Eichornia crassipes*) is a further cause of deteriorating water quality. It blocks water channels and decaying mats of the weed cause eutrophication. More than half the world's rivers are 'seriously depleted and polluted, degrading and poisoning the surrounding ecosystems, threatening the health and livelihood of people who depend on them' (World Commission on Water 1999). For example the Brahmaputra has concentrations of 0.82mg/litre nitrates and 0.06mg/litre phosphates, and the Nile has concentrations of 0.80mg/litre nitrates and 0.03mg/litre phosphates (World Resources 2000). Mining also threatens the supply of clean water, particularly in mountainous areas in countries with lax mining laws, regulatory controls, or enforcement. Water drained or pumped directly from mines is often highly acidic and laden with cyanide and other heavy metals. Liquid wastes may be pumped directly into local waterways, or stored in ponds or behind earthen dams that are vulnerable to overflow or leaks (MMSD 2002).

Deteriorating water quality and dams or engineering works cause loss of habitats and environmental degradation. This affects inland fisheries, which are a major source of protein and other nutrients for a large proportion of the world's population. For example, the population of Cambodia gets roughly 60% of its total animal protein from the fishery resources of Tonle Sap, a large freshwater lake (MRC 1997), and the freshwater catch in Malawi provides about 70% - 75% of animal protein for both urban and rural low-income families (FAO 1996). In certain areas, such as the Mekong River basin in Asia, overfishing and destructive fishing practices also

contribute to declining inland fisheries. In other areas, the introduction of non-indigenous fish species has increased fish catches. For example, the introduction of Nile perch and Nile tilapia to Lake Victoria in the 1950s caused the extinction of nearly half the lake's endemic cichlid fish species. By 1983, Nile perch made up almost 70% of the catch, with Nile tilapia making up much of the balance. The increase in fish biomass caught in the lake benefited commercial fishers, but artisanal fishers who were unable to afford the gear required to catch Nile perch suffered many costs.

Water and Ecosystems

Dams, diversions, irrigation pumps, and other engineering works have profoundly altered the amount and location of freshwater available for both human uses and for sustaining aquatic ecosystems (World Resources 2000). Water development projects in the 20th century have eliminated marshes and wetlands, removed water for other uses, altered flows, and contaminated water with industrial and human waste. In many rivers and lakes, ecosystem functions have been lost or impaired. This affects human settlements as well as species distribution and biodiversity, because many poor communities in particular rely on wetlands for flood control, natural water purification, fish, shellfish, timber and fibre (UNEP 2002).

Box 4: The Wetlands Sector Strategic Plan in Uganda: a policy for ecosystem integrity

The Wetlands Sector Strategic Plan was launched in early 2001 to build on the experiences gained during 12 years of the National Wetlands Programme, a collaboration between the Government of Uganda and IUCN supported by the Netherlands. Wetlands cover 13% of Uganda, and many are of international biodiversity significance. The programme integrates wetlands management and poverty alleviation by funding local communities to develop sustainable management initiatives that improve their livelihoods and maintain the integrity of the wetlands. These are based on locally developed management plans that identify areas where all exploitation is prohibited and areas where specific types of management (such as cultivation, fishing, livestock and papyrus collection) are allowed. The experiences of successful local pilots convinced the sometimes sceptical authorities that local communities were interested in and capable of sustainable management within agreed boundaries. These pilots have formed the basis for 'scaling up' the approach to the national level and the integration of the principles of sustainable management into the national policy framework for these critical habitats. The Ugandan Constitution contains a clause stating that 'wetlands should be held on trust by the government for the benefit of all the people'. The introduction of the Wetlands Sector Strategic Plan shows that this constitutional aspiration can be turned into robust policy that includes effective means through which it can be implemented. The Uganda experience also demonstrates the importance of a sustained effort, supported over many years, both financially and technically, by external development partners.
Source: WWAP 2001

Forest cover helps maintain drinking water supplies, and deforestation is a useful indicator of watershed degradation because forests are often crucial for maintaining water quality and moderating water flow (table 2). The Congo region/watershed has

lost more than 1,000,000km^2 of its original forest cover, and the Ganges and the Mekong have lost between 500,000 and 1,000,000km^2 (World Resources 2000).

Table 2: Watersheds including LDCs Losing the Greatest Share of Original Forest Cover

Region and Watershed	Percentage of Original Forest Lost
Africa	
Lake Chad	100
Limpopo	99
Mangoky	97
Niger	96
Nile	91
Orange	100
Senegal	100
Volta	97
Asia and Oceana	
Amu Darya	99

Source: Revenga et al. (1998)

Despite their small area compared with other ecosystems, freshwater systems are relatively rich in the number of species they support. Although 12% of all animal species live in freshwater systems (Abramovitz 1996), many more depend on them for survival. Freshwater biodiversity is not uniformly distributed around the world; some regions are particularly important because they contain large numbers of species or many endemic species. Most of the highest concentrations of both endemism and species diversity are found in the tropics, particularly the Amazon, Congo, and Mekong watersheds (World Resources 2000).

Water and Agriculture

Globally, agriculture accounts for 70% of the water withdrawn from freshwater systems for human use (WMO 1997). This figure increases to 86% of all water used when considering Asia and the Pacific alone (UNEP 2002). Although only 17% of agroecosystems depend on irrigation, the share of irrigated areas increased by 72% from 1966 to 1996. Competition with other kinds of water use, especially for drinking water and industrial use, will be stiffest in developing countries, where populations and industries are growing fastest. Shifting water from freshwater systems to agroecosystems, increases crop production, but at significant cost to downstream ecosystems and users, both in terms of water quantity and quality. Only 30% - 60% of water is returned for downstream use, making irrigation the largest net user of freshwater globally. However, water returned to rivers typically carries with it pollution from agricultural nutrients or chemicals from leaching fertilizers, pesticides, and manure (World Resources 2000).

South and Southeast Asia support some of the most intensive agricultural production systems in the world, and soils are therefore amongst the most degraded. Globally, about 31% of agroecosystems are croplands and 69% are pasture, but croplands occupy 92% of agroecosystem areas in South Asia and 84% in Southeast Asia. In these regions, slopes are significantly steeper and more subject to erosion, and soils are more likely to be salinized, acidic, depleted of potassium, and saturated with

aluminium than soils in most other regions (World Resources 2000). For example, in Bangladesh, the area salinized by irrigation was estimated at 100,000 ha in 1991.

Table 3: Irrigation water use in certain LDCs

	Total renewable water resources (km^3)	Irrigation water needs (km^3)	% water use efficiency	Water withdrawal for agriculture (km^3)	Water withdrawal as % of renewable water resources
Afghanistan	65	8.78	38	22.84	35
Angola	184	0.04	30	0.14	0
Bangladesh	1211	17.55	25	70.20	6
Benin	25	0.06	30	0.19	1
Burkina Faso	13	0.21	30	0.69	5
Burundi	4	0.06	30	0.19	5
Cambodia	476	1.20	30	4.00	1
Chad	43	0.07	35	0.19	0
Democratic Republic of the Congo	1283	0.03	30	0.11	0
Eritrea	6	0.10	32	0.30	5
Ethiopia	110	0.56	25	2.19	2
Gambia	8	0.01	30	0.02	0
Guinea	226	0.41	30	1.36	1
Haiti	14	0.18	20	0.93	7
Lao	270	0.78	30	2.59	1
Madagascar	337	3.58	25	14.31	4
Malawi	17	0.20	25	0.81	5
Mali	100	2.06	30	6.87	7
Mauritania	11	0.44	29	1.50	13
Mozambique	216	0.22	39	0.55	0
Myanmar	1045	8.36	30	27.86	3
Nepal	210	2.45	25	9.82	5
Niger	34	0.62	30	2.08	6
Rwanda	5	0.01	30	0.02	0
Senegal	39	0.43	30	1.43	4
Sierra Leone	160	0.11	33	0.34	0
Somalia	14	0.98	30	3.28	24
Sudan	65	14.43	40	36.07	56
Tanzania	91	0.54	30	1.79	2
Togo	15	0.02	30	0.08	1
Uganda	66	0.03	30	0.12	0
Yemen	4	2.48	40	6.19	151
Zambia	105	0.26	30	0.85	1

Source: http://www.fao.org/ag/agl/aglw/aquastat/water_use/index.stm

Access to Safe Water and Sanitation

Poor water supply and sanitation lead to high rates of water-related diseases such as cholera, diarrhoea and dysentery. Most rivers in Nepal's urban areas have been

polluted and their waters are now unfit for human use, while drinking water in Kathmandu is contaminated with coliform bacteria, iron, ammonia and other contaminants (UNEP 2001). About two billion people, approximately one third of the world's population, depend on groundwater supplies, but issues of groundwater use and quality have received less attention, particularly in developing countries (UNEP 2002). For example in Bangladesh, 73% of total water withdrawal comes from groundwater. In the Pacific Islands, use of polluted groundwater for drinking and cooking had lead to health problems such as diarrhoea, hepatitis, and occasional outbreaks of typhoid and cholera.

In the mid-1990s, only 35.6% of people in Dhaka lived in a household with a tap, 6.7% of the population was served by public taps and there was an average of 500 people per public tap. Although many studies suggest that the proportion of urban residents benefiting from 'improved' water supplies and sanitation has increased in recent years (table 4), these figures fail to consider the social, temporal and spatial problems of obtaining adequate water supplies and sanitation (for example living within one kilometre from a tap is useless if the tap is used by 500 other people and only works at certain times). Studies drawn from individual cities show how the proportions of people with safe and sufficient provision are also much less than the figures in table 4 suggest. For example in 2002 there were an estimated 2.5 million people living in Dhaka's slums, and most had very inadequate water and sanitation provision. Seventy percent of Dhaka's population have no sewers and tens of thousands of children die each year because of water borne diseases and polluted water. Provision for sanitation remains so poor in some cities, that large proportions of the population resort to open defecation. For example, about 30% of residential dwellings in Addis Ababa use open fields for defecation, and in peri-urban and urban centres outside Addis Ababa, about 46% of families have no sanitary facilities. Fifty five percent of the population of Conakry, Guinea, is not connected to water mains, and Conotou, Benin, has no sewer system at all to serve its one millions inhabitants. In Kampala, Uganda, only affluent families are connected to sewers (which serve 9% of households) or septic tanks (10%), and in Khartoum, Sudan, the municipal sewage system serves only 5% of the urban area. In Ouagadougou, Burkina Faso, only 23% of households have water connections from the official water and sanitation agency, and most others depend on getting water from standpipe vendors or handcarts. Only 8% of the population are served by sewers. In Port-au-Prince, Haiti, only 10% of families have water connections in the home. Even where pit latrines are available, children younger than eight in Malawi, Nepal and Burkina Faso rarely use them because of the risk they may fall in (UN-HABITAT 2003).

Table 4: Proportion of the urban population in selected Asian and African LDCs with access to improved* water supply and sanitation.

Country	*Percentage of urban population with improved coverage for*	
	Water supply	*Sanitation*
Afghanistan	19	25
Angola	34	70
Bangladesh	99	82
Benin	74	46
Bhutan	86	65
Burkina Faso	84	88

Burundi	96	79
Cambodia	53	58
Central African Republic	80	43
Chad	31	81
Democratic Republic of the Congo	89	53
Eritrea	63	66
Ethiopia	77	58
Gambia	80	41
Guinea	72	94
Guinea-Bissau	29	88
Lesotho	98	93
Madagascar	85	70
Malawi	95	96
Maldives	100	100
Mali	74	93
Mauritania	34	44
Mozambique	86	69
Myanmar	88	65
Nepal	85	75
Niger	70	79
People's Democratic Republic of Laos	59	84
Rwanda	60	12
Senegal	92	94
Sierra Leone	23	23
Sudan	86	87
Togo	82	71
Uganda	80	96
United Republic of Tanzania	80	98
Yemen	85	87
Zambia	88	99

* In this study, the definition of improved water supply includes a household connection, public standpipe, borehole, protected dug well, protected spring or rainwater collection. The definition of improved sanitation includes connection to a public sewer or a septic system, pour-flush latrine, simple (or ventilated) pit latrine.
Source: WHO and UNICEF (2000)

In cities served by piped water, sanitation, drainage, waste removal and a good health care system, child mortality rates are generally around 10 per 1000 live births. However, in cities with inadequate provision it is common for child mortality rates to be 10 to 20 times higher than this. For example, urban child mortality rates per 1000 live births were 190 in Chad in 1996, 194 in Malawi in 1992, 172 in Mali in 1995, 169 in Mozambique in 1997, 174 in Zambia in 1996, and 135 in Haiti in 1994 (UN-HABITAT 2003).

Most of the world's urban dwellers live in smaller cities or urban centres, about which there is little documentation. However, studies suggest that access to safe water and sanitation services in smaller urban centres is often worse than in mega-cities. For example, a study of three secondary cities in Benin found that in two of them the vast majority of the population lacked running water and latrines, so most people defecated in the bush. Some argue that access to safe water and sanitation is even

more problematic in rural areas. For instance, in 2000, the number of rural dwellers lacking improved water and sanitation facilities was around five times that in urban areas. In Eritrea, 99% of the rural population have no sanitation coverage, and groundwater in some villages in Bangladesh is contaminated with arsenic levels as high as 70 times the national drinking water standard of 0.05mg/litre (UNEP 2002). However, comparisons between rural and urban water and sanitation provision often fail to recognise contextual differences, and the figures in table 2 could be three to four times too high, making the differential between rural and urban service provision less significant (UN-HABITAT 2003).

The economic costs of contamination of surface and groundwater resulting from poor water supply and sanitation can also be high. In Malawi, for example, the total cost associated with water degradation was estimated at US$2.1 million in 1994 (DREA Malawi 1994). Costs of poor water and sanitation provision are also borne locally. For example, inhabitants of Part-au-Prince, Haiti, spend 3.2% - 10.6% of their income on obtaining water, and water from vendors is 5.5 - 16.5 times more expensive than piped water (Johnstone and Wood 2001; Fass 1993). In Khartoum, Sudan, low-income groups in squatter settlements pay the most for water, which is also often bought from vendors (UN-HABITAT 2003).

Conclusions

Even after the United Nations 'Water Decade' (1981 to 1990), and Safe Water 2000, more than one billion people in the LDCs lack access to safe, clean water, and three billion to adequate sanitation. The conferences in Dublin (Water and Environment) and Rio (Environment and Development) in 1992 explicitly linked these issues to environmental concerns, and the 1997 White Paper of the Department for International Development (DFID) further linked water and sanitation to the goal of poverty elimination. LDCs on average use per capita about 1%-2% of the water used in Canada, but despite this, they still face formidable obstacles with regards to water, and globalisation appears to be deepening their vulnerability. These challenges could be met through effective national and international policies anchored firmly in long-term development strategies aimed at the implementation of the Brussels POA.

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