

TABLE 3 (continued)

Country and territory	1970	2000	2030
Kuwait	78	96	97
Lebanon	59	90	94
Libyan Arab Jamahiriya	45	88	92
Mauritania	14	58	80
Morocco	35	56	71
Oman	11	76	86
Palestine	54	67	77
Qatar	80	93	96
Saudi Arabia	49	86	93
Somalia	20	28	46
Sudan	16	36	58
Syrian Arab Republic	43	51	66
Tunisia	45	66	78
United Arab Emirates	57	87	93
Yemen	13	25	41
Arab region	38	53	65

Source: United Nations, DESA, *World Urbanization Prospects: The 2001 Revision* (New York, 2002), available at: <http://www.un.org/esa/population/publications/wup2001/>.

B. CRITICAL FRESHWATER RESOURCES

Access to safe water is a global concern. Freshwater sustains human health, food production and economic development. While certain innovations can maximize the use of available water, technological advances cannot change the rate at which water is renewed in the global water circulation system. Freshwater or salt-free water resources amount to a meagre 3 per cent of global water. Moreover, nearly 70 per cent of freshwater is locked in glaciers and icebergs and is not available for human use. The freshwater that is available comes from rain, rivers, lakes, springs and groundwater reserves, including aquifers.⁷ At a regional level, the available renewable freshwater is estimated at 474 cubic kilometres a year (km^3/y), and the per capita renewable freshwater in 2000 was 1,687 cubic metres a year (m^3/y) (see table 4).

⁷ Water below the water table contained in solid or fractured rock is known as groundwater; aquifers are geologic formations that store, transport and yield groundwater to wells. P.H. Gleick, *The World's Water 2000-2001: The Biennial Report on Freshwater Resources* (Island Press, 2000).

TABLE 4. ANNUAL RENEWABLE FRESHWATER AVAILABLE IN ARAB COUNTRIES IN 1970, 2000 AND 2030 (PROJECTED)

Country and territory	Total renewable freshwater (km ³ /y)	Per capita renewable freshwater (m ³ /y)		
		1970	2000	2030
Algeria	14.3	1 040	472	318
Bahrain	0.1	455	156	108
Comoros	1	3 623	1 416	687
Djibouti	0.3	1 935	475	349
Egypt	86.8	2 460	1 279	872
Iraq	96.4	10 304	4 201	2 237
Jordan	0.9	555	183	96
Kuwait	0.02	27	10	6
Lebanon	4.8	1 944	1 373	1 015
Libyan Arab Jamahiriya	0.6	302	113	71
Mauritania	11.4	9 337	4 278	1 891
Morocco	30.0	1 960	1 004	680
Oman	1.0	1 383	394	164
Palestine	..	..	..	..
Qatar	0.1	901	177	129
Saudi Arabia	2.4	418	118	54
Somalia	15.7	4 360	1 789	637
Sudan	154	10 674	4 953	2 929
Syrian Arab Republic	46.1	7 367	2 848	1 576
Tunisia	4.1	800	433	321
United Arab Emirates	0.2	897	77	56
Yemen	4.1	648	223	71
Arab region ^{a/}	474.32	3 796	1 687	951

Sources: United Nations, DESA, *World Population Prospects: The 2000 Revision (Highlights)* (New York, 2001); and P.H. Gleick et al., *The World's Water 2002-2003: The Biennial Report on Freshwater Resources* (Island Press, 2002).

Note: Two dots (..) indicate that data are not available.

^{a/} Excluding Palestine.

The rapid population growth has exacerbated water scarcity in the Arab region. While such natural factors as intermittent droughts and limited freshwater reserves cause scarcity, high population growth imposes additional pressures. Water experts define regions where per capita water supply drops below 1,700 m³/y as experiencing “water stress”, which is a situation in which disruptive water shortages can frequently occur. In regions where per capita water supplies drop below 1,000 m³/y, the consequences can be more severe and lead to problems with food production and economic development. Countries below this lower threshold are termed “water-scarce”. Table 4 illustrates that, with a per capita supply of 1,687 m³/y in 2000, the region was already water-stressed. Moreover, given the growing population, this

supply is projected to fall below the threshold of 1,000 m³/y by 2030, thereby shifting the region into the water-scarce bracket.

However, these regional averages mask the already severe water shortages in a number of countries. In 2000, there were four water-stressed countries in the region, namely, Comoros, Egypt, Lebanon and Morocco, and 12 water-scarce countries with per capita supplies of renewable freshwater below 500 m³/y, as follows: Algeria, Bahrain, Djibouti, Jordan, Kuwait, Libyan Arab Jamahiriya, Oman, Qatar, Saudi Arabia, Tunisia, United Arab Emirates and Yemen. Kuwait, which has negligible renewable freshwater of its own, is almost entirely dependent on such unconventional sources as desalination to meet its demand for water. Moreover, by 2030, the per capita supply in the Syrian Arab Republic is expected to drop below 1,700 m³/y due to the high population growth in that country. Consequently, only two Arab countries are projected to be above the water-stressed threshold in 2030, namely, Sudan and Iraq, which currently account for half of the renewable freshwater resources in the Arab region.

Moreover, water use is determined both by the quantity and quality of available freshwater and by the ability to collect and transport the water to users. Additionally, a significant amount of renewable freshwater in the Arab region is lost due to evaporation and other ecological factors before it can be collected for human use. Water withdrawal in the region is estimated to be close to 200 km³/y, or some 700 m³/y per person. If this per capita withdrawal rate persists, the region will be exploiting 70 per cent of its renewable freshwater resources by 2030, which represents an increase from 40 per cent in 2000.

Water experts have set a per capita benchmark of 50 litres per day (l/d) as a basic water requirement (BWR) for such domestic uses as drinking, cooking, sanitation services and bathing, and have urged the international community to recognize BWR as a standard against which to measure access to safe water. While national per capita averages can be more than 50 l/d, domestic water use can fall below this threshold. This is the case of Djibouti, Oman and Somalia, which, despite national per capita averages of 1,300 l/d, 1,078 l/d and 4,890 l/d, respectively, all have average per capita domestic water use of less than 50 l/d.⁸

1. *Health*

The quality of water is an important aspect of water security, particularly for the poor. According to the World Health Organization (WHO), an estimated 3.4 million people in the world die each year due to inadequate water and sanitation and “over 40 per cent of this burden falls on children under five years of age, even though they

⁸ P.H. Gleick et al., *The World's Water 2002-2003: The Biennial Report on Freshwater Resources* (Island Press, 2002).

make up only about 10 per cent of the world's population".⁹ While water-related diseases have largely been eliminated as serious health problems in developed countries, they remain a major concern in most developing countries. Water-related diseases come in a variety of forms. In some instances, water can be the agent of transmission, carrying bacteria, parasites and viruses that cause diarrhoea. Other diseases come from hosts that either live in water or require water for part of their lifecycle. These diseases are transmitted to humans when the water is ingested or comes into contact with the skin. The main examples are schistosomiasis, equally known as bilharzia, and dracunculiasis, commonly known as guinea worm.

While Arab Governments have largely succeeded in eliminating or reducing the incidence of water-related diseases, there are pockets throughout the region where people are still suffering from these diseases. In addition to malaria, which is a water-related disease that is prevalent in the Arab region, approximately 55,000 cases of guinea worm were reported in Sudan in 2000, and a further 8,000 cases in Nigeria.¹⁰

2. Poverty

The links between poverty, water and population are complex and multifaceted. The relationship is particularly profound in the agricultural sector where the livelihood of subsistence farmers depends on the quantity of water available to them. When these quantities are insufficient to grow food and feed animals, these farmers are often forced to leave their rural settings to migrate to the cities where they join the urban poor. Poverty and a sense of helplessness among the rural communities are compounded by droughts in the Arab region.

Furthermore, both the rural and urban poor generally lack access to adequate and safe water. This is largely attributed to a failure by Governments to adopt and implement appropriate policies and strategies with regard to water shortages and distribution. Within the context of the latter, the poor tend to lack water and food because they do not have options for acquiring their share of the scarce resources. Consequently, water insecurity is "not only due to poor water endowment but more importantly to the inability of the agricultural sector, national administrations and institutions to adapt to the resource scarcity and take measures to find alternatives".¹¹

⁹ Environment News Service (ENS), "Water for health declared a human right" (ENS, 4 December 2002). Available at: <http://ens-news.com/ens/dec2002/2002-12-04-01.asp>.

¹⁰ P.H. Gleick et al., *The World's Water 2002-2003: The Biennial Report on Freshwater Resources* (Island Press, 2002).

¹¹ Consultative Group on International Agricultural Research (CGIAR), "Trade as a means to food and water security", which was presented at the Dialogue on Water, Food and Environment organized by the International Water Management Institute (IWMI) (Colombo, 13-16 December 2000).

Access to safe water is key to eliminating a host of preventable diseases and advancing socio-economic development. It represents a component of the commitment by Governments to follow up on the outcomes of the World Summit on Sustainable Development (WSSD) (Johannesburg, South Africa, 2-11 September 2002), which calls on the number of people without access to adequate and safe water to be halved by 2015.

Moreover, in an unprecedented move, the United Nations Committee on Economic, Social and Cultural Rights (CESCR) declared water a basic human right that is “indispensable for leading a healthy life in human dignity”.¹² By this declaration, water becomes an intrinsic human right on par with such social equities as rights to adequate food and nutrition, shelter and education. Recognizing the variation in water use among different cultures, CESCR defined the adequate amount of safe water as that necessary to prevent death from dehydration, reduce the risk of water-related disease, and provide for consumption, cooking, and personal and domestic hygienic requirements.¹³ The move was welcomed by the international development community, which saw the declaration as a major boost to efforts aimed at reducing the number of people without access to adequate and safe water. Furthermore, within the framework of this new definition of water, civil societies are entitled to hold Governments accountable for equitable access to water, particularly for the poor.

C. THE ROLE OF POPULATION IN THE DEMAND FOR FRESHWATER

It is necessary to understand the demographic trends of the region in order to plan and manage water resources that meet the demand for freshwater. Population growth usually increases demand for water in all sectors of the economy, including agricultural, industrial and domestic. In the Arab region, agriculture accounts for the overwhelming majority of water use at 89 per cent of total water supply, while the remaining 11 per cent is divided between industrial and domestic sectors, see table 5.

Between 1965 and 1997, the total amount of land under irrigation in the region nearly doubled, which is partly due to the increase in demand for food to meet the demand of growing populations.¹⁴ Equally, these growing populations have expanded the demand for water in industrial and service sectors. Industry requires water for manufacturing and cooling, in addition to removing wastes generated by these processes. While demand for water in all sectors has increased rapidly in the region, it

¹² See General Comment No. 15 (2002), twenty-ninth session of the United Nations Committee on Economic, Cultural and Social Rights (Geneva, 11-29 November 2002).

¹³ ENS, “Water for health declared a human right” (ENS, 4 December 2002). Available at: <http://ens-news.com/ens/dec2002/2002-12-04-01.asp>.

¹⁴ P.H. Gleick, *The World's Water 2000-2001: The Biennial Report on Freshwater Resources* (Island Press, 2000).

has risen most rapidly in the domestic sector.¹⁵ The domestic share of water is already much higher than the industrial share in some Arab countries, and constitutes 25 per cent or more of total water use in five countries, namely, Algeria, Bahrain, Comoros, Kuwait and Lebanon.

TABLE 5. FRESHWATER USE BY SECTOR IN ARAB COUNTRIES
(Percentages)

Country and territory	Agricultural	Industrial	Domestic
Algeria (1990)	60	15	25
Bahrain (1991)	56	4	39
Comoros (1987)	47	5	48
Djibouti (1985)	87	0	13
Egypt (1993)	86	8	6
Iraq (1990)	92	5	3
Jordan (1993)	75	3	22
Kuwait (1994)	60	2	37
Lebanon (1994)	68	4	28
Libyan Arab Jamahiriya (1994)	87	2	11
Mauritania (1985)	92	2	6
Morocco (1991)	92	3	5
Oman (1991)	94	2	5
Palestine	..	..	..
Qatar (1994)	74	3	23
Saudi Arabia (1992)	90	1	9
Somalia (1987)	97	0	3
Sudan (1995)	94	1	4
Syrian Arab Republic (1993)	94	2	4
Tunisia (1990)	89	3	9
United Arab Emirates (1995)	67	9	24
Yemen (1990)	92	1	7
Arab region ^{a/}	89	5	6

Source: P.H. Gleick et al., *The World's Water 2002-2003: The Biennial Report on Freshwater Resources* (Island Press, 2002).

Note: Two dots (..) indicate that data are not available.

^{a/} Excluding Palestine.

Additionally, increasing standards of living and consumerism result in greater demand for water in other sectors. Rising income, for example, generally leads to an

¹⁵ D. Koehn, "Water in the Middle East and North Africa", which was presented at the 6th Annual Conference cosponsored by the Middle East Institute (MEI) and the World Bank (Washington D.C., 15 May 2001).

increase in meat consumption, which in turn requires substantial additional inputs of water for grains and crops that feed livestock. In some cases, domestic food production cannot meet the demand of growing populations, and Arab Governments are therefore compelled to rely increasingly on imported food.

Modern appliances used in the region have generally been developed in countries where water efficiency is not a high priority. Consequently, appliances are often inefficient in their use of water. An analogous situation arises with regard to human consumers. Expatriates, who come from countries that are not water-stressed, are typically unaware of the water issues in their host countries, particularly the Gulf States. There is therefore a need to build awareness of the profligate uses of water among expatriate populations.

While technological innovations can increase the supply and delivery of available freshwater, human activities often pollute existing sources of water, thereby rendering them unusable or expensive to treat and reuse. Deteriorating water quality in many Arab countries is an increasingly serious problem, and such activities as clearing land, disposing of municipal and industrial wastes, and using fertilizers and pesticides that leachate into groundwater, disrupt the water cycle. Continuing population growth compounds these problems.

Moreover, rapid urbanization and modernization in the region raise the demand for water even faster than the overall population growth. Urban dwellers tend to adopt a more modern lifestyle whereby more water is consumed for domestic use than do rural dwellers or those who in some respects keep to a more traditional way of life.¹⁶ Domestic use of water is affected by the following factors: (a) the distance between the household and the source of water; (b) the frequency of water use; (c) the size of the household; and (d) the consumption pattern.

While a greater population density in urban areas enables communities to invest in more efficient and cost-effective water management systems, rapid urbanization can hinder the development of adequate water management and sewage systems. In Cairo, the water distribution system, which was constructed in the late nineteenth century, is outdated and currently unable to serve all its citizens. Despite substantial investments by the Government of Egypt aimed at improving the water supply systems, some residents of greater Cairo still live in dwellings with no piped water. This is partly attributed to rapid urbanization. Cairo, which is the largest city in the region and one of the most densely populated cities in the world, grew from 2.4 million people in 1950 to 10.5 million in 2000, and its population is projected to reach 13.8 million in 2025.¹⁷

¹⁶ For instance, traditionalists tend to favour more water-efficient public baths compared to the private baths of modern urban dwellers.

¹⁷ United Nations, DESA, *World Urbanization Prospects: The 1999 Revision* (New York, 2001).

The gap between rural and urban residents is even wider in terms of access to adequate sanitation. In Iraq, where 93 per cent of those living in urban areas have access to adequate sanitation, a meagre 31 per cent of rural residents have such access, and in Mauritania, 67 per cent of the population lacks access to adequate sanitation, see table 6.

TABLE 6. ACCESS TO SAFE WATER AND SANITATION
IN THE ARAB REGION IN 2000
(Percentages)

Country and territory	Percentage of population using improved drinking water sources			Percentage of population using adequate sanitation facilities		
	Total	Urban	Rural	Total	Urban	Rural
Algeria	89	94	82	92	99	81
Bahrain	..	..	..	..	..	..
Comoros	96	98	95	98	98	98
Djibouti	100	100	100	91	99	50
Egypt	97	99	96	98	100	96
Iraq	85	96	48	79	93	31
Jordan	96	100	84	99	100	98
Kuwait	..	..	..	..	..	..
Lebanon	100	100	100	99	100	87
Libyan Arab Jamahiriya	72	72	68	97	97	96
Mauritania	37	34	40	33	44	19
Morocco	80	98	56	68	86	44
Oman	39	41	30	92	98	61
Palestine	86	97	86	100	100	100
Qatar	..	..	..	..	..	..
Saudi Arabia	95	100	64	100	100	100
Somalia	..	..	..	..	..	..
Sudan	75	86	69	62	87	48
Syrian Arab Republic	80	94	64	90	98	81
Tunisia	80	92	58	84	96	62
United Arab Emirates	..	..	..	..	..	..
Yemen	69	74	68	38	89	21

Source: UNICEF, *The State of the World's Children 2003* (UNICEF, 2003). Available at: www.unicef.org/sowc03/tables/table3.html.

Note: Two dots (..) indicate that data are not available.