Average Annual

		e Annuai ter Recharge									Desalinated Water
_	Per Capita		Annual Groundwater Withdrawals							Production	
	Total	(cubic meters)		-		Percentage of Annual	Per Capita	C4	Ch ((million
	(cubic km) Years Vary	Year 2000	Year		Total bic km)	Recharge	(cubic meters)		Industry	centage) (x) Agriculture	cubic meters) 1990
WORLD	X		1995		00-700	X	106-124		15	20	X
ASIA (EXCL. MIDDLE EAST)	Х		Х		Х	Х	Х			Х	Х
Armenia Azerbaijan	4.2	1,193	X		X	X	X			X	X
Bangladesh	6.5 21.0	842 163	X 1990		X 10.7	X 50.9	X 97.6	13	X 1	X 88 hl	
Bhutan	X	X	X		X	X	X			X	X
Cambodia China	17.6 828.8	1,576 649	1988		52.9	X 6.4	X 47.1		X	X 54	X X
Georgia	17.2	3,469	1990		3.0	17.4	549.5	X	X	Χ	X
India Indonesia	418.5 455.0	413 2,145	1990 X		190.0 X	45.4 X	223.3 X		2 X	89 ii X	X X
Japan	27.0	jjj 213	1995	0	13.6	50.3	108.2	29	41	30 jj	40.0 r
Kazakhstan	35.9	2,211	1993	е	2.4	6.7	143.9		71	8 e	1,328.0 f
Korea, Dem People's Rep Korea, Rep	21.0 13.3		X 1995	0	X 2.5	X 18.6	X 55.1		X	X 17 kl	X X
Kyrgyzstan	13.6	2,894	1994		0.6	4.4	132.0	50	25	25 II	X
Lao People's Dem Rep Malaysia	38.0 64.0	6,994 2,877	1995		0.4	0.6	19.0		X 33	X 5	X
Mongolia	6.1	2,291	1993		0.4	5.8	149.1	Х	X	Χ	X
Myanmar Nepal	156.0 X	c 3,420 X	X		X	X	X		X	X	X X
Pakistan	55.0	351	1991		60.0	109.1	489.5		X	90 m	
Philippines	180.0	c 2,369	1980		4.0	2.2	82.8	50	50	X	X
Singapore Sri Lanka	X 7.8	X 414	X		X	X	X		X	X	X X
Tajikistan	6.0	970	1994		2.3	37.7	398.7	X	X	X	X
Thailand Turkmenistan	41.9 3.4	c 682 753	1980 1994		0.7	1.7 11.9	15.0 100.3		26 9	14 38	X X
Uzbekistan	19.7	809	1994		7.4	37.6	334.3		11	57 ni	
Viet Nam	48.0	601	1990		0.8	1.7	11.9	Х	Х	X	X
Albania	7.0	2,248	1989		0,6	9.0	193.6		X	X 52	X
Austria	22.3		1995		1.4	6.2	173.5		43	5 q	
Belarus	18.0	1,758	1989		1.2	6.6	115.7		13	28 rr	. X
Belgium Bosnia and Herzegovina	0.9 X	g 89 X	1980 X		0.8 X	86.4 X	79.0 X		22 X	4 X	X X
Bulgaria	13.4		1988		5.0	37.3	566.1	Х	Х	X	Х
Croatia Czech Rep	11.0 X	2,459 X	X 1995	0	0.5	X	X 48.0		X	X X	X X
Denmark	30.0		1995		0.9	3.0	169.8		22	38 ss	X
Estonia Finland	4.0 1.9	2,865 hhh 367	1995	0	0.2	12.8	X 47.8		X 11	X 24 tt	X X
France	100.0		1993	U	6.0	6.0	103.8		27	17	X
Germany	45.7	c 556	1990		7.1	15.5	89.4	48	47	4 kl	k X
Greece Hungary	10.3 6.8	968 q 678	1990 1995		2.0 1.0	19.4 14.5	195.7 96.5		5 48	58 18 ui	X X
Iceland	24.0	c 85,419	1995		0.2	0.6	558.9	Х	Х	X	X
Ireland	3.5 43.0	g 928 750	1995 1992		0.2 13.9	6.5 32.3	62.3 243.2		38 4	29 vv 58	X X
Italy Latvia	2.2	934	1992 X		X	32.3 X	243.2 X			X	X
Lithuania EVD	1.2	327	1995		0.2	17.1	55.1			X	X
Macedonia, FYR Moldova, Rep	X 0.4	X 91	X		X	X	X		X	X	X
Netherlands	4.5	h 285	1990		1.0	23.3	70.2	32	45	23 w	w X
Norway Poland	96.0 36.0	c 21,502 929	1985 1995	0	0.4 2.0	0.4 5.5	97.5 51.5		73 30	X m X vv	mm X X
Portugal	5.1	g 516	1995		3.1	60.1	311.0		23	39 xx	X
Romania Russian Federation	8.3 788.0	h 372 5,363	1993 1988		3.6 12.6	43.7 1.6	158.0 85.5		38 X	1 zz X	X X
Slovakia	X	5,363 X	1995	0	0.6		113.0			X	X
Slovenia	X 28.9	X	1994		0.2	X X 100	88.9	X	X X	X	X
Spain Sweden	28.9	729 g 2,245	1995 1995		5.4 0.6	18.8 3.2	137.2 72.8		2 8	80 X aa	x na X
Switzerland	2.7	366	1995		0.9	33.4	126.3	72	40	X bl	ob X
Ukraine United Kingdom	20.0 9.8	396 167	1989 1995	0	4.0 2.5	20.1 25.2	77.5 42.4		18 47	52 cc 2 dc	
Yugoslavia	3.0	282	X		X	X	X	X	X	X	X
MIDDLE EAST & N. AFRICA	X		X		X	X	X			X	X
Afghanistan Algeria	29.0 1.7		X 1989		X 2.9	X 167.6	X 117.1			X 49	X 64.0
Egypt	1.3	g 19	1995		5.3	407.7	85.1	58	0	42 t	25.0
Iran, Islamic Rep Iraq	42.0 13.0		1980 1985		29.0 0.2	69.0 1.5	738.8 13.1		X 40	X	2.9 k X
Israel	0.5	g 502 80	1996		1.2	234.0	204.5		2	80 u	20.0 z
Jordan	0.6		1993		0.5	91.4	100.7	30	4	66 v	2.0 f
Kuwait Lebanon	X 4.8	X 1,463	1994 1991		0.3	X 8.3	142.7 153.2			100 w 78	231.0 f X
Libyan Arab Jamahiriya	0.7	116	1995		3.7	561.5	734.9	9	4	87 y	70.0 p
Morocco Oman	9.0 1.0	317 376	1998 1985		2.7 0.4	29.8 41.9	97.9 280.7			84 aa X	3.4 j 34.0 n
Saudi Arabia	1.0	g 44	1990		14.4	1518.9	899.3	10	X	90	714.0 n
Syrian Arab Rep	6.6	409	1993		1.8	27.3	133.5	13	4	83 bl	X
Tunisia Turkey	4.2	433 300	1995 1995	0	7.6	39.2 38.0	181.8 124.0		9	86 60 bl	8.3
United Arab Emirates	0.1	49	1995		1.6	1333.3	724.1	X	19	d 81 cc	385.0 m
Yemen	1.5	84	1985	dd	1.4	88.5	139.2		Х	X	10.0 n

Notes: See Page 3

59.0 c 42.0 c

128.0 c

130.0 c

1.874.0

510.0

134.0

103.0

303.0

11,627 14,708

3,456

15,609

11.016 9,204 12,051

10,596

119.582 7,459 11,807 1975

X 1987

X 1973

Sources: Various

Nicaragua Panama Trinidad and Tobago SOUTH AMERICA

Argentina

Brazil

Chile Colombia

Ecuador

Guyana

Peru

Paraguay

Average Annual Desalinated Water Groundwater Recharge **Annual Groundwater Withdrawals** Per Capita Production (cubic meters) (million Total Percentage Per Capita Sectoral Share (percentage) {x} (cubic km) Year Total of Annual (cubic cubic meters) Years Vary 2000 Year (cubic km) Recharge meters) Domestic Industry 1990 SUB-SAHARAN AFRICA 72.0 1.8 Angola Benin 5.591 0.1 295 1,048 Botswana g 796 314 Burkina Faso Burundi Cameroon 6,629 15,490 Central African Rep 56.0 c Х 1,503 Chad 11.5 1990 0.1 0.8 15.7 29 71 67,268 8,150 Congo Congo, Dem Rep Côte d'Ivoire 2.550 37.7 g 10.0 c Equatorial Guinea Eritrea 22.092 X 44.0 703 Ethiopia 50,566 1989 Gabon 62.0 0.6 100 Gambia X 1.301 Ghana 26.3 g c Guinea X X X Guinea-Bissau 11.541 14.0 Kenya 100 232 19,023 X X 8.7 Lesotho 60.0 X 482.9 Liberia 1984 4.8 Madagascar 3,450 nnn Malawi X 1989 0.5 20.0 1.780 11.6 Mali Mauritania 0.3 g 17.0 c 112 864 1985 0.9 293.3 498.3 X X X 58 Mozambique Namibia 2.1 1,217 5.2 3.0 17.9 Niger Nigeria 233 1988 0.1 39 87.0 780 3.0 Rwanda 3.6 0.3 X X 3.3 X 0.1 X 39.2 X 1985 X 24 Senegal Sierra Leone 802 72 10,300 X 1985 0.3 9 1 45.8 0.1 Somalia 3.3 327 South Africa 1980 Sudan Tanzania, United Rep 7.0 30.0 c 237 895 1985 0.3 X 13.0 0.4 Togo Uganda 5.7 29.0 1,231 1,332 X Zambia Zimbabwe 47.1 5.0 5,137 NORTH AMERICA 11,879 5,439 1990 1990 Canada United States 370.0 1,514.0 1.0 109.8 37.3 432.3 34 62 c gg 34 20 C. AMERICA & CARIBBEAN Belize Costa Rica 21.0 c 5,219 X 1975 X 3.8 X 47.5 X 408.3 Cuba 8.0 C Dominican Rep El Salvador 3.0 353 Guatemala 31.0 2.5 39.0 Haiti 304 Honduras Jamaica X 139.0 c 1,406 Mexico 1995

X 15 X 25 X Suriname 191,787 Uruguay 23.0 c 227.0 c 6,892 9,392 OCEANIA Х Х Х Х Х Х Х 72.0 g Australia 3,812 1985 143.2 20 d 67 ee Fiji New Zealand 198.0 51,270 Papua New Guinea Notes: See next page

Х

4.7

X 8.0

X

X 2.0

Х

19

X 25

70

X 38

Χ

60

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X

11

X 38

180.4

57.0

139.4

3.7

X 0.4

X

0.7

Sources: Various

{x}

{kk}

{rr}

Foo'	

Sum of all groundwater flows, including base flow (as a constituent of surface water flows).

{d} Domestic and industrial withdrawals have been combined.

Both withdrawal and sectoral data are estimated from a bar graph from FAO Report: Irrigation {e}

in the Former Soviet Union Countires in Figures, p. 116.

{f} Data are from 1993.

Sum of all aguifer recharge flows. $\{g\}$

{h} Sum of the total groundwater flow that is exploitable.

Data are from 1992 {j} Data are from 1991 Data are from 1995. Data are from 1989.

Data refer to 1995 or latest available year (generally from 1991, 1992, 1993, or 1994). (0)

Data are from 1994; from FAO irrigation in the Near East Region in Figures, p. 29. {p}

{r} Data are from 1996.

Sectoral data are from Margat Blue Plan for 1989 Sectoral data are from 1992, Margat Blue Plan. Sectoral data are from 1994, Margat Blue Plan.

Groundwater withdrawal and sectoral data are estimated from a bar graph for 1993 from FAO Water Report; Irrigation in the Near East Region in Figures, Rome, 1997, p. 115. Groundwater withdrawal and sectoral data are estimated from a bar graph for 1994 {w} from FAO Water Report: Irrigation in the Near East Region in Figures, Rome, 1997, p. 124

Estimates are typically approximate and therefore the sum of the sectoral data may

not add to 100 percent.

{y} Sectoral percentages are calculated using groundwater withdrawal of 3.81 km3 which is

an estimate provided with sectoral data for 1995 in Margat Blue Plan.

{z} Data are from Margat, personal communication February 2000.

Sectoral data are from 1991, Margat Blue Plan. {aa}

Sectoral data are from 1990, Margat Blue Plan.

Sectoral percentages for UAE are a combination of data from text and a bar graph for 1995 {cc} from FAO Water Report: Irrigation in the Near East Region in Figures, Rome 1997, p. 266. {dd} Groundwater withdrawal data are from Margat 1990, presented as two separate values; one

for Yemen du Nord for around 1985 equal to 1 billion m3 per year; the other for Yemen du Sud for 1975 equal to 0.35 billion m3 per year. These two figures have

Sectoral data for Australia are calculated using a groundwater withdrawal value of 2.46 km3 from 1983 {ee}

as reported by Margat 1990.

{ff} Sectoral data for Canada are calculated using a groundwater withdrawal value of 1.6 km3 from 1985

as reported by Margat 1990.

Data for the United States are from Economic Commission for Europe (1992) without a specific date. Data reported {gg}

by Margat (1990) are 660 km3 from a source dated 1974 and refer to the U.S. including

the 50 states and Puerto Rico.

{hh} Sectoral data for Bangladesh are calculated using a groundwater withdrawal value of 3.4 km3 from 1979

as reported by Margat 1990.

Sectoral data are from around 1990 as provided by Shiklomonov; total withdrawal data {iii}

also are from 1990 but are from FAO, Irrigation in Asia in Figures, p. 95

Sectoral data for Japan are from 1987 as provided by Shiklomonov 1997 based on groundwater {ii} withdrawal of 12.88 km3.

Sectoral data for the Republic of Korea are calculated using a groundwater withdrawal value of

1.2 km3 from around 1985 as provided by Margat 1990. Kyrgystan data: FAO Irrigation in the Former Soviet Union Countries in Figures, p. 129, "In 1994, more than {|||}

0.6 km3 of water was withdrawn from groundwater." We have entered a value of .6 but the figure may be higher; we have calculated the sectoral data from the figure in this report

on page 129, using the .6 figure for total withdrawal.

Sectoral data for Pakistan are from Shiklomonov who reports "approximately 90 percent" for agriculture {mm}

share; total withdrawal also is approximately 60 km3 per year for around 1990 (table p. 57).

Sectoral data for Uzbekistan are from 1994 FAO Irrigation in the Former Soviet Union Countries in Figures {nn}

estimated from a bar graph, p. 217.

Sectoral data are calculated using a groundwater withdrawal value of 23.5 km3 from around 1985 {00}

as reported by Margat 1990.

Sectoral data refer only to Mauritius Island only.

Sectoral data for Austria are calculated using a groundwater withdrawal value of 1.17 km3 from 1980

as reported by Margat 1990. Sectoral data Belarus are calculated using a groundwater withdrawal value of 1.06 km3 from 1985

as reported by Margot 1990. Sectoral data are calculated using a groundwater withdrawal value of 1.32 km3 from 1977 {SS}

as reported by Margat 1990 {tt} Sectoral data are calculated using a groundwater withdrawal value of .37 km3 from 1980

as reported by Margat 1990

Sectoral data are calculated using a groundwater withdrawal value of 1.6 km3 from 1972 {uu}

as reported by Margat 1990.

Sectoral data for Ireland are calculated using a groundwater withdrawal value of .17 km3 from 1980 {vv}

as reported by Margat 1990

Sectoral data are calculated using a groundwater withdrawal value of 1.28 km3 from 1981 {ww}

as reported by Margat 1990

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1985 as reported by Margat 1990.

Sources: Various

{nnn}

Footnotes Continued:	
{xx}	Sectoral data are calculated using a groundwater withdrawal value of 2.0 km3 from 1980
	as reported by Margat 1990.
{yy}	Sectoral data are calculated using a groundwater withdrawal value of 2.0 km3 from 1980-81
	as reported by Margat 1990.
{zz}	Sectoral data are calculated using a groundwater withdrawal value of 1.18 km3 from 1975
	as reported by Margat 1990.
{aaa}	Sectoral data for Sweden are calculated using a groundwater withdrawal value of .48 km3 from 1985
	as reported by Margat 1990.
{bbb}	Sectoral data for Switzerland are calculated using a groundwater withdrawal value of 1.0 km3 from 1983
	as reported by Margat 1990.
{ccc}	Sectoral data are calculated using a groundwater withdrawal value of 4.22 km3 from 1985
	as reported by Margat 1990.
{ddd}	Sectoral data are calculated using a groundwater withdrawal value of 2.38 km3 from 1975
	as reported by Margat 1990.
{eee}	Sectoral data for the U.S. are calculated using a groundwater withdrawal value of 101.3 km3 from 1985
	as reported by Margat 1990.
{fff}	Data for Bulgaria are from ECE (1992) and refer to the year 1988; Margat (1990) reports data from a
()	1989 source (Anonyme 1989) as 3.1 km3.
{ggg}	Data for Denmark are from ECE (1992) and refer to the year 1985; Margat (1990) reports data from a
(le le le)	1981 source (Anonyme 1981) as 4.3 km3.
{hhh}	Data for Finland are from ECE (1992) without a year specified; Margat (1990) reports data from a
{iii}	1989 source (Anonyme 1989) as 2.2 km3. Data are from Margat (1990) and refer to a source dated 1989 (Margat 1989); data reported
{III}	from ECE (1992) is 26.0 km3 for 1981.
{iji}	Data are from FAO, Irrigation in Asia in Figures (1999) which states " The renewable
(III)	potential of groundwater resources is estimated at about 27 km3/year"
	A value of 185 km3/year is provided by Margat (1990) cited from L'vovich 1974.
{kkk}	Sectoral data are from Margat (1990) and combine his data for both Germanys.
(VVV)	Margat's total withdrawal data are from different dates for the two Germanys:
	Germany - RFA is 7.77 km3 from 1981 and Germany - ex DDR is from 1975; the
	combined total is 9.55 which is used to calculate the sectoral percentages.
	The sectoral data also are from 1981 (Germany RFA) and 1975 (Germany - ex DDR).
{mmm}	Sectoral data for Norway are calculated using a groundwater withdrawal value of 0.11 km3 from
()	1985 as reported by Marriat 1990

Sectoral data for Madagascar equal .32 percent for domestic for 1984 as reported by Margat 1990.

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Technical Notes Page 5

Table FW. 2 Groundwater and Desalinization

Sources: Groundwater resources and withdrawal data: J. Margat, Les eaux souterraines sans le monde (Bureau de recherches géologiques et minières [BRGM], Département eau, Orléans, France, December 1990); J. Margat and D. Vallée, Water Resources and Uses in the Mediterranean Countries (Blue Plan, Sophia Antipolis, 1999); I.A. Shiklomanov, Comprehensive Assessment of the Freshwater Resources of the World (Stockholm Environment Institute, Stockholm, 1997); Organisation for Economic Co-Operation and Development (OECD), OECD Environmental Data Compendium 1997 (OECD, Paris, 1997); and Economic Commission for Europe, The Environment in Europe and North America (United Nations, New York, 1992).

Groundwater resources and desalinization activities: J. Margat, Lex Eaux Souterraines Dans Le Bassin Mediterraneen. Ressources et Utlisations Plan Bleu, Doc. BRGM 282 (Ed. BRGM, Orléans, France, 1998); Food and Agriculture Organization of the United Nations (FAO), Irrigation in Africa in Figures, Water Reports No. 7 (FAO, Rome, 1995); FAO, Irrigation in the Near East Region in Figures, Water Reports No. 9 (FAO, Rome, 1997); FAO, Irrigation in the Former Soviet Union in Figures, Water Report No. 15 (FAO, Rome, 1997); FAO, Irrigation in Asia in Figures, Water Reports No. 18 (FAO, Rome, 1999); and FAO, Irrigation in Latin America in Figures, Water Reports (FAO, Rome, in preparation). Population data: United Nations (U.N.) Population Division, World Population Prospects, 1950–2050 (The 1998 Revision), on diskette (U.N., New York, 1999).

Average annual groundwater recharge is the amount of water that is estimated to annually infiltrate soils, including water from rivers and streams that lose it to underlying strata. In general, this figure would represent the maximum amount of water that could be withdrawn annually without ultimately depleting the groundwater resource. These data are estimated in a variety of ways and caution should be used in comparing values for different countries.

Per capita recharge is the amount of water that annually infiltrates soils on a per person basis, using 2000 population estimates from the U.N. Population Division.

Annual total groundwater withdrawals refers to abstractions from all groundwater sources—even nonrenewable sources. The percentage of annual recharge refers to total groundwater withdrawals. Per capita annual withdrawals were calculated using national population data for the year of data shown.

Sectoral share of withdrawals of groundwater is classified as domestic (drinking water, homes, commercial establishments, public services, and municipal use), industry (including water withdrawn to cool thermoelectric plants), and agriculture (irrigation and livestock).

Desalinated water production refers to the removal of salt from saline waters—usually seawater—using a variety of techniques including reverse osmosis. Most desalinated water is used for domestic purposes.

Totals may not add due to rounding.