Water

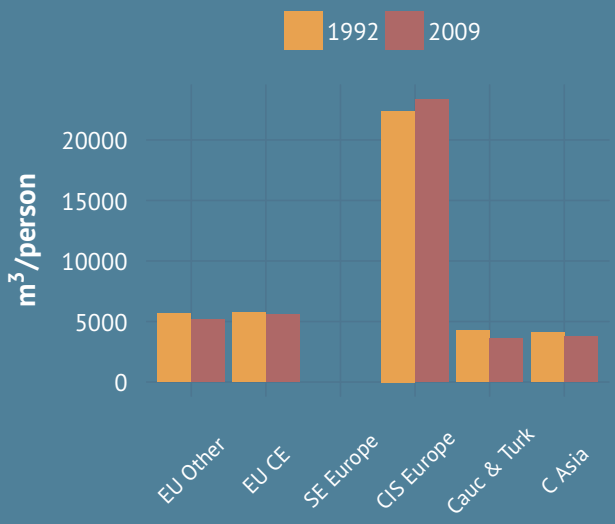
Global demand for water has risen radically in recent decades. Total annual water withdrawal per inhabitant had grown from 360 m^3 at the beginning of the twentieth century to 607 m^3 in 2005. Agriculture accounts for 70 percent of all water usage. The necessary and significant rise in global agricultural production during the last decades - driven by the consistently growing demand for food - has mainly been possible due to improved technology in irrigation.

Global renewable per capita water resources fell by 21 percent, to 6,242 m^3 per person per year, between 1992 and 2009. Similarly, in Europe and Central Asia (with the exception of the CIS Europe sub-region), a slight decrease can be observed over the same period. CIS Europe is an exception due to the fact that this sub-region has plentiful resources of water, with an annual per capita value, which has actually risen by four percent since 1992, of over 23,000 m^3. In EU Central and Eastern, following a slight decrease, the value was 5,500 m^3, followed by EU other and EFTA with 5,100 m^3 per capita. In Central Asia, and the Caucasus and Turkey, the indicator is below 4,000 m^3 per capita, having fallen notably in the last decades. The richest countries in this region in terms of water resources are Iceland, Norway, the Russian Federation, Croatia and Finland.

In 2008, the region accounted for 13 percent (304 million hectares) of the total global area that was equipped for irrigation. The arid and semi-arid countries of Central Asia and the Caucasus and Turkey, together with the Mediterranean countries, all have much higher percentages of irrigated land area. In Uzbekistan and Turkmenistan more than 90 percent of agricultural land was irrigated, and in Tajikistan and Kyrgyzstan the figure exceeded 80 percent in 2008.

Therefore, Central Asian countries top the list in terms of per capita water withdrawal. In Turkmenistan, the annual indicator is over 5,000 m^3 per inhabitant. In contrast, in Slovakia and Denmark the figure is just over 100 m^3.

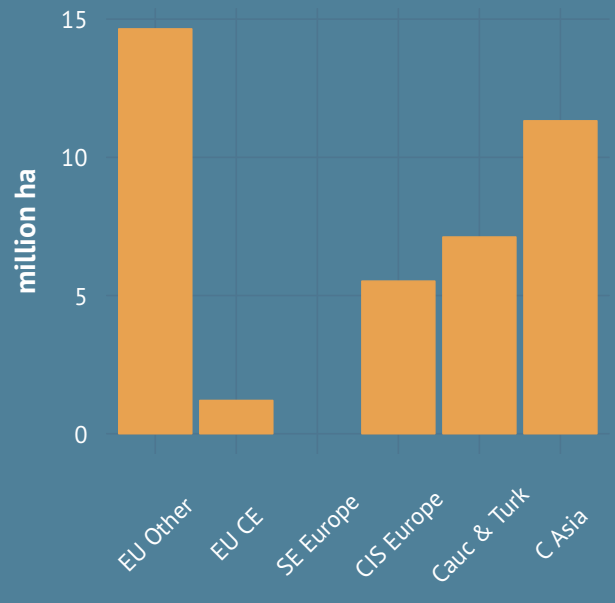
CHART 60: Water resources, renewable per capita (1992 and 2009)



Source: Land and Water Division (AQUASTAT)

Metalink: P1.RES.FAO.NRL.WTRpc, p. 110

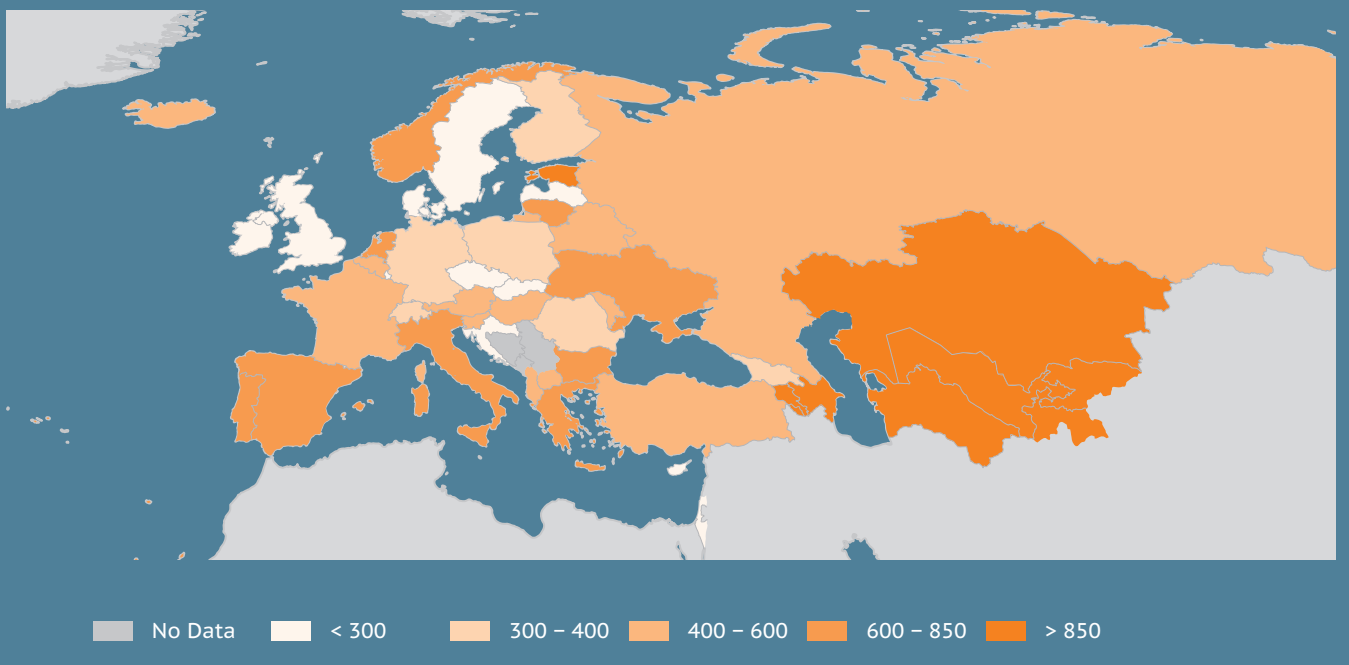
CHART 61: Total area equipped for irrigation (2008)



Source: Land and Water Division (AQUASTAT)

Metalink: P1.RES.FAO.NRL.TAEI, p. 112

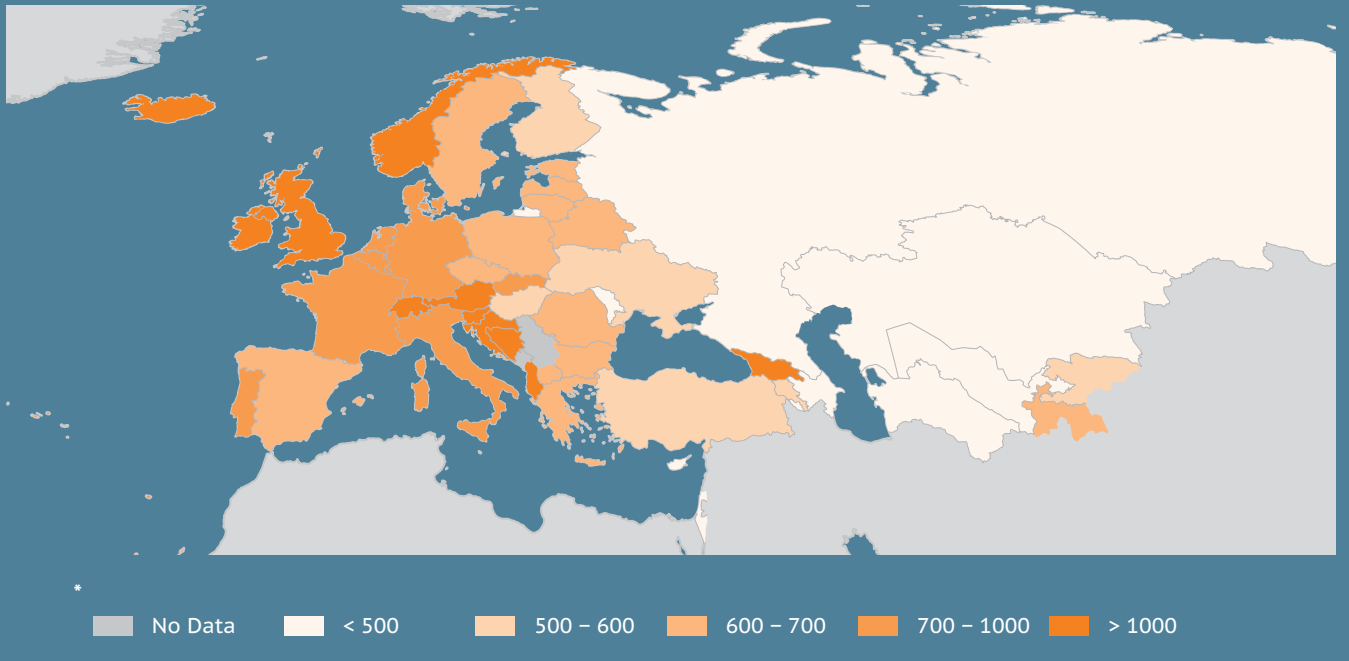
MAP 38: Total water withdrawal per capita (m^3, 2005)



Source: Land and Water Division (AQUASTAT)

Metalink: P4.ENV.FAO.NRL.WAT.TWWpc, p. 112

MAP 39: Average precipitation in depth (mm/year, 2000-2010*)



*

Source: Land and Water Division (AQUASTAT)

Metalink: P4.ENV.FAO.ACQ.CLIM.APD, p. 102

Inputs

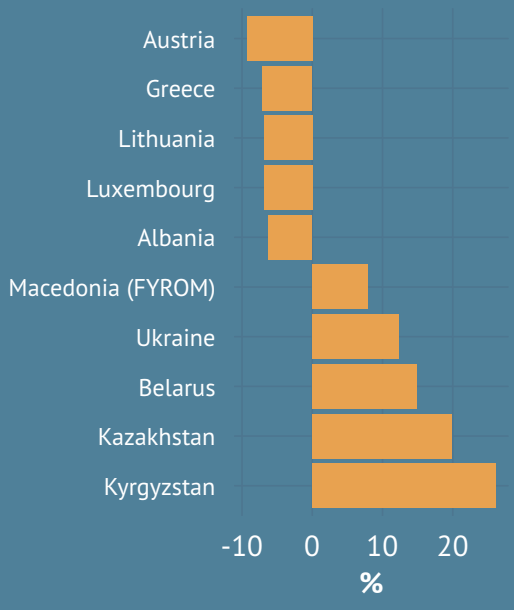
Agricultural investment plays a key role in modern farming, and inputs, such as fertilizers and pesticides, are indispensible for increasing yields, safeguarding the agricultural produce, and ensuring reliable incomes for farmers. However, over-usage can cause damage to the environment resulting in soil degradation and water pollution.

Between 2002 and 2009, global fertilizer usage increased by 13 percent to 122 kg per hectare. In the region, Iceland uses the most fertilizer per hectare, followed by Ireland, Luxembourg, Belarus and Croatia. Kyrgyzstan, the Russian Federation, Azerbaijan, Moldova and Kazakhstan are at the bottom of the list in terms of fertilizer use. Most of the countries that have seen substantial growth in fertilizer use in recent years have started from a very low base, with the exception of Belarus, where the benchmark indicator was relatively high. Conversely, countries like Austria and Luxembourg have taken notable steps in reducing their usage of fertilizers, by two-thirds and by half respectively in the last years.

Between 1961 and 2000, the global number of agricultural tractors per arable land has doubled. The differences between regions can be explained by the general gap in economic development and by the difference in the intensity of farming.

Incomplete information and statistics do not allow us to thoroughly analyze pesticide usage. However, it can be stated that, over the last decade countries like the Netherlands, Italy, the United Kingdom and France, which have traditionally used high volumes of pesticides, have all experienced reductions. In contrast, countries where usage was previously low - including Hungary, Lithuania, Slovakia and Finland - are now increasing their consumption.

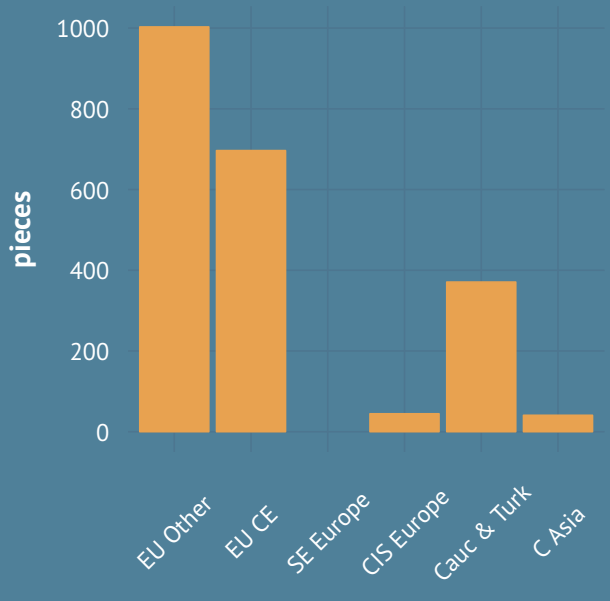
CHART 62: Annual change in fertilizer consumption (2002-2009)



Source: Statistics Division

Metalink: P1.REU.WBK.WDI.FER.HA, p. 101

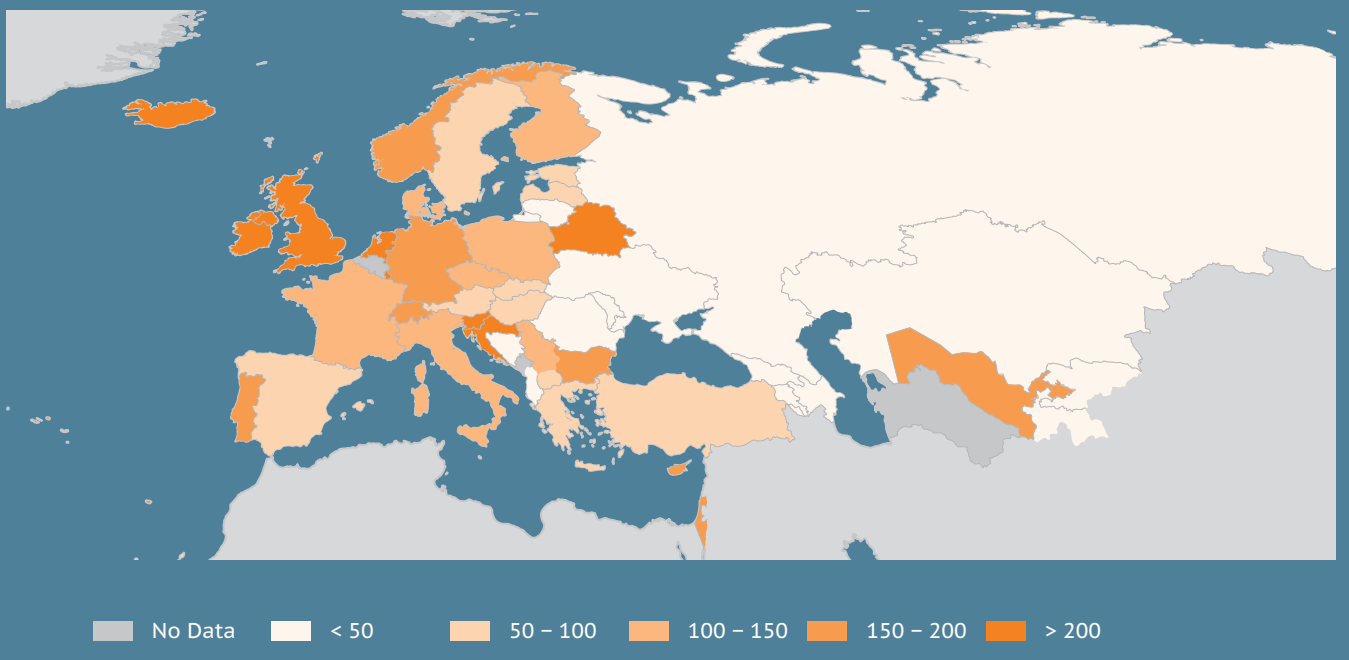
CHART 63: Agricultural tractors per 100 km^2 of arable land (2009)



Source: World Bank (WDI)

Metalink: P1.RES.WBK.WDI.TRA.SKM, p. 101

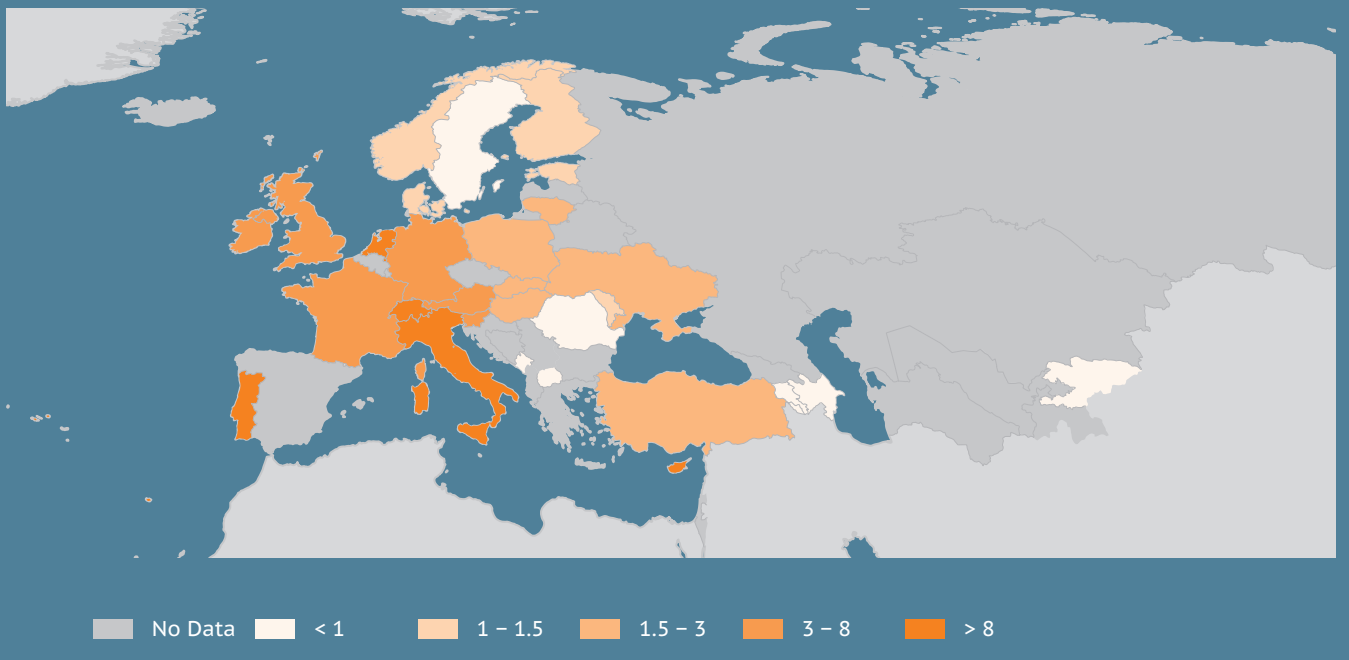
MAP 40: Fertilizer consumption, kilograms per hectare of arable land (kg/ha, 2009)



Source: World Bank (WDI)

Metalink: P1.RES.WBK.WDI.FER.HA, p. 105

MAP 41: Pesticide use, kilograms per hectare of arable and permanent crops (kg/ha, 2009)



Source: Statistics Division

Metalink: P1.RES.FAO.ESS.PES.TON.SHL, p. 109

Pollution

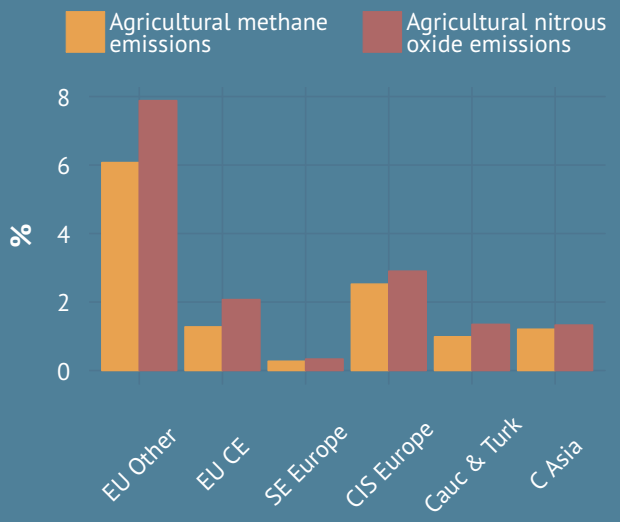
Agriculture has to serve an increasing demand for food while those involved in agriculture must ensure that the negative impacts that the sector has on the environment do not increase. This is one of the great challenges of the 21st century. Agriculture affects air quality and the atmosphere, ground and surface water, and it can pollute and degrade the soil. The agricultural sector is responsible for about 30 percent of total global anthropogenic emissions of greenhouse gases such as carbon dioxide, methane, nitrous oxide and ammonia.

The region of Europe and Central Asia contributes 12 percent to global agricultural methane emissions and 16 percent to those of nitrous oxide. Not surprisingly, countries with large agricultural land areas and intensive farming such as the Russian Federation, France, Germany, United Kingdom and Turkey negatively contribute with the highest emissions.

Globally, agricultural activities accounted for 43 percent of methane emissions in 2005. In the sub-regions of EU other and EFTA, and South Eastern Europe this same percentage is reflected; while in Central Asia, Caucasus and Turkey, and EU Central and Eastern agriculture is responsible for between 27 and 30 percent of methane emissions. In CIS Europe the figure is 12 percent. Generally, countries with intensive farming with large numbers of livestock, and a high proportion of agricultural land, will produce higher methane emissions. So, for example, Ireland and Luxembourg have much higher agricultural methane emissions than a country like Norway.

Fertilizer use and cattle breeding are responsible for most of the nitrous oxide emissions resulting from agriculture. Globally, two thirds of nitrous oxide emissions come from the agricultural sector. In Central Asia, agriculture accounts for 72 percent of these nitrous oxide emissions, while in CIS Europe it accounts for 48 percent. In the EU other and EFTA and in South Eastern Europe the percentage is below the global indicator. More than the 80 percent of the nitrous oxide emissions in Ireland, Tajikistan, Lithuania, Uzbekistan and Armenia results from agricultural activities.

CHART 64: Agricultural nitrous oxide and methane emissions, share of world total (2005)

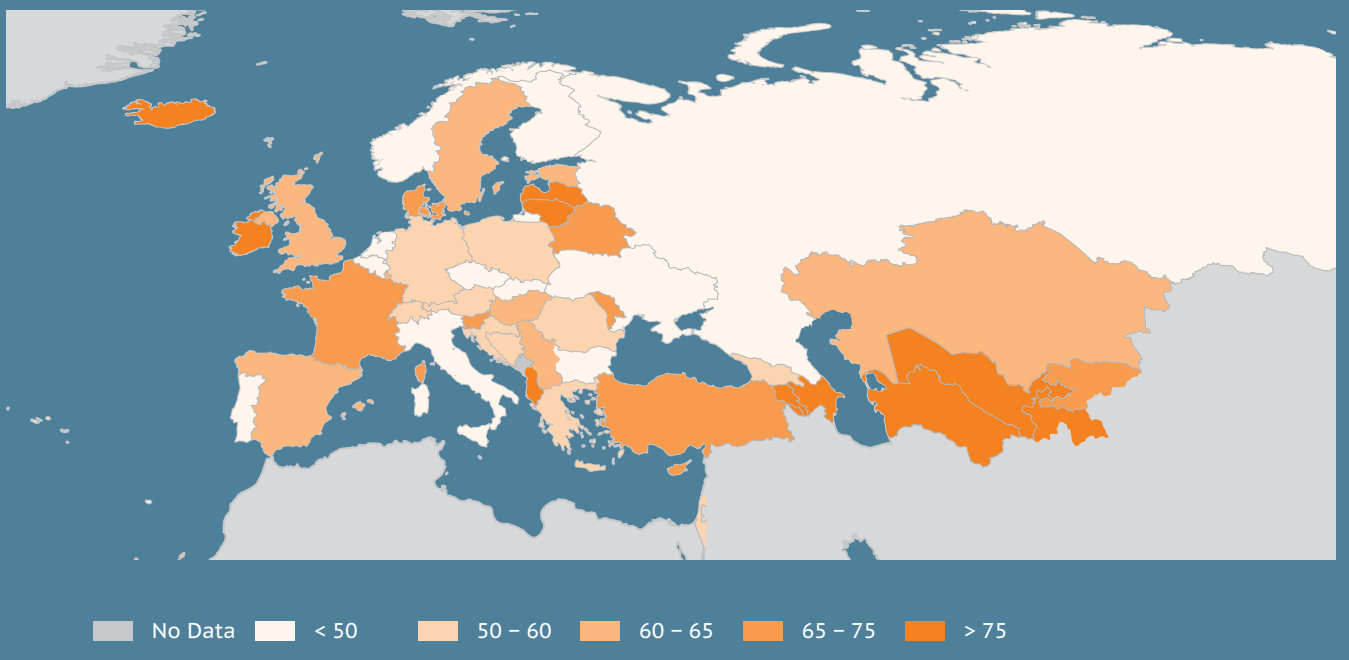


Source: World Bank (WDI)

Metalink: P4.ENV.WBK.WDI.POL.AMTHEAB.SC, p. 101

- Ireland, a country with a high proportion of agricultural land and large numbers of livestock, has significantly high rates of agricultural methane and nitrous oxide emissions.

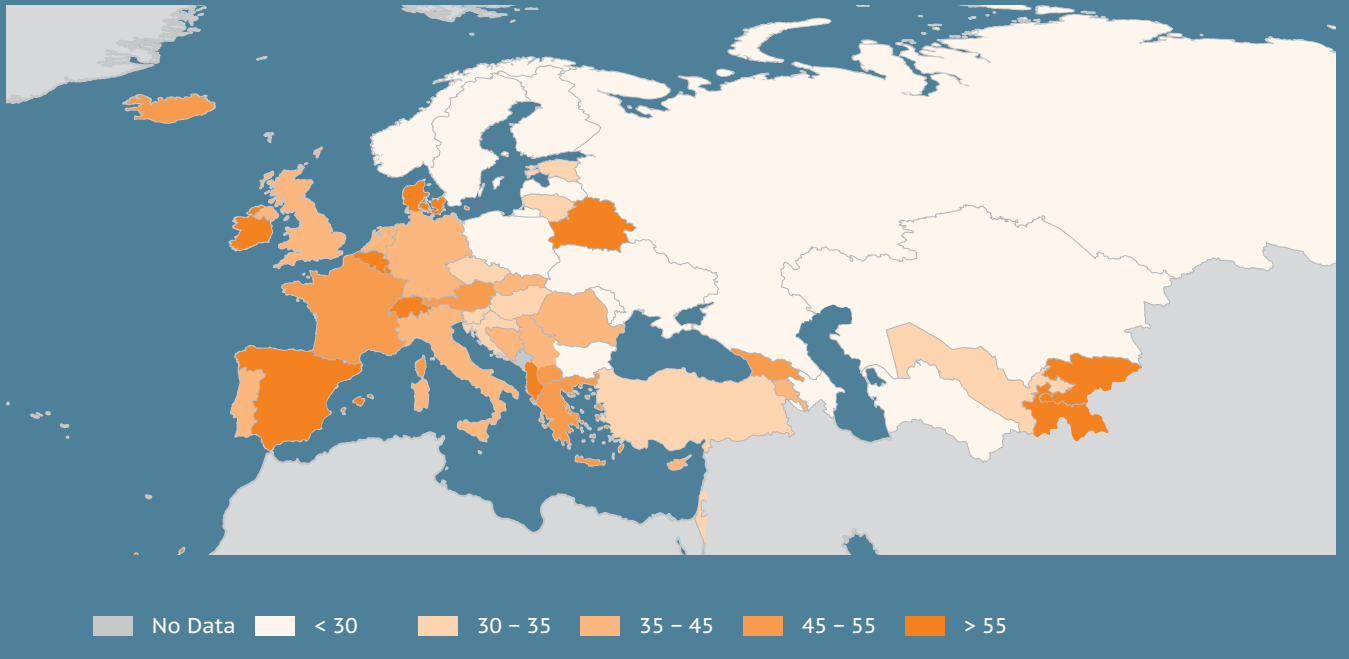
MAP 42: Agricultural nitrous oxide emissions, share of total emissions (%, 2005)



Source: World Bank (WDI)

Metalink: P4.ENV.WBK.WDI.POL.ANOE, p. 101

MAP 43: Agricultural methane emissions, share of total emissions (%, 2005)



Source: World Bank (WDI)

Metalink: P4.ENV.WBK.WDI.POL.AMTHE, p. 101

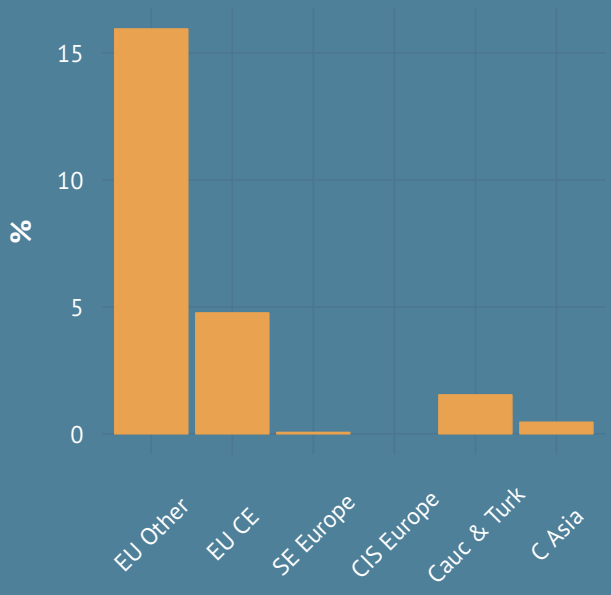
Organic agriculture

Although on a global scale, organic farming is growing dynamically, it still only makes up a small proportion of total agricultural production. In 2009, nearly 30 million hectares of land were being cultivated with organic crops. The majority of this land is to be found in Oceania, Europe and Latin America. Finding a balanced share of organic farming vis-à-vis conventional farming in the future will be a notable challenge. While conventional farming is putting increasing pressure on the environment, an ever increasing global population means an ever growing demand for food which, in turn, requires higher agricultural productivity and yields. While organic farming ensures that farming is more sustainable, it may not be able to meet the ever growing demand for food, since its yields can be substantially lower than those of conventional farming.

The region accounted for 26 percent of global land under organic crops (in 2009). The EU other and EFTA sub-region accounted for 18 percent of this, EU Central and Eastern for 5.4 percent and the Caucasus and Turkey for the final two percent. The leading countries in organic production are Spain, Italy, the United Kingdom and France. The prominent role that the EU other and EFTA sub-region has played in developing organic farming on a global scale cannot be understated; in 2004, it had three quarters of the total organic farming land of this region, although this share has fallen significantly since then.

In 2010, organic land accounted for 0.6 percent of total global agricultural land. In the EU other and EFTA sub-region this share of organic land was 3.9 percent of total agricultural land. In EU Central and Eastern it was 3.1 percent and in Caucasus and Turkey it was 1.1 percent. At 12.7 percent, Sweden has the largest share of organic land, followed by Estonia, the Czech Republic, Latvia and Italy.

CHART 65: Organic agriculture area, share of world total (2009)

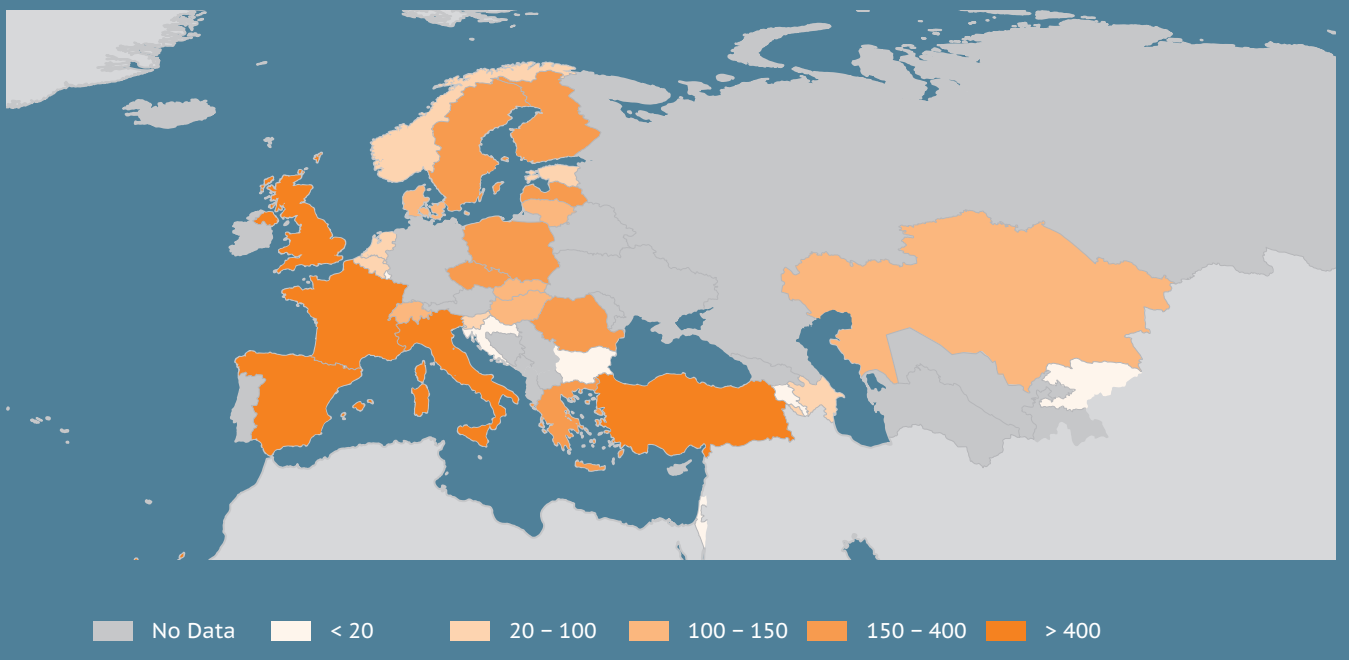


Source: Statistics Division (FAOSTAT)

Metalink: P4.ENV.FAO.BIO.ORGAN.HA.SC, p. 108

- The region accounts for 26 percent of global organic land
- Sweden has highest proportion of organic land (12.7 percent)

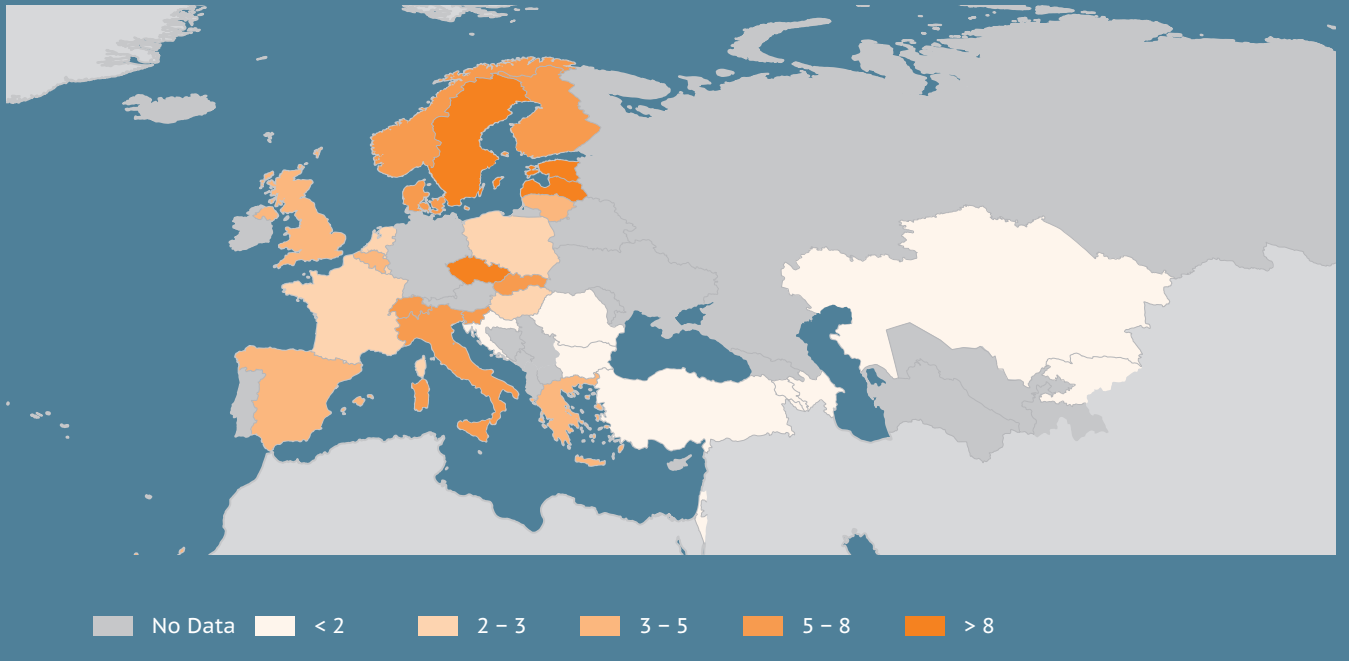
MAP 44: Organic agriculture area (thousand ha, 2009)



Source: Statistics Division (FAOSTAT)

Metalink: P4.ENV.FAO.BIO.ORGAN.HA, p. 108

MAP 45: Organic agriculture area, share of agricultural area (%, 2009)



Source: Statistics Division (FAOSTAT)

Metalink: P4.ENV.FAO.BIO.ORGAN.HA.SHL, p. 108

TABLE 19: Water and irrigation

	Water resources	Total water withdrawal		% of freshwater resources withdrawn		Irrigation		Average
	renewable	volume	per capita	total	by agriculture	potential	equipped for	precipitation
	m^3/person	million m^3/yr	m^3	%	%	thousand ha	thousand ha	mm/year
	2009	2005	2005	2005	2005	2008	2008	2000-2010
WORLD	6 242.0	3 941 055	607	9.3	6.5		304 398	208 004
Central Asia	3 729.4						11 319	1 841
Kazakhstan	6 919.0	34 197	2 254	31.2	26.1	3 768	3 556	250
Kyrgyzstan	4 379.0	10 080	1 999	43.7	40.9	2 247	1 077	533
Tajikistan	2 356.0	11 960	1 853	74.8	68.6	755	719	691
Turkmenistan	4 964.0	24 907	5 246	100.8	97.2	2 353	1 744	161
Uzbekistan	1 858.0	59 808	2 305	118.6	107.9	4 915	4 223	206
Caucasus & Turkey	3 605.1						7 116	2 628
Armenia	2 518.0	2 827	922	36.4	23.9	666	274	562
Azerbaijan	3 825.0	12 211	1 422	35.2	26.9	3 200	1 426	447
Georgia	14 479.0	1 621	362	2.6	1.7	725	433	1 026
Turkey	2 973.0	40 100	588	18.8	13.9	8 500	4 983	593
CIS Europe	23 379.5						5 520	2 093
Belarus	6 019.0	4 242	432	7.3	1.4		131	618
Republic of Moldova	3 233.0	1 789	475	15.4	6.5	1 500	312	450
Russian Federation	31 510.0	66 200	460	1.5	0.3	29 000	4 346	460
Ukraine	3 054.0	37 744	804	27.0	14.1	5 500	731	565
South Eastern Europe								
Albania	13 060.0	1 853	590	4.4	2.5		340	1 485
Bosnia and Herzegovina	9 952.0						3	1 028
Croatia	23 917.0	631	142	0.6	0.0		3	1 113
Macedonia, FYR	3 111.0	1 028	504	16.1	2.0		128	619
Montenegro								
Serbia		4 121						
EU Central & Eastern	5 543.8						1 203	7 020
Bulgaria	2 824.0	6 119	791	28.7	4.7		105	608
Czech Republic	1 260.0	1 709	167	13.0	0.3		39	677
Estonia	9 545.0	1 792	1 331	14.0	0.0	150	4	626
Hungary	10 398.0	5 590	554	5.4	0.3		141	589
Latvia	15 679.0	384	167	1.1	0.1		1	641
Lithuania	7 453.0	2 375	695	9.5	0.3	200	1	656
Poland	1 610.0	11 959	313	19.4	1.9		116	600
Romania	9 839.0	6 876	316	3.2	0.6	5 500	615	637
Slovakia	9 189.0	688	127	1.4	0.0		172	824
Slovenia	15 746.0	942	471	3.0	0.0		9	1 162
EU other & EFTA	5 130.1						14 645	18 360
Austria	9 283.0	3 403	413	4.4	0.1		117	1 110
Belgium	1 717.0	6 216	597	34.0	0.2		23	847
Cyprus	716.0	184	178	23.6	20.4	37	46	498
Denmark	1 086.0	660	122	11.0	4.0		435	703
Finland	20 592.0	1 634	312	1.5	0.0		77	536
France	3 379.0	31 618	518	15.0	1.9		2 642	867
Germany	1 869.0	32 299	391	21.0	0.1		485	700
Greece	6 555.0	9 471	847	12.8	11.4		1 555	652
Ireland	11 786.0	850	204	1.6	0.0		0	1 118
Italy	3 175.0	45 395	774	23.7	10.5		3 951	832
Luxembourg	6 225.0	65	143	2.1	0.0		0	934
Malta	122.0	54	132	106.7	37.6	2	3	560
Netherlands	5 496.0	10 606	650	11.7	0.1		457	778
Portugal	6 446.0	8 904	844	13.0	9.0		584	854
Spain	2 443.0	32 461	748	29.1	17.6		3 818	636
Sweden	18 688.0	2 616	290	1.5	0.1		160	624
United Kingdom	2 375.0	12 990	215	8.8	0.9		152	1 220
Iceland	537 975.0	165	556	0.1	0.0			1 940
Norway	79 024.0	2 939	636	0.8	0.2		115	1 414
Switzerland	7 020.0	2 557	345	4.8	0.1		25	1 537
Israel	245.0	1 954	296	109.8	63.4		225	435

TABLE 20: Inputs and agricultural emissions

	Tractors	Fertilizer use per ha		Pesticide use per ha		Methane emissions		Nitrous oxide emissions	
	x100 km^2-arable land	of arable land		of arab and perm crops land		total, CO_2 equivalent	by agricul-ture, share of total	total, CO_2 equivalent	by agricul-ture, share of total
	pieces	kg/ha	kg/ha	kg/ha	kg/ha	thousand kt	%	million mt	%
	2000-2008	2002	2009	2000	2009	1990-2005*	1990-2005*	1990-2005*	1990-2005*
WORLD		107.8	122.1			7 136	42.6	2 852.5	66.2
Central Asia						122	29.9	34.8	72.1
Kazakhstan		1.0	2.4	0.2		47	25.3	17.6	62.5
Kyrgyzstan		7.1	21.0	0.5	0.2	4	72.3	1.5	72.6
Tajikistan			47.2			4	68.6	1.4	86.9
Turkmenistan						28	21.6	4.3	78.1
Uzbekistan			193.3			40	33.7	10.0	84.2
Caucasus & Turkey						108	27.6	38.0	66.9
Armenia		34.5	29.3		0.8	3	36.7	0.6	81.6
Azerbaijan		10.4	13.6		0.3	37	13.6	2.6	77.5
Georgia		33.0	43.0			4	50.8	2.0	56.9
Turkey		72.8	96.5	2.5	1.6	64	33.6	32.8	66.4
CIS Europe	48.6					648	11.8	114.7	47.7
Belarus	89.8	136.0	281.1			11	70.9	11.7	72.9
Republic of Moldova	197.6	8.1	9.4	1.3	1.1	3	29.4	0.8	73.5
Russian Federation	30.0	13.6	15.6			563	9.1	76.1	44.3
Ukraine	103.3	15.9	29.7		2.1	70	23.3	26.1	45.6
South Eastern Europe						18	45.1	10.3	61.3
Albania	121.9	85.3	45.5			2	70.8	1.0	78.4
Bosnia and Herzegovina		32.7	24.5			3	42.4	1.2	57.8
Croatia		257.0	246.8			4	33.3	2.9	52.4
Macedonia, FYR		30.9	56.9	0.5	0.2	1	46.6	0.6	63.9
Montenegro					0.0				
Serbia	17.7		133.8			8	43.7	4.6	63.6
EU Central & Eastern	696.6					143	27.1	70.9	55.1
Bulgaria	172.3	113.8	167.4			11	18.9	4.2	48.1
Czech Republic		81.7	123.3	2.7		11	33.6	8.9	36.9
Estonia		44.1	69.5	0.4	1.3	2	30.5	0.9	60.5
Hungary		122.2	80.0	1.7	2.7	8	33.6	7.0	60.1
Latvia		50.6	64.9	0.6		3	27.7	1.3	77.4
Lithuania	631.8	110.2	45.4	0.4	2.6	6	33.8	2.5	86.0
Poland	1 246.0	116.2	144.6	0.7	2.9	70	21.9	30.2	57.7
Romania	200.4	34.8	48.5	1.0	0.7	24	36.0	11.5	56.2
Slovakia	154.6	83.1	95.5	1.8	2.3	4	39.0	3.4	37.7
Slovenia		403.5	241.9	13.8	5.9	3	32.1	1.2	70.4
EU other & EFTA						415	44.4	264.0	56.4
Austria		234.0	83.1	3.2	3.3	9	48.6	4.4	52.5
Belgium				21.7		10	56.7	6.6	44.3
Cyprus		159.7	181.9	20.0	18.7	1	44.0	0.3	65.5
Denmark		97.6	103.2	2.8	1.3	8	65.2	6.3	73.4
Finland		136.5	108.0	1.0	1.5	10	20.7	7.1	41.7
France		210.4	148.3	10.0	3.7	77	47.7	49.1	66.8
Germany		220.1	181.4	5.9	6.5	68	43.8	56.6	52.2
Greece		156.4	83.7	3.0		7	50.0	6.0	58.2
Ireland		597.0	477.3	3.5	4.2	15	76.7	7.5	90.5
Italy		171.1	135.5	14.1	11.4	41	39.8	28.6	43.7
Luxembourg	1 039.7	581.1	301.8			1	81.3	0.5	60.3
Malta		103.2	81.5	40.3		0	28.6	0.1	39.8
Netherlands		428.8	240.9	24.1	18.1	21	43.4	14.6	39.5
Portugal		194.2	159.1	12.9	13.0	12	35.4	6.0	43.8
Spain	825.1	164.5	96.9	2.1		36	56.8	26.5	62.6
Sweden		99.9	69.4	1.3	0.7	11	28.1	5.9	60.2
United Kingdom		319.1	239.2	9.1	7.0	66	38.2	30.6	60.0
Iceland	16 464.3	2 686.0	2 671.4	0.9		0	53.5	0.4	79.7
Norway		205.6	191.3	0.8	1.3	17	12.6	4.7	39.0
Switzerland		195.9	190.4	7.2	10.1	5	67.6	2.4	59.3
Israel		251.9	189.5			4	31.2	1.8	53.0