

Water management in the regions of the European Union

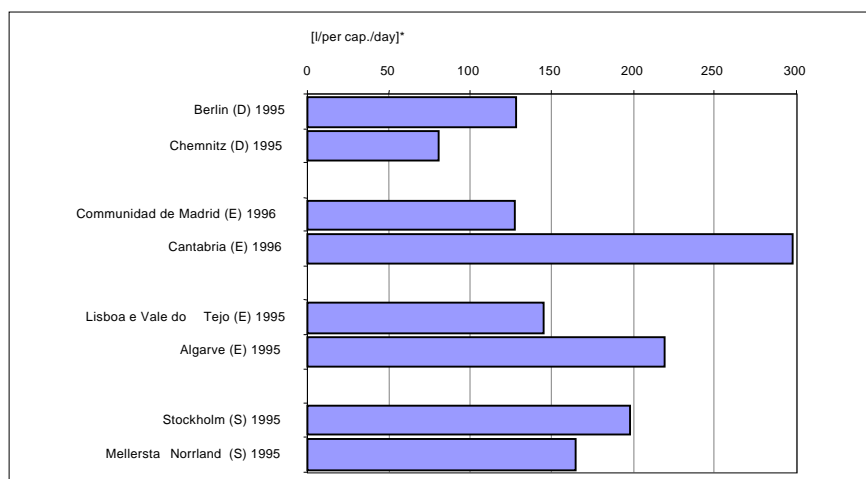
From abstraction to water treatment

Mario Ronconi

In 1999 Eurostat began to expand the collection in the Member States of regional (Nuts2 ⁽¹⁾) environmental statistics applied, in particular, to the primary domains of water and waste. This document presents the preliminary results for water consumption by the domestic sector and waste-water treatment.

A knowledge of regional differences makes it possible to understand and anticipate changes, to set coherent objectives and to focus the measures which need to be taken at European level to improve (and ensure the sustainability of) the local environment in the Regions of Europe. With regard to water supplies, there has in recent years been a reduction in abstractions by public networks (page 2), even if account must be taken of the considerable differences in the consumption of the domestic sector, which in some regions of the European Union can be as much as three times more than in others (page 4).

Figure 1: Water consumption* of the domestic sector in some regions of the Union.
(* water distributed by the public network)



* cf. methodological note

There are similar contrasts in the collection and treatment of waste water (page 6). Certain regions of southern Europe must extend their infrastructures to meet the standards which have already been achieved in the northern regions.

Regional environmental statistics, which are still in their infancy, must cope not only with the harmonisation of reference parameters (definitions, units) but also with the sometimes still inadequate local environmental information networks. The extent to which consistent regional data are available determines and often limits the choice of analyses (cf. methodological note).

⁽¹⁾ Nomenclature of Territorial Units for Statistics

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ENVIRONMENT AND
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ENVIRONMENT

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Reduction in water abstraction for the public sector

Public water supply via the public network concerns mainly the domestic sector but also industry and agriculture. At the same time, these sectors may use water from a self-supply source. Figure 2 shows that, depending on the region (in this case Austria), there are considerable variations in the distribution between public supply and self-supply. For example, supply via the public network accounts for 66% of water abstraction in Voralberg compared with 6% in Oberösterreich, where industrial activities predominate (62%). There is, however, some supply via the public network in all regions

Since 1991, the abstraction of water for the public sector decreased in most of the regions in: Germany (between 1991 and 1995) -regions, particularly the new *Länder*, reduced their abstraction by more than a third-, Netherlands (1991-1996), Austria (1991-1997) and Finland (1989-1995) (Table 1). The opposite was the case in Spain (1996-1998), Italy (1975-1987) and Portugal (1991-1998), where most of the regions, during the respective periods, considerably increased (by more than 10%) their abstraction of water for the public sector. Of these countries, Austria and Portugal displayed the greatest regional differences.

Figure 2: Water abstraction (surface and ground water) in Austria by sector in 1997.

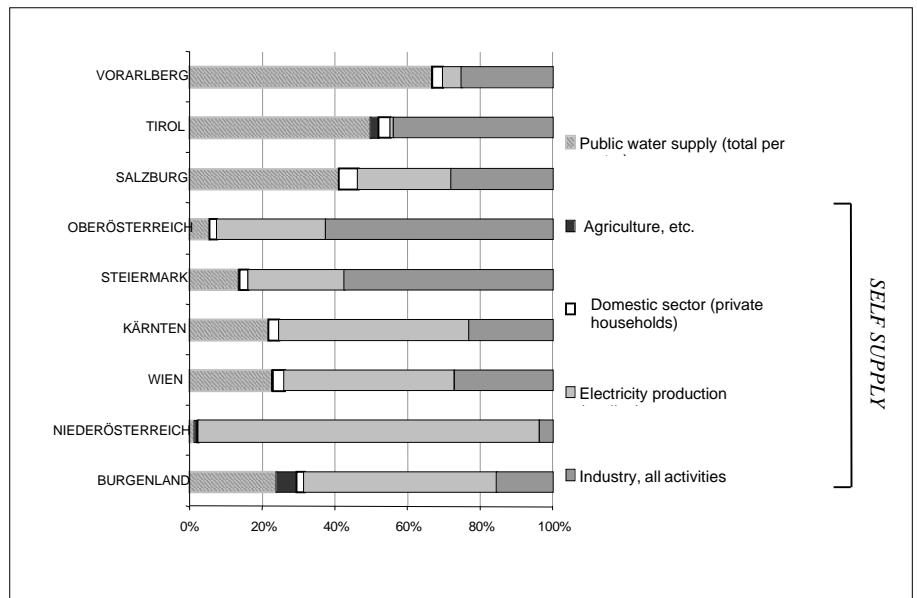


Table 1: Breakdown of the regions into 5 classes according to trends in water abstraction for the public sector.

		INCREASES			DECREASES		NUMBER OF REGIONS
		> 10%	1 - 10%	stable	1 - 10%	> 10%	
D	(1991-1995)	1	2	3	19	12	37 regions (1)
E	(1996-1998)	5	9	1	2	0	17 regions
I	(1975-1987)	18	2	0	0	0	20 regions
NL	(1980-1996)	9	0	0	0	3	12 regions
	(1991-1996)	2	2	2	5	1	
A	(1980-1997)	6	0	0	2	1	9 regions
	(1991-1997)	2	3	0	2	2	
P	(1991-1998)	5	0	1	0	1	7 regions
FIN*	(1989-1995)	0	1	0	4	0	5 regions (2)

(1) Not including Chemnitz, Dreden and Leipzig

(2) Not including the Aaland region

The regions of northern Europe use mainly ground water

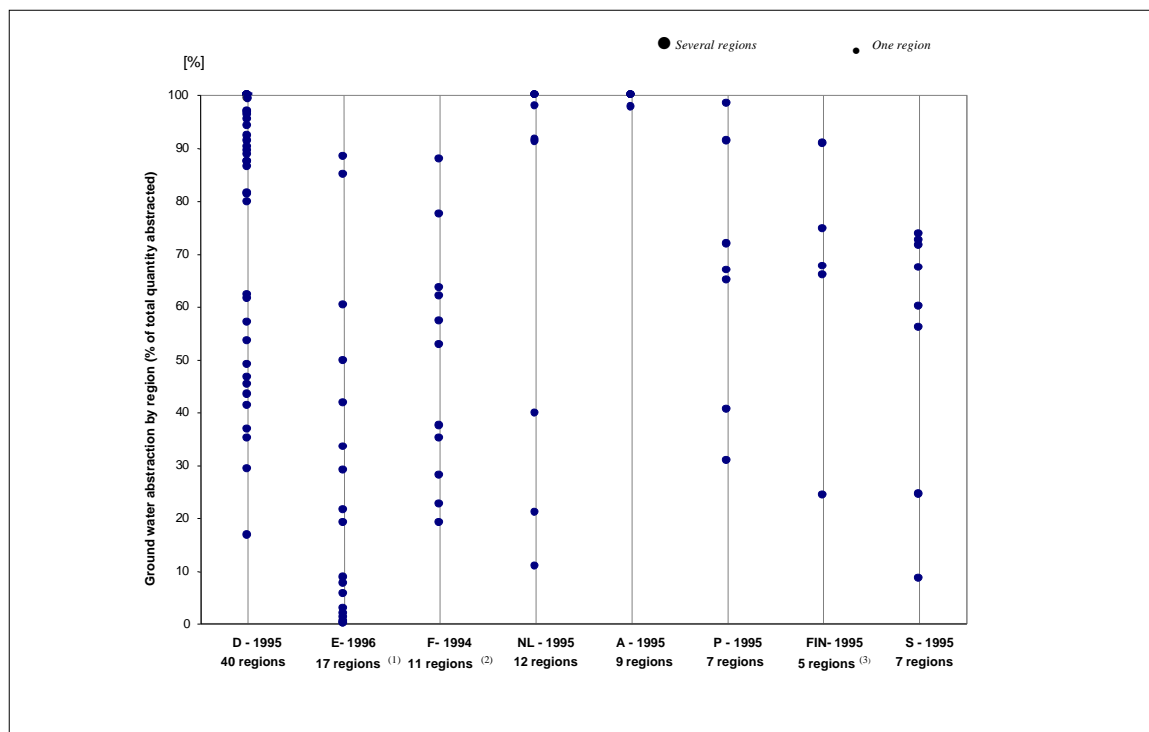
Surface water and ground water (renewable resources) are used to supply the public network. The distribution between these two resources varies between regions, thus highlighting the hydrological, geographical etc. features of each region.

The availability of plentiful ground water resources in the regions of Austria, Germany and the Netherlands means that they are used virtually exclusively in most of the regions of these countries (Figure 3).

This is because, whenever possible, ground water is preferred for supplying the public sector. Of better quality than surface water, it requires less treatment and thus costs less. In Finland, despite the many lakes, more ground water is used, except for supplying the major urban centres. Thus, for the capital city region of Uusimaa, only 25% of the water supplied by the public network comes from ground water resources. Similarly, the figure is 8% for the region of Stockholm (Sweden).

In southern Europe, most of the regions of Spain - Pais Vasco, Cantabria, Madrid, etc. - have to rely almost exclusively on surface water. Only the island regions - Islas Baleares and Canarias - use surface water at a rate of 88% and 85%. Similarly, Madeira (Portugal) uses ground water at a rate of 98%.

Figure 3: Abstraction of ground water for the public network in the regions of Europe (% of total abstraction).



- (1) Not including Ceuta y Mellila
- (2) Concerns the NUTS2 regions of Ouest, Sud-Ouest, Centre-Est and Méditerranée
- (3) Not including Aaland

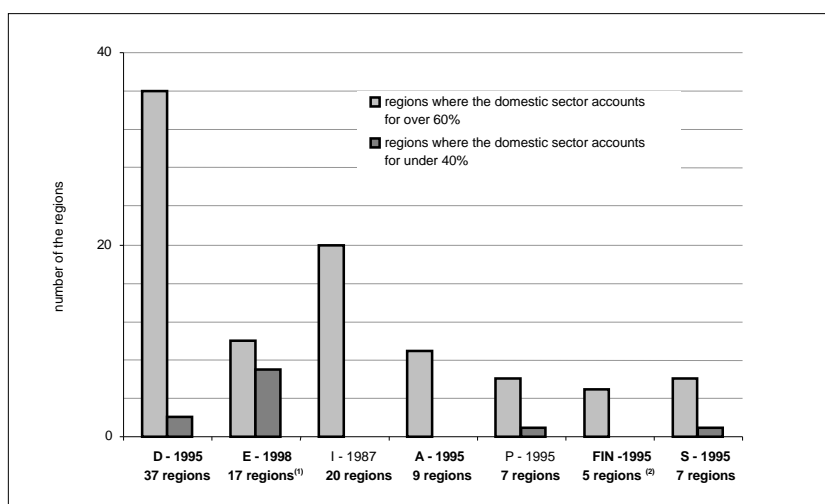
The public network supplies mainly the domestic sector

The quantities of water abstracted to supply the public network depend, *inter alia*, on the following:

- water losses during transport (e.g. leaks in pipelines). This parameter is not easy to study owing to water exports between certain regions;
- the extension of the distribution network to cope with an increasing number of customers;
- trends in water consumption by the sectors served by the public network, particularly the domestic sector.

The last parameter greatly influences the water requirement of the public network since, in most regions of the countries studied, the water it distributes is intended mainly for the domestic sector (Figure 4).

Figure 4: Proportion of the domestic sector in the abstraction of water intended for the public network at regional level.



- (1) Not including Ceuta y Mellila
- (2) Not including Aaland

Regional contrasts in the water consumption of the domestic sector

For the countries, reporting data, the trend in per capita water consumption by the domestic sector ranges over a roughly five-year period from +27% for Burgenland (A) to -51% for Açores (P) (Figure 5).

The domestic sector saw a decrease in its per capita consumption in most of the regions shown (70% of the regions).

The decreases were particularly marked in Germany, where there was a huge drop in consumption in some of the new *Länder*: Magdeburg (-43%), Mecklenburg-Vorpommern (-32%) and Dessau (-31%). Decreases in consumption were also recorded in a large majority of the old *Länder*. Consumption increased in only three of the 37 regions shown

In Portugal there were sharply contrasting regional situations. Per capita consumption fell sharply in: Açores(-51%), Centro (-31%) and Madeira (-14%), while in Norte and Alentejo it increased by 14% and 12% respectively. Lisboa e Vale do Tejo was the only capital city region in this study where water consumption by the domestic sector increased significantly (+12%).

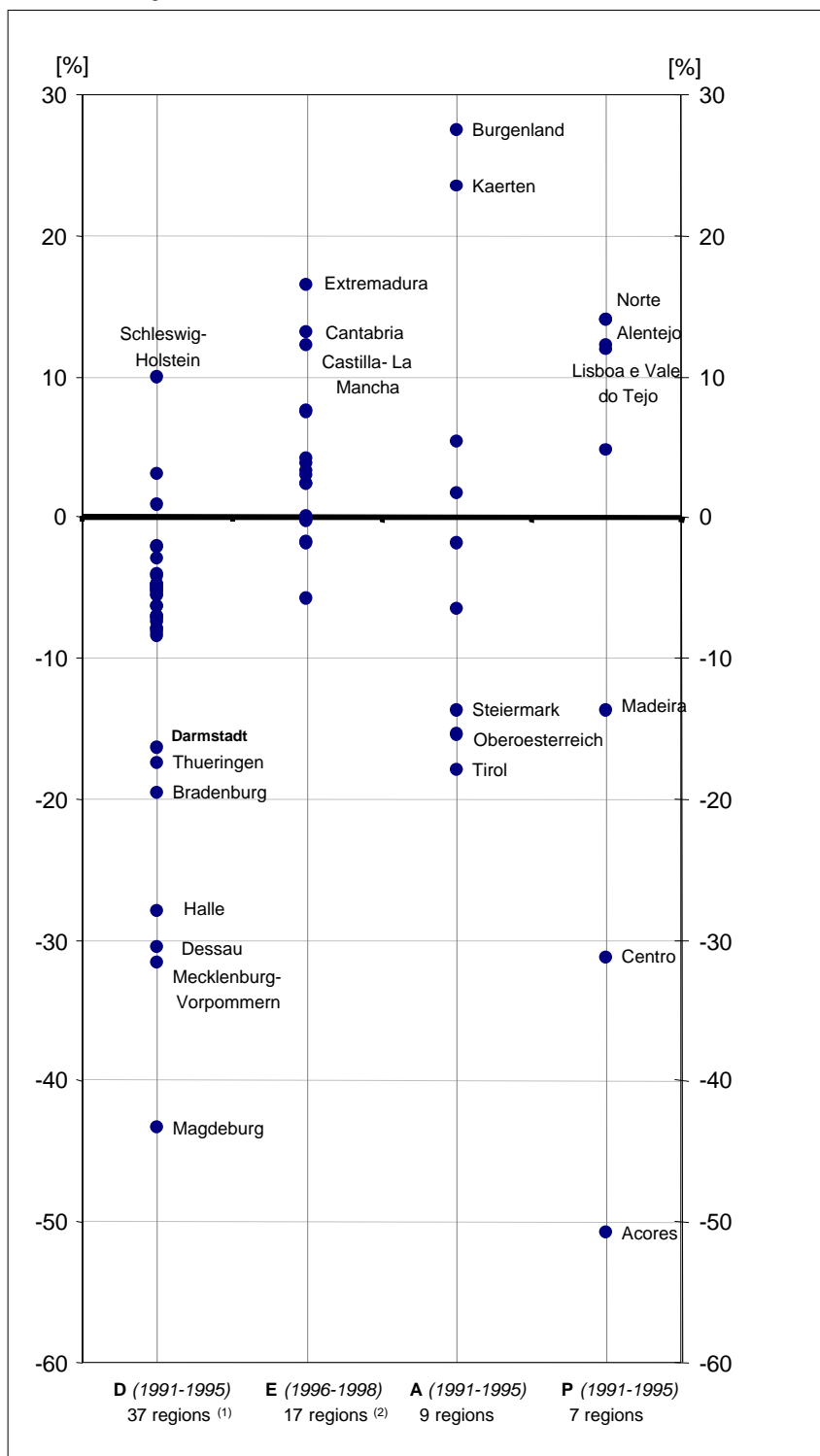
In Austria, the consumption of the domestic sector increased in the Burgenland (+27%) and Kärnten (+23%) regions, where the gross domestic product is relatively small. In contrast, Austria's eastern regions - Tirol and Salzburg - and Steiermark saw a decrease of about 15% in their per capita consumption.

The consumption of the domestic sector increased in most regions of Spain. The greatest increases were in the central regions of Extremadura and Castilla-la-Mancha and in the Cantabria region: between 12% and 16% over a period of only three years (1996-1998).

Figure 5: Water consumption by the domestic sector at regional level. Figures for 1991-1995 in litres per capita* per day.

Note: Water distributed by the public network. Only regions with variations exceeding 10% are shown.

* Cf. methodological note



(2) Not including Chemnitz, Dresden and Leipzig

(3) Not including Ceuta y Mellila

The Cantabria region (E) consumes three times more water than the Chemnitz region (D)

In the mid-1990s, water consumption by the domestic sector in the 5 studied countries ranged from 297 litres per capita per day in Spain (Cantabria) to 81 litres in Germany (Chemnitz) (Figure 6).

The domestic sector of the northern Spanish Cantabria region (297 litres) used almost three times more water than that of the Murcia region (104 litres) in the south of the country. The situation was reversed in Portugal, where consumption was greatest in the southern region of Algarve (218 litres) compared with 113 litres in Norte.

Sweden had a more uniform regional situation, with consumption ranging from 214 to 163 litres.

Depending on the region, the domestic sector also consumed water from self-supply sources. This secondary consumption, the proportion of which was variable, was in addition to the water supplied by the public network.

In Austria and Sweden, auto-supply is not negligible in certain regions. Figure 7 shows examples of these regions, where auto-supply can account, in terms of quantities abstracted, for almost half the volume of water distributed by the public network.

Oberösterreich recorded the lowest water consumption in Austria (Figure 6), but its auto-supply was proportionally the highest in the country.

Figure 6: Highest and lowest consumption by the domestic sector of water distributed by the public network (litres per capita* per day) at regional level

* Cf. methodological note

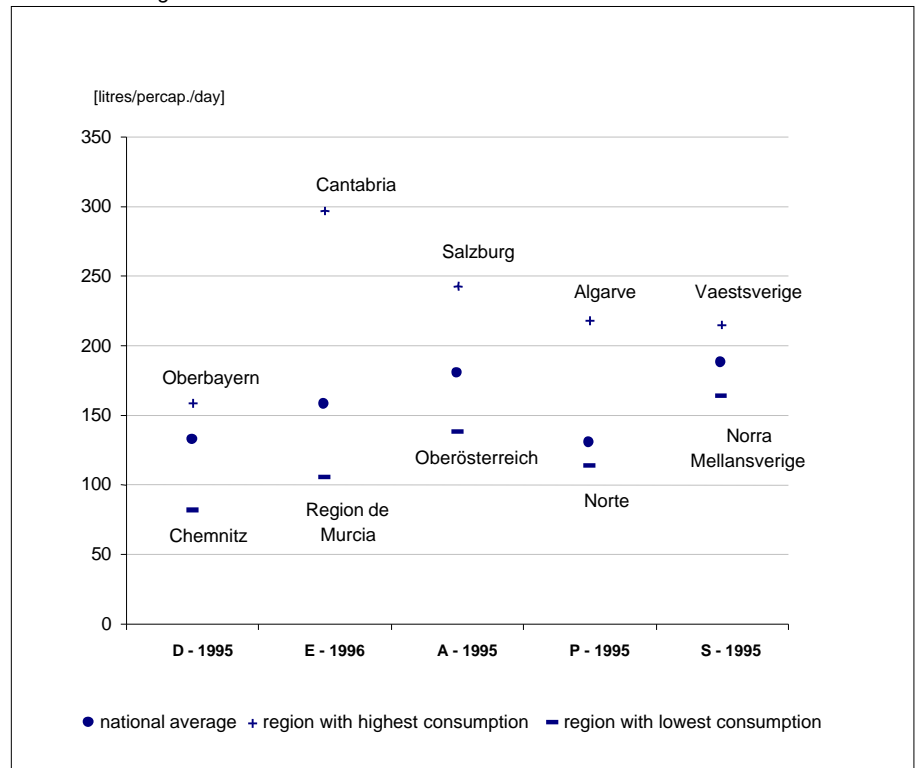
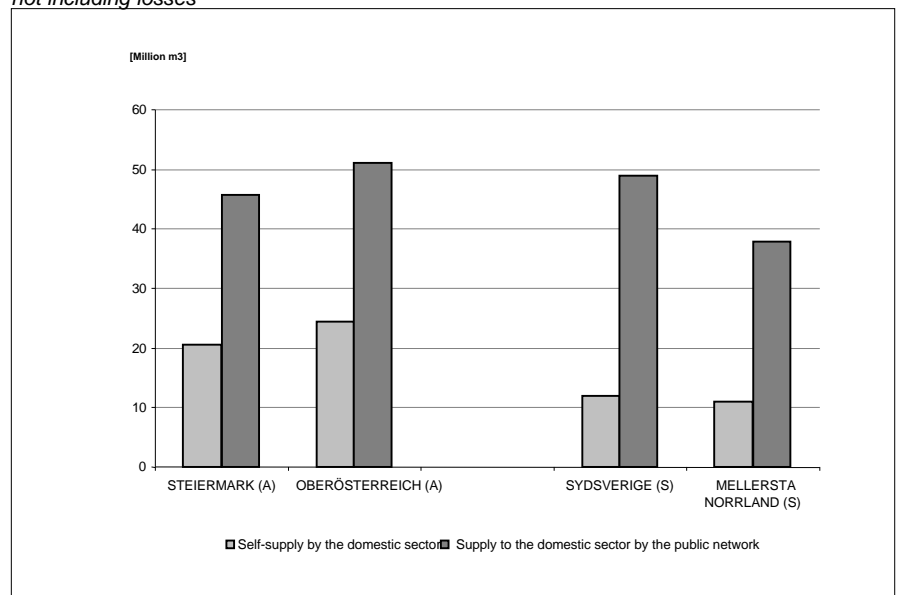


Figure 7: Comparison between domestic self-supply and supplies to the domestic sector by the public network in 1995

Note: self-supply: quantities of water abstracted; public network: quantities of water supplied, not including losses



The regions of southern Europe are catching up in the collection and treatment of waste water

The above table shows considerable differences in waste-water management between the regions.

European Directive 91/271/EEC concerning urban waste-water treatment lays down standards and minimum requirements and sets deadlines for their entry into force in all the Member States. Certain regions, particularly in southern Europe, have recently made very considerable improvements to their infrastructures in order to catch up.

For example, in Greece's second largest region, Kentriki Makedonia, the percentage of the population connected to public sewage plants rose from 10% in 1994 to 30% in 1998, and the capacity of such plants increased by 15% over the same period.

In 1998 the capital city region of Attiki, with 70%, had the highest connection rate in Greece.

In Portugal, 56% of the population of Lisboa e Vale do Tejo was connected to sewage plants and 88% to public sewerage.

In Germany, there are marked contrasts between the regions. The waste water of virtually the entire population of Bremen and Darmstadt is treated in public plants, while in the new *Länder* the corresponding figures for Dessau, Brandenburg and Thüringen are only 61% and 54%. Furthermore, 12% of the population of Dessau (69 000) and 35% of the population of Thüringen (876 000) are connected to public sewerage but not to a public sewage plant.

Sweden's waste water management is well balanced, since all waste water discharged into sewers is treated. The same percentage of the population is connected to public sewerage (between 95% and 75% depending on the region) as to public sewage plants.

Table 2: Connection of the population to public sewerage and public sewage plants. Comparison in 1995 or 1998 depending on the regions selected.

Note: for each country studied, the highest rates are shown in grey and the lowest in white.

	Total population		Population connected to public sewage plants		Population connected to public sewerage (mains drainage)		Population connected to public sewerage but not to a public sewage plant	
	1000 inhab.	% of total pop.	1000 inhab.	% of total pop.	1000 inhab.	% of total pop.	1000 inhab.	
BREMEN (DE)- 1995	680	100%	680	100%	680	0%	0	
DARMSTADT (DE) -1995	3685	99%	3648	100%	3685	1%	37	
DESSAU (DE) -1995	573	61%	350	73%	418	12%	69	
BRANDENBURG (DE)- 1995	2542	61%	1551	62%	1576	1%	25	
THÜRINGEN (DE) -1995	2504	54%	1352	89%	2229	35%	876	
ATTIKI (EL) -1998	3450	70%	24	82%	2829	81%	2805	
KENTRIKI MAKEDONIA (EL)- 1998	1799	30%	5	40%	720	40%	714	
IPEIROS- 1998	669	12%	1	2%	134	20%	133	
DYTIKI ELLADA (EL)- 1998	739	4%	0.30	26%	192	26%	192	
LISBOA E VALE DO TEJO (P) -1998	3306	56%	19	88%	2909	87%	2891	
ALGARVE (P)- 1998	344	63%	2	76%	261	75%	259	
ALENTEJO- 1998	531	59%	3	85%	451	84%	448	
NORTE (P)- 1998	3511	22%	8	49%	1720	49%	1713	
ACORES (P)- 1998	240	3%	0.07	38%	91	38%	91	
STOCKHOLM (S)- 1995	1726	95%	1640	95%	1640	0%	0	
OEVRE NORRLAND (S)- 1995	1769	87%	1539	87%	1539	0%	0	
SYDSVERIGE (S)- 1995	862	87%	750	87%	750	0%	0	
MELLERSTA NORRLAND (S)- 1995	795	79%	628	79%	628	0%	0	
SMAALAND MED OEARNA (S)- 1995	1264	79%	999	79%	999	0%	0	

Treatment plants improve their performance

The quality of treatment depends on the type of plant which treats the waste water. Plants providing advanced or biological treatment should therefore be preferred to mechanical treatment plants.

Since 1995 the capital city regions of Berlin and Stockholm have used exclusively advanced treatment. In 1993 the treatment capacity of Emilia-Romagna was shared between advanced (56%) and biological (42%). In 1994 the Greek region of Kentriki Makedonia used mostly mechanical treatment (81%), but by 1998 it had shifted largely to biological treatment (84%).

Table 3: Breakdown of public sewage plants in some major European regions by type of treatment

[% of total treatment capacity]	Mechanical treatment	Biological treatment	Advanced treatment
BERLIN (1995)	0	2	98
KENTRIKI MAKEDONIA (1994)	81	19	0
KENTRIKI MAKEDONIA (1998)	16	84	0
EMILIA-ROMAGNA (1993)	2	42	56
STOCKHOLM (1998)	0	0	100
STOCKHOLM (1995)	0	0	100

Ø WHAT YOU NEED TO KNOW – METHODOLOGICAL NOTES

The regional level refers to the geographical breakdown in the Nomenclature of Territorial Units for Statistics (NUTS) (*Regions, 1997 Statistical Yearbook; European Communities*). Data are collected at NUTS1 and NUTS2 levels. Since this new statistical domain is still being developed, the data are analysed simultaneously at NUTS2 and NUTS1 levels where the latter is not an aggregation of regions at the lower level.

The **number of inhabitants** used for the various calculations (per capita water consumption, inhabitants not connected to public sewage plants or to public sewerage) refers to the population actually connected to public sewerage, sewage plants or mains drainage.

The definitions of the parameters studied are those used by Eurostat in the Joint Eurostat/OECD 2000 Questionnaire. All the definitions are available on CIRCA

http://forum.europa.eu.int/Public/irc/dsis/envirmeet/library?l=/jq_2000&vm=detailed&sb=Title

DOMESTIC SECTOR: Depending on the definitions used in the countries, this covers either private households only or private households plus small businesses. Since there is a lack of harmonisation of the definitions, it is not possible to know exactly what definition is used in any given country..

WATER ABSTRACTION = WATER WITHDRAWAL: Water removed from any source, either permanently or temporarily. Mine water and drainage water are included. Water abstractions from ground water resources in any given time period are defined as the difference between the total amount of water withdrawn from aquifers and the total amount charged artificially or injected into aquifers. The amounts of water charged artificially or injected are attributed to abstraction from that water resource from which they were originally withdrawn.

SUPPLY OF WATER: Delivery of water to final users plus net abstraction of water for own final use (self-supply).

PUBLIC WATER SUPPLY: Water supply by water works. Deliveries of water from one public supply undertaking to another are excluded.

WATER CONSUMPTION: Water abstracted which is no longer available for use for various reasons. Water losses during transport between the point(s) of abstraction and the point(s) of use are excluded.

WASTE WATER TREATMENT: Process to render waste water fit to meet applicable environmental standards or other quality norms. Three broad types of treatment are distinguished in the questionnaire: mechanical, biological and advanced.

For calculating the total volume of waste water treated, volumes should be entered only under the "highest" type of treatment to which they have been subjected.

PUBLIC SEWERAGE: Sewerage networks for the evacuation of domestic and other waste water, operated by governmental, federal or local authorities, communities, water authorities or sewage/waste-water collection, discharge and treatment associations. This does not necessarily include waste water treatment.

PUBLIC SEWAGE TREATMENT: public sewage treatment is all treatment of sewage in municipal sewage treatment plants (MSTP) by official authorities or by private companies (for local authorities) whose main activity is sewage treatment.

TREATMENT CAPACITY: the total quantity of oxygen-demanding material that a waste water treatment plant is designed to treat per day with reasonable efficiency. This quantity is generally expressed in population equivalents.

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For information on methodology

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