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Preface

This regional compendium concerning environmental statistics in the Mediterranean countries which are partners of the European Union is an answer to the needs for information. It supplies not only figures to enable the quantifying of the situation, but also definitions and methodological information about data production and collection so as to give users a better understanding of the complexity and transversal nature specific to the field of the environment.

This work is a follow up to the compendium published in the same collection in March 2003. It is the visible result of the continuous work carried out by the twelve National Statistics Offices of the Mediterranean partner countries during the second phase of the MEDSTAT statistics cooperation programme launched and financed by the European Commission in the framework of the Euro-Mediterranean partnership.

Phase 2 of the MEDSTAT-Environment project, implemented by Plan Bleu from 2003-2006, is the continuation of the actions carried out in the first phase of the programme (1999-2003). The work carried out during these three years was aimed at reinforcing and consolidating the institutional capacities to produce national statistics that are recent, relevant, reliable and comparable from one country to the next because they have been harmonised according to international and European standards, while conserving the essential local specificities. In the first phase the project concentrated on the topics of water, waste and land use, while this second phase concentrated its activities on air pollutant emissions, biodiversity and the calculation of environmental indicators for sustainable development.

This second edition of the regional compendium is even richer than the first one. This enrichment is a quantitative one with the updating of existing series and the addition of information about the new areas covered by the second phase of the project. The qualitative effort is also noteworthy with improvements in the existing information in terms of harmonisation and the integration of international standards at national level. This considerable quantitative and qualitative work is the fruit of the combined efforts of the members (data users and producers), of the technical working groups gathered together around the National Statistics Offices, and of their national coordinators. Nevertheless, there are still gaps in the data collection and a lot of data is still absent or not fully harmonised. The countries are continuing their efforts to identify the areas where information is insufficient in order to set up progress paths in the short or medium term.

The 2006 edition of the regional compendium is the fruit of a collegial effort for which we would like to thank all the protagonists: the Mediterranean National Statistics Offices and the national institutions associated with the project for their investment and their precious collaboration, without forgetting Plan Bleu.

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Reading guide

This 2005 compendium on the environmental statistics of the Mediterranean countries is composed of a book and a CD -ROM.

The following work covers eight topics, grouped together in four parts: state and use of natural resources (land and forest, water, biodiversity) impact, environmental pollution (air pollution, waste, water quality and waste water treatment), environmental indicators for sustainable development, and annexes (geographical and socio-economic statistics, list of acronyms, list of sources, etc.).

For each topic the data presented corresponds to the tables of the joint OECD/Eurostat questionnaire 2004 on the state of the environment that is used for data collection in the framework of the Euro-Mediterranean statistics cooperation project MED-Env phase II. This essential tools for regional data collection and harmonisation was adapted to the Mediterranean context in consultation with the twelve National Statistics Offices (NSO) of the Mediterranean countries and with Eurostat at the start of the project.

The figures presented in this compendium are concentrated on the latest available years and on long-term series when available.

For each topic, the problem and the relevance of the information presented are indicated with a brief introduction, followed by definitions of the variables and by comments on the statistics presented. As this publication is the reflection of work to produce official environmental statistics and not a report on the state of the environment no causality analysis or response strategy is put forward.

Supplementary information concerning production and collection methodologies, as well as concerning the level of comparability of the figures presented in time and space is given in the form of boxes, to highlight the meta-data collected by the National Statistics Offices of the twelve Mediterranean countries. The specific cases of a number of countries are proposed at the end of some of the chapters in the form of « country files ».

The CD-ROM contains all the statistical information collected during the project, including all the topics not dealt with in this work, or only partially so, (e.g. environmental protection expenditures).

The CD-ROM is in two languages (English and French). It contains all the statistical tables and data collected and transmitted by the National Statistics Offices of the Mediterranean countries.

All of the data can easily be extracted from the tables and can be used dynamically on a spread sheet according to the users' requirements.

Extraction date

All the figures presented in this regional publication were communicated and validated by the National Statistics Offices of the 12 Mediterranean countries and represent the data that was available and transmitted on 31st January 2006. Cyprus, Malta and Turkey transmitted specifically data for the production of this regional publication. Therefore, recent figures for this three countries can differ from those published elsewhere.

Data sources

The systematic data collection of environmental data is a relatively recent activity. The data sources are often spread out over several agencies and administrative levels and the information is often collected for other purposes. As the national statistics offices are not the only producers of the data presented, the various primary national sources are indicated in annexe at the end of the document for all of the illustrations.

Order of the countries, codes and geographical coverage

The 12 Mediterranean countries are classified in this 2005 compendium in the alphabetic order of the two-figure ISO code for their country. While member states of the European Union since May 2004, Cyprus and Malta remain, for reasons of continuity, associated with the project until it ends.

The geographical coverage of the figures presented is national, unless otherwise indicated (measuring stations for urban pollution, measuring stations for water quality). Concerning Cyprus, the data transmitted corresponds solely to the part of the territory controlled by the government; in the case of the Palestinian Authority, the data refers to West Bank and Gaza Strip.

Countries and National Statistical Offices

ISO2	Usual name	Formal name	NSO	Full name
DZ	Algeria	the People's Democratic Republic of Algeria	ONS	National Statistical Office
CY	Cyprus	the Republic of Cyprus	CYSTAT	Statistical Service
EG	Egypt	the Arab Republic of Egypt	CAPMAS	Central Agency for Public Administration and Statistics
IL	Israel	the State of Israel	CBS	Central Bureau of Statistics
JO	Jordan	the Hashemite Kingdom of Jordan	DOS	Department of Statistics
LB	Lebanon	the Lebanese Republic	ACS	Central administration for Statistics
MA	Morocco	the Kingdom of Morocco	DS	Statistics Directorate
MT	Malta	The Republic of Malta	NSO	National Statistics Office
PS	Palestinian Authority	the Palestinian Authority	PCBS	Palestinian Central Bureau of Statistics
SY	Syria	the Syrian Arab Republic	CBS	Central Bureau of Statistics
TN	Tunisia	the Republic of Tunisia	INS	National Institute of Statistics
TR	Turkey	the Republic of Turkey	TURKSTAT	Turkish Statistical Institute

Symbols and codes

Figures in italic :	Plan Bleu estimate
e	Estimated value
-	real zero or zero by default
0	Less than half the final digit shown
|	break in series
d	day
inhab.	inhabitant
°C	Celsius grade
toe	ton oil equivalent
m	meter
ha	hectare
km^2	square meter
m^3	cubic meter
Mm^3	million of cubic meter
m^3/s	cubic meter per second
Mm^3/y	million of cubic meter per year
ml	millilitre
l/inhab/d	litre per inhabitant per day
Gg	gigagram
µg	microgram
mg	milligram
kg	kilogram
t	ton
Mt	million tons

µg/l	microgram per litre
$µg/m^3$	microgram per cubic meter
mg/l	milligram per litre
mg/m^3	milligram per cubic meter
g/inhab/an	gram per inhabitant et per year
kg/j	kilogramme per day
kg/inhab/an	kilogramme per inhabitant and per year
t/inhab/an	tonne per inhabitant per year
eq.	equivalent
ppa	purchasing power parity

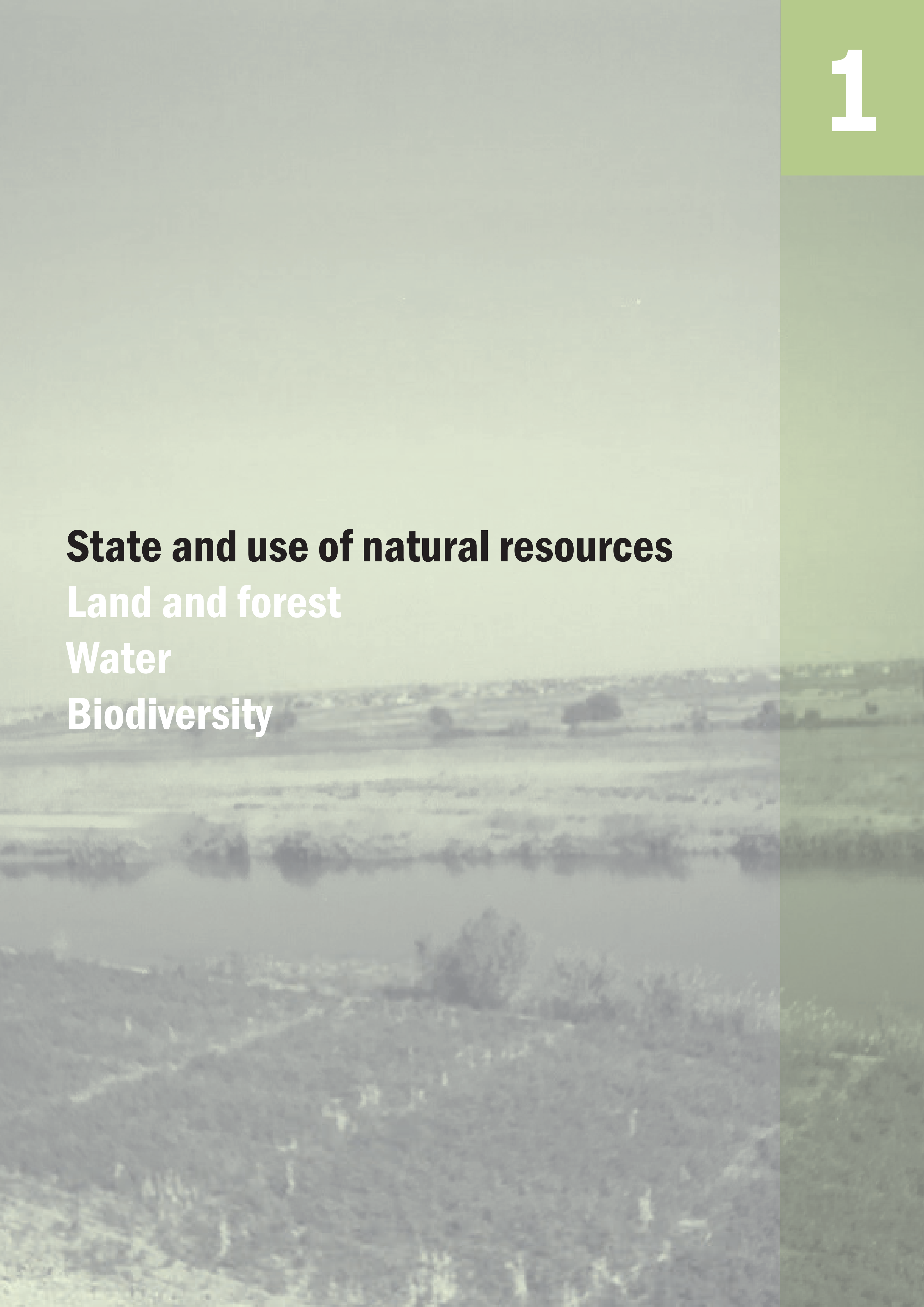
Summary

1. State and use of natural resources

2. Impacts, environment pollution

3. Environmental indicators for sustainable development

4. Annexes



1

State and use of natural resources

Land and forest

Water

Biodiversity

Land and forest

The monitoring of land use, of the evolution and degradation of the land enables the relative importance over time of the numerous human activities (agriculture, industry, urban development, and so on) and of the types of pressure that affect this land (erosion, bio-chemical processes, etc.) to be determined. The consequences of land use and of the measures to limit its effects can thus be assessed. It can, however, be observed that knowledge of land use in the Mediterranean region remains strongly linked to the economic activities (agriculture and forestry).

The absence of monitoring in all countries of the type of land use prevents a description of the rapid transformation underway in the Mediterranean region, especially the process of town development. Apart from this, the importance of irrigation and drainage in this region is not always taken into account sufficiently.

The amount of sunshine, the moderate geographical relief and accessibility are undeniable assets for the development of human activities, for diversifying agricultural production systems as well as for trade. Yet, phenomena such as land erosion, desertification and salinity make the Mediterranean land fragile and sometimes irreversibly threaten the current land uses.

The functions of the environmental protection of forests, such as combating erosion and desertification, and protecting river basins and irrigated perimeters, their contribution to the national economy and to meeting the needs of rural populations, are recognised by all the countries. The renewal and production of forests are still limited, however, by natural factors (drought, land quality) or by anthropological factors (overuse of pasture land, growing demand for products, fires).

The terms and definitions used are taken from the EEC-UN classification of standard statistics for land use. The definitions concerning forests and other wooded areas are based on the EEC-UN/FAO analysis of forest resources in the year 2000.

Land use

Total agricultural land includes land under scattered farm buildings and permanently uncultivated land, as well as the sub-categories that follow.

— **Arable land** refers to all land generally under rotation or left fallow. The latter refers to the land set at rest for a period of time ranging from one to five years before it is cultivated again.

— **Land under permanent crops** signifies land used for crops occupying it for a long period of time and which do not have to be planted for several years after each harvest (vineyards, fruit trees). Permanent meadows and pastures are excluded.

— **Land under permanent meadows and pastures** means land used permanently (i.e., for five years and more) for herbaceous forage crops. Permanent meadows and pastures on which trees and shrubs are grown should be recorded under this heading only if the growing of forage crops is the most important use of the area.

— **Other agricultural land** includes all agricultural land, which is not specified previously. Such land may be potentially productive or not and include scattered farm buildings.

Built-up and related land designates land under houses, roads, mines and quarries and any other facilities, including their auxiliary spaces linked to human activities. Included are also city parks and gardens and land under closed villages or similar rural localities

The following major sub-categories can be distinguished : residential land, industrial land (mainly manufacturing activities), land used for quarries, pits, mines, and related facilities, commercial land, land used for public services (technical facilities, transport and communication excluded). Land for mixed use refers to the land to which none of these uses can be attributed.

Wetlands are non-wooded sites either partially, temporarily or permanently water-logged, the water of which may be fresh, brackish or saline, on blanket or raised peat lands. The water may be either stagnant or running, and is usually shallow, especially if it is saline.

Natural open land include non-wooded land covered by low vegetation (less than 2 m), as well as land the surface of which either is not covered at all by vegetation or scarcely covered by some vegetation. Deserts are included in this category.

Table 1.1 supplies an overview of recent land use in the south and east Mediterranean countries. In all countries, agricultural land is the surface where monitoring is the most regular and the most reliable, even though it represents on average less than 27% of the total surface area of the countries. This type of land ranges from 3.24% in Egypt to 77% in Syria.

The natural open lands include desert land, the surface area of which is considerable in this arid region. Desert land is at a maximum in Egypt, and covers approximately 90% of the total surface area.

The classification of the forests and other wooded land calls on various national and international classifications. In Cyprus this type of land corresponds to the land administered by the forestry department, which partly explains the relative size of these surfaces (more than 40% of the total surface area, almost double the area of land used for agriculture).

Knowledge of Built-up land is the least known land and data is imprecise and sporadic, except in Syria where surveys have been carried out since 1970 (Cf. table 1.2).

Malta has the highest level of urbanisation with 23% of its total surface area developed. The remainder is occupied by industrial surfaces, transport and communication facilities, and quarry areas (Cf. figure 1.1). With about 8% of the total surface area,

Table 1.1 Land use per country (% of total area, last year available)

		Total agricultural land	Forest and other wooded land	Built-up and related land	Wetland	Open land	Waters
CY	2003	21.53	41.76 [1]	2.20 [2]			*0.11*
DZ	2003	17.14	1.71		1.24 [3]		-
EG	2000	3.24	0.00 [3]	*7.65*		88.99	0.25
IL	2002	25.41	8.72	7.48	-		1.95
JO	2003	*17.01* [2]	1.16				*0.31*
LB	2004		*1.30*		0.05		
MA	2003	12.72	12.80		0.40		*0.04*
MT	2000	33.90	4.23	23.22	0.51	36.26	0.32
PS	2003	23.94	1.48	9.43 [2]			3.03
SY	2002	77.01 [4]	3.11	3.39	-	15.75	0.80
TN	2004	60.09	5.08 [6]	1.10 [6]	4.01 [5]	31.84 [6]	
TR	2001	*54.77*	*13.05*				*0.66*

Notes: 1: 2002; 2: 2000; 3: 2004; 4: 2001; 5: 1997; 6: 1995.

the urbanised areas in Egypt are double the total agricultural surfaces.

Table 1.3 and figure 1.2 show a significant increase in non-residential buildings in Jordan. Refer to methodology box 1.1 on this matter and to the general statistics in part 4.

Concerning agricultural land (Cf. table 1.4), the figures supplied by the countries show heterogeneous monitoring over time. A continuous drop in the total agricultural land during the last decade can be observed in Cyprus, partially explained by growing town development. In Algeria, the growth in the surface areas hides the loss of the more fertile land in the north due to the extension of the main urban districts compensated by development in the south of new agricultural areas.

In Egypt, a regular increase in the agricultural areas can be explained by categorisation of land reclaimed from the desert. It is not certain that the reclassifying of the agricultural land of the delta as an urbanised area was carried out at the same pace as the counting of this new land.

In Jordan the classifying of pasture land as agricultural land during the 2000 census prevents the observed trend from being confirmed. The drop noticed in Malta corresponds to the urbanisation there as well as to the relative abandoning of agricultural activities.

The large increase in agricultural land in Tunisia since 1999 can be explained by the introduction for the first time of the surface belonging to the governorate of Tataouine following the creation of a statistics department in this governorate, and by the reclassifying of desert areas as pasture land.

In figure 1.3, Turkey and Algeria can be seen to be the countries with the largest agricultural surface area, 429 156 km² and 408 179 km² respectively. However, as a percentage of the total surface area, this represents over 50% in Turkey and 17% in Algeria. Syria, Turkey and Tunisia are countries where the total agricultural surface area is more than half of the total surface area (up to 77% in Syria).

Nevertheless, the composition of the agricultural land varies greatly from one country to the next

Table 1.2 Built-up and related land in Syria (km², 1970-2002)

1970	1980	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002
3224	3267	4017	5871	6113	6124	6113	6191	6198	6173	6192	6280

Table 1.3 Distribution of built-up land excluding residential in Jordan (km², 1987-1998)

	1987	1988	1989	1990	1995	1996	1997	1998
Industrial land	0.03	0.06	0.10	0.15	1.00	1.14	1.26	1.33
Commercial land	0.07	0.16	0.26	0.36	1.54	1.74	1.93	2.11
Land used for public services (excluding transport and communications)	0.03	0.08	0.25	1.09	1.48	1.57	1.76	1.85
Land of mixed use	0.08	0.14	0.18	0.22	1.55	1.84	2.06	2.31

Figure 1.1 Detail of built-up and related land in Malta in 2000 (km²)

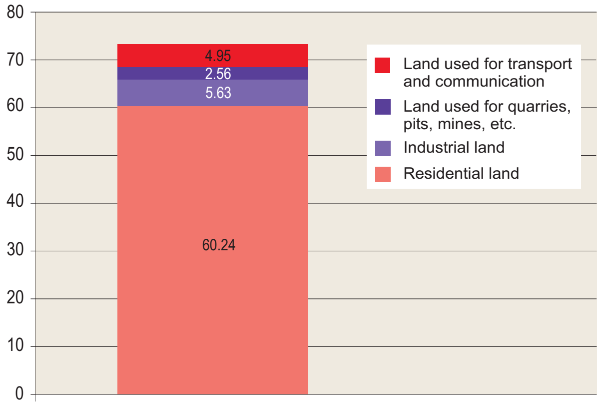


Figure 1.2 Built-up land excluding residential in Jordan (km², 1987-1998)

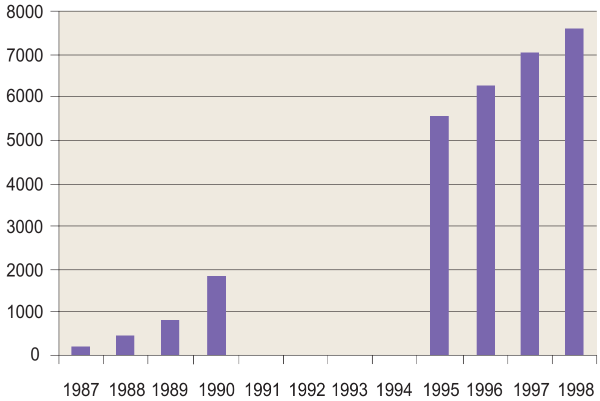


Table 1.4 Total agricultural land (km², 1994-2003)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY	2010	2005	1997	2005	1993	1993	1973	1967	1959	1992
DZ	405 967	406 518	405 410	406 630	407 325	405 963	408 881	409 838	407 359	408 179
EG	30 224	31 044	31 878	31 752	32 603	32 905	32 425			
IL						6080	5660	4259 [1]	5626	
JO		11 730					15 200			
LB										3397 [2]
MA	68 980	92 900			92 400	91 400	90 200	89 900	89 750	90 410
MT				110			107			
PS				1486	1505	1368	1515	1495	1516	1487
SY		142 658	142 683	142 694	142 513	142 618	142 642	142 612		
TN		80 012		76 283	79 402	95 264	95 508	95 000	97 630	97 846
TR	422 092	413 722	415 242	414 022	415 072	413 402	409 172	429 156		

Notes: 1: excluding permanent meadows and pastures; 2: arable land, data 2004.

(Cf. figure 1.4). The extreme heterogeneousness of definitions distorts the comparison between countries. In Tunisia, Algeria, Jordan and Syria for example, desert land for cattle feeding and pasture is important and classified under the permanent crops category.

Cyprus, Tunisia and the Palestinian territories stand out as having the highest share of land devoted to permanent crops. In the latter country it comprises almost 80% of the agricultural land. Olive trees have a predominant place.

In Egypt total agricultural land is only a little more than 3% of the country's surface area, but comprises about 90% of arable land, with up to three harvests per year. Indeed, in some publications the Egyptian Ministry of Agriculture considers the yearly agricultural area as the result of the number of harvests per the real cultivated area.

In Cyprus desert land and uncultivated land are included in the category other agricultural land, thus explaining their relatively high share compared to the other countries. In all countries a continuous relative drop in the arable land can be seen over the last decade, except in Algeria, Cyprus and Morocco where a stable situation can be observed.

Figure 1.3 Total agricultural land (km², last year available)

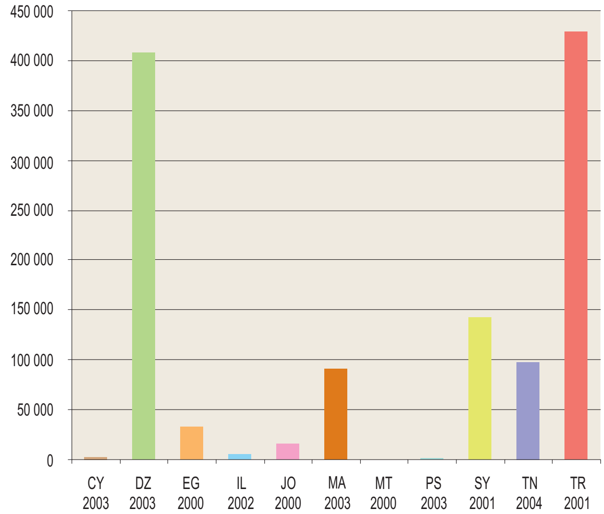
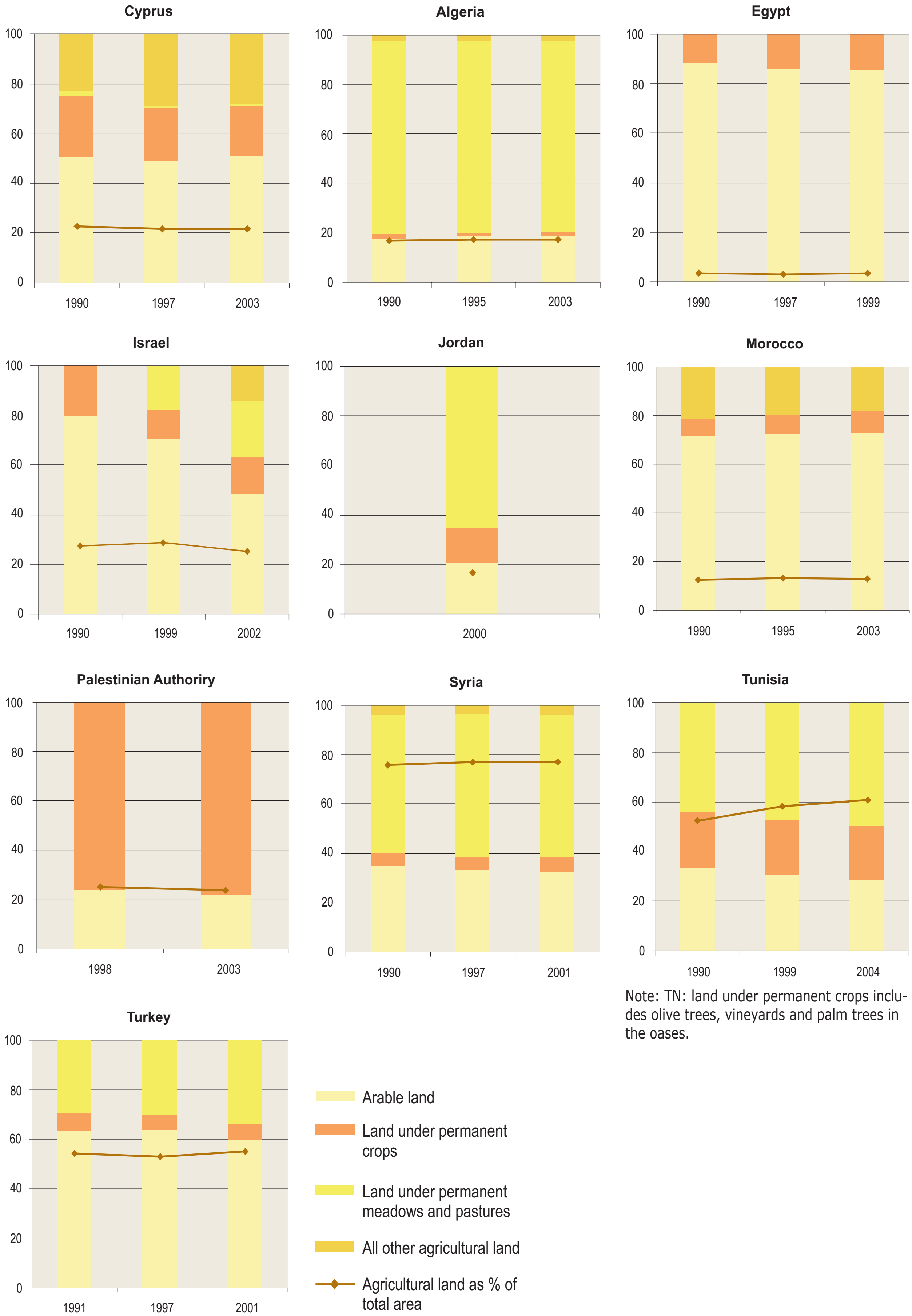


Figure 1.4 Share of agricultural land and classes (%, 1990-2004)



Note: TN: land under permanent crops includes olive trees, vineyards and palm trees in the oases.

Box 1.1 Land use

The data was collected at national level from 1950 to 2004 with series that are globally longer than those for the other environmental topics. Except for the change in classification in Israel which broke off the series, the level of comparability of the data over time is relatively satisfying for the agricultural data (CY, DZ, EG, JO, TR) and for the forestry data (CY, IL, JO, MA, TN). The monitoring of the other uses suffers from considerable discontinuity in the surveys.

The use of different units of measure in the countries (ha, km2, feddans, etc.) and the nuances in the definitions make the comparability of the data among the countries somewhat difficult. Indeed, in Jordan the definition of urbanised areas differs dramatically since it is applied to the inhabited surface areas and not the land area. In Cyprus the definition of forests differs, while the agricultural sub-categories cannot be easily applied in Egypt and in Syria. An infra-national scale sometimes proves to be more pertinent in this region where the spatial division of human activities is very much polarised, especially in the coastal areas. Comparison with the European countries proves difficult in these circumstances.

The data concerning land use transmitted by all the NSIs in the framework of the MED-Env project was obtained by means of national censuses and administrative registers during periodical surveys (mostly annual for agriculture). Some countries have set up land use surveys using remote sensing techniques. Cyprus, Israel, Malta, Morocco and Turkey also have data on land use obtained with aerial photographs (ortho photos). As these studies are selective, they do not permit a description of the evolution of land use.

In most of the countries land use is monitored by several institutions depending mainly on the nature of the land use. Monitoring of agricultural land is managed by the Ministry of Agriculture that still holds larger prerogatives in most of the countries, except in Egypt, Jordan, Malta and Tunisia where the Ministries of Environment, planning or employment are in charge of other uses. Forests are managed by ad hoc directions in Cyprus, Algeria, Morocco and Tunisia and depend on a Ministry in Turkey. There is a risk of overlapping between institutions especially for this topic.

Land degradation

Land degradation refers to the land affected by water and wind erosion. Land degradation caused by desertification, salinity, compaction and pollution (pesticides, heavy metal, etc.) is not dealt with.

Only Cyprus, Algeria, Morocco and Tunisia have attempted to monitor these phenomena.. However, coherent series over time are sadly lacking. Nevertheless, national monitoring should not hide the problems of land use that can be seen elsewhere at infra-national level or only in certain regions such as in coastal areas, mountainous areas, energy supply production or operating areas, as well as in areas prone to flooding.

One of the major problems in the Mediterranean countries due to land degradation is the silting of reservoirs.

Egypt, Morocco, Tunisia and Turkey are confronted with this problem. The land use Directorate in Tunisia estimates that more than 56 000 hectares of agricultural land were affected by this phenomenon during the period 1990-1994. The implementing of studies often depends on international funding at specific moments which does not allow for continuity over time. The data for Algeria was produced in the context of the forest and land inventory carried out in 1980.

Figure 1.5 Area affected by erosion in Algeria in 1980 (ha)

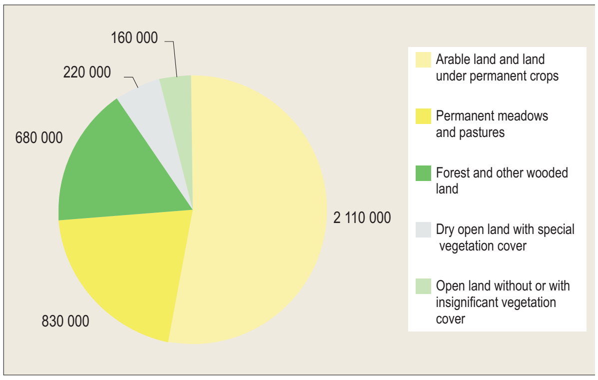
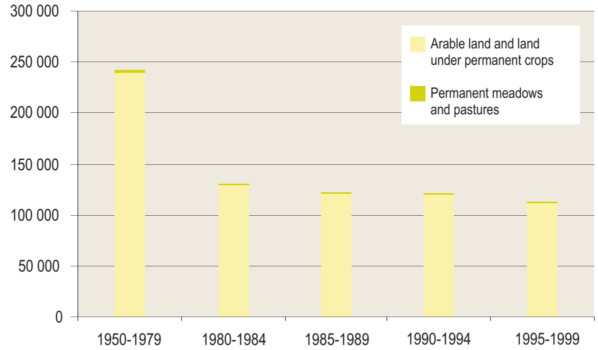


Figure 1.6 Area affected by total erosion in Cyprus (ha, 1950-1999)



Forest

Forest refers to land with tree crown cover of more than 10 percent and area of more than 0.5 ha. The trees should be able to reach a minimum height of 5m at maturity in situ. Young natural stands and all plantations established for forestry purposes which have yet to reach a crown density of 10 percent or tree height of 5m are included under forest, as are areas normally forming part of the forest area but which are temporarily unstocked as a result of human intervention or natural causes but which are expected to revert to forest. Also included are forest nurseries and seed orchards and other small open areas within the forest, forest in national parks, nature reserves and other protected areas, windbreaks and shelterbelts of trees with an area of more than 0.5 ha and a width of more than 20m.

— **Forests predominantly composed of coniferous/broadleaved trees** are those forests in which more than 75% of the tree crown cover consists of coniferous/broadleaved trees. Forests in which neither coniferous, nor broadleaved, nor palms, etc account for more than 75% of the tree crown area are called mixed forests.

Turkey alone represented over 57%, followed by Morocco, Algeria and Tunisia with 25.25%, 11.27% and 2.35% respectively.

Table 1.5 shows positive evolution in forest land in all of the countries. It remains stable in Malta and in the Palestinian territories, and in neither country do they form a significant part of the economy. The highest increase in surface area is in Turkey, Algeria and Cyprus. The trend is the highest in Cyprus and in Egypt. These changes are mainly due to plantations. The high rate in Egypt can be explained by the fact that the very small surface area makes any increase considerable in terms of percentage of the land. The rate in Cyprus is unclear as the figures do not correspond to those published by the FAO (Cf. methodology box 1.2).

Figure 1.7 identifies the total surface areas for forests and other wooded lands on a logarithmic scale in each country in 2000.

The trends observed in the countries are not for periods that are exactly identical, but they are confirmed elsewhere (FAO 2002). Figure 1.8 presents the

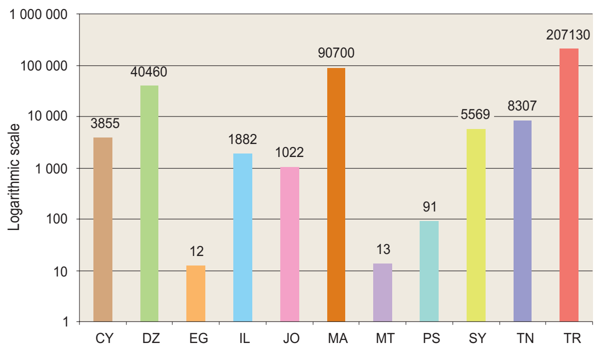
Table 1.5 Forest and other wooded land (km², 1995-2004)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CY	1 701			3 855		3 855		3 863		
DZ	38 550					40 460			40 710	
EG					12	12				23
IL					1 860	1 882	1 950	1 942	1 966	
JO	972	989	1 010	1 016	1 019	1 022	1 026	1 030	1 034	
MA	90 330	90 425	90 496	90 538	90 558	90 700	90 710	90 880	91 010	
MT			13			13				
PS					91	91	92	92	92	
SY	4 929	5 097	5 215	5 368	5 464	5 569	5 663	5 750		
TN	8 307									
TR	201 990	201 990	207 030	207 030	207 030	207 130				

— **Other wooded land** is land which has either a tree crown cover (or equivalent stocking level) of 5-10% of trees able to reach a height of 5m at maturity in situ; or a crown cover of more than 10% of trees not able to reach a height of 5m (e.g. dwarf or stunted trees) and shrub or bush cover.

Forest land is very different from the south to the east Mediterranean. The Mashrek countries (Egypt, Israel, Jordan, Palestinian Authority, Syria) are among the countries with the fewest forests. They represented less than 1% of the total forest cover for the region in 2000 (Cf. table 1.5), while

Figure 1.7 Forest and other wooded land in 2000 (km²)



Note: TN: inventory 1995.

evolution in forest land in Jordan and Syria where the relative increase is significant.

Jordan has little forest land. The natural forests are not very dense; they are damaged and are not demarcated or defined on maps. by The Ministry of Agriculture and the private sector began planting about sixty years ago, the latter being more present here than in the other Mediterranean countries. An increase in the surface area since 1955 is due exclusively to planting and sowing.

Plantations on roadsides and hedges that act as wind-shields represent a non negligible proportion of the total forest cover. Their classification in standardised categories is likely to distort matters. Most of Jordan's national production is not ligneous.

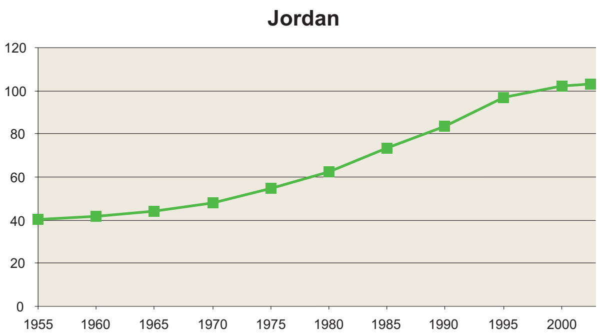
Table 1.6 gives details of the forest land by species for some countries. In Cyprus estimates are based on experts' assessments.

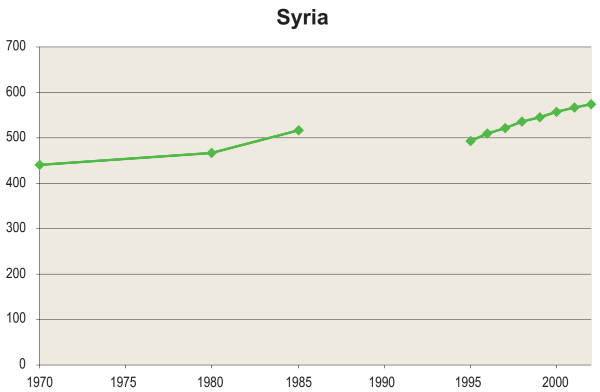
Forests in the Mediterranean region are made up of production forests, of degraded forests and of unproductive forest land (Cf. figure 1.9). The predominant species are pines and oaks.

Territorial forest planning exists in most of the countries. Algeria and Tunisia include production forests in their plans. Algeria and Turkey also have a vast planting programme. Cyprus, Morocco, Syria and Turkey have set up national forestry programmes which are concerned with the management of natural forests.

The extent of natural forest land is closely linked to annual precipitation. For this reason, the natural forests are concentrated in the coastal areas of Algeria, Morocco and Tunisia and in the mountains of Cyprus and Turkey, whereas xerophyte species can be found in desert areas. In Egypt natural forests are considered to be non existent. There is a forest irrigation programme there using recycled water.

Figure 1.8 Trend in total forest area (1000 ha, JO 1955-2002 and SY 1970-2002)





Box 1.2 Forest

Few countries have national forest inventories. In Algeria the sole inventory goes back to 1982, but more recent surveys have begun to update it. The inventories for Morocco and Tunisia were made in 1995 and in 1996. As for Cyprus, Egypt, Israel, Jordan, Syria and Turkey, the data is from secondary sources (FAO 2002).

The difficulty in assessing the forest area comes from the differences in the classifying of forest types by the countries and by the FAO. Differing vegetation components are classified as forest land by the countries. This is the case for shrub formation of the scrub or brush type (maquis) that is common in the Mediterranean: 327 747 hectares are covered with this type of vegetation in Tunisia. The total or partial integration of this vegetation in the figures communicated by the national authorities could be responsible for considerable differences with the figures from international sources.

Standardised definitions can also give problems when the wooded land has several uses (e.g. pasturage). As forests are one of the land use categories, data is sometimes reproduced and included differently by other producers.

Table 1.6 Forest area by species group in a few countries (km², 1950-2003)

		Total forest and other wooded land	of which predominantly coniferous	of which predominantly broadleaved	of which predominantly other essences	of which mixed forest	of which other wooded land
CY	1950	1 597	1 080	10			507
	1970	1 680	1 163	10			507
	1980	1 678	1 161	10			507
	1985	1 701	1 184	10			507
	1990	1 701	1 184	10			507
	1995	1 701	1 184	10			507
	2000	3 855	1 706	10			2 139
	2002	3 863	1 714	10			2 139
DZ	1955	51 850					20 000
	1966	49 900					
	1980	39 168	9 244	4 380	1 160		24 384
	1985	36 681	9 292	4 284	1 160		21 945
	1995	38 550	9 004	4 290	1 160		24 096
	2000	40 460	9 280	4 290	1 330		25 560
	2003	40 710	9 280	3 210	2 190		26 030
TN	1995	8 307	3 691	1 339		1 329	1 948
TR	1970	201 992	50 991	37 573			113 428
	1975	202 426	52 118	37 347			112 961
	1980	203 511	54 934	36 783			111 794
	1985	204 595	57 750	36 219			110 626
	1990	205 680	60 567	35 655			109 458
	1995	201 990	63 383	35 090			108 291

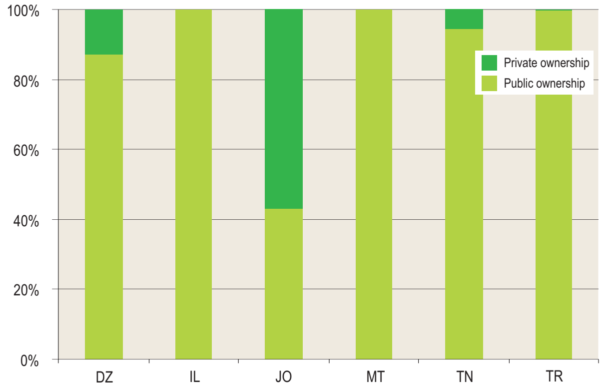
Figure 1.9 Forest area by species group in a few countries (%, last year available)

Most of the time, forest land belongs to the state, although some variations from one country to another can be observed concerning the ownership system and the land rights of the local populations (Cf. figure 1.10). In Tunisia and Morocco the private land share is composed entirely of plantations.

As the main function of forest cover in this region is to protect the land from erosion and to conserve the landscapes from degradation, many national parks have been created and these also conserve habitats.

Refer to the chapter on biodiversity concerning this aspect and to the chapter on indicators for the rate of forest protection and the yearly surface areas set on fire.

Figure 1.10 Forest ownership in 1997 (% of total forest area)



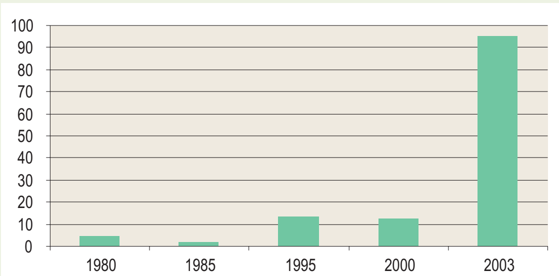
Country file 1.1 The Algerian forest

Algeria is the third contributor to Mediterranean forest land after Turkey and Morocco.

Aleppo pine (Pinus halepensis) is the most widespread species in the territory. Most of the species are scattered and many of the forests are suffering from degradation. Nevertheless, forests are a natural resource to which the country gives great importance.

An increase in land available for wood production indicates the size of the needs for the manufacturing and building industries. Despite this, these industries only represent a small percentage of the wood used and national production remains far below the total demand for ligneous products (FAO 2002).

Forest available for wood supply (%, 1980-2003)



Growing stock of standing volume by type of tree (1000 m³, 2000)

Aleppo pine tree	856
Cedar	67
Maritime pie	29
Eucalyptus	145
Oak tree Zeen and Afares	127
Green oak tree	53

Algeria has launched the largest planting programme in the Maghreb. The table below shows an increase of more than 60% of forest area in public ownership between 1990 and 2003.

The allocating of vast parcels of land for conservation purposes demonstrates the nation's desire to preserve its natural reserves.

Trend in forest ownership (1000 ha, 1990-2003)

	1990	1991	1992	1993	1996	1997	1998	1999	2000	2003
Forest in public ownership	2300	2314	2276	2003	2450	2587	3370	3156	3696	3697
Forest in private ownership	350	350	350	350	298	384	436	466	350	350

Case study 1.2 The Turkish forest

Turkey alone represents more than half of the Mediterranean forests in terms of surface area. The largest plantation areas of the region can be found here.

It is the only country where the contribution by the forestry sector to the GNP is distinguished from the contribution by agriculture, because it is an independently managed sector. This contribution represents only 0.8% of the GNP but this does not include the indirect profits (FAO 2002).

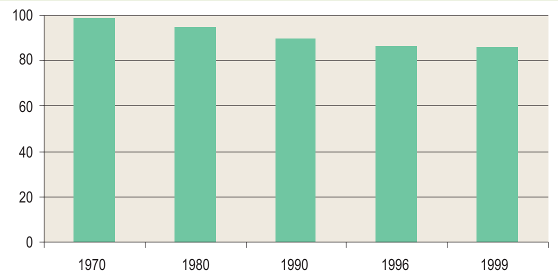
Continuous assessments have been available since 1970 for a large panel of variables including wood supply, the growth in resources in terms of volume and the main types of growing stock of standing volumes.

The forest land is overall increasing but there is a noticeable drop in the share available for wood supply.

Forest available for wood supply (1000 ha, 1970-1999)

	1970	**1980**	**1990**	**1996**	**1999**
Total forest area	8 856	9 172	9 622	9 954	10 028
Forest available for wood supply	8 730	8 704	8 657	8 635	8 645
— Predominantly coniferous	5 018	5 160	5 425	5 547	5 561
— Predominantly broadleaved	3 712	3 544	3 232	3 088	3 084
forest not available for wood supply		468	965	1 319	1 383

Forest available for wood supply
(%, 1970-1999)



Forest area by management and protection status (% of forest area, 1970-1999)

	Managed forest	**Protected forest**	**of which IUCN or equivalent**	**of which categories I+II**
1970	100	1	71	100
1980	100	5	19	100
1990	100	10	11	98
1996	100	13	14	95
1998	100	13	14	95
1999	100	14	14	95

Growing stock and woody biomass on forest (1970-2000)

	Growing stock of standing volume (Mm^3)									**Woody biomass on forest (Mt)**	
	Trees on forest										
					available for wood supply						
	Total	**Coniferous**	**Broadleaved**	**Other**	**Total**	**Coniferous**	**Broadleaved**	**Other**	**not available**	**above stump woody biomass**	**other woody biomass (stump, roots)**
1970	1044.60	658.44	386.16	-	1032.35	649.73	382.63	-	12.25	1044.60	176.00
1980	1083.05	693.15	389.90	-	1030.15	653.39	376.76	-	52.90	1083.05	181.95
1990	1215.93	790.35	425.58	-	1085.07	694.92	390.15	-	130.86	1215.93	203.67
1996	1349.32	890.77	458.55	-	1187.31	776.13	411.18	-	162.01	1349.32	225.33
1998	1352.95	894.07	458.88	-	1187.55	776.98	410.57	-	165.40	1352.95	225.89
1999	1366.36	906.44	459.93	-	1195.59	784.43	411.16	-	170.77	1366.36	227.95
2000	1349.32	890.77	458.55								

Depletion and growth of forest resources in terms of volume (1000 m^3, 1970-2000)

	Fellings			**Gross increment**			**Net change**		
	Total	**Coniferous**	**Broadleaved**	**Total**	**Coniferous**	**Broadleaved**	**Total**	**Coniferous**	**Broadleaved**
1970	20 812	11 382	9 430	30859	18491	12 368	10 047	7 109	2 938
1980	24 911	13 720	11 191	30223	19170	11 053	5 312	5 420	-138
1990	16 448	9 303	7 145	31834	20388	11 446	15 386	11 085	4 301
1996	17 380	9 843	7 537	34177	20752	13 425	16 797	10 909	5 888
1998	15 126	9 505	5 621	34146	20731	13 414	19 020	11 226	7 793
1999	14 902	9 221	5 681	34278	20847	13 431	19 376	11 626	7 750
2000	17 380	9 843	7 537	34177	20752	13 425	116 797	10 909	7 750

Water

This chapter describes the situation of water resources and uses in the Mediterranean countries.

The water balance consists of the assessment of the volume of the total water resources in a territory on the basis of precipitation, losses due to evapotranspiration and real external contributions. The calculation of the proportion of total fresh water resources available for annual abstraction provides information about the long term availability of water intended for human consumption.

Some countries use renewable resources to such an extent that natural recharge is surpassed and recourse to non-renewable resources and/or so-called «non conventional» sources (mainly desalinated water and recycled water) proves necessary. The creation of dams and artificial water storage systems, technological progress (limitation of losses during transportation, pressurized distribution networks) and economic instruments to control demand are efficient methods to increase the availability of this resource, though in a limited way.

The volume abstracted by source (groundwater and surface water) and by supply category is often not well known, although it is foreseeable that domestic and industrial uses will deserve greater concern than agricultural uses in the years to come.

Salt intrusion in coastal areas and a reduction in non-renewable resources are two irreversible phenomena linked to overuse of resources and they should suffice to draw the attention of decision-makers to the necessity for setting up monitoring and sustainable management mechanisms.

Water resources

Total freshwater resources are made up of the internal flow and of the actual external inflow.

— **Internal flow** is made up of the total volume of river run-off and groundwater generated, in natural conditions, exclusively by precipitation into a territory. The internal flow is equal to precipitation less actual evapotranspiration and can be calculated or measured.

— **Actual external inflow** corresponds to the total volume of actual flow of rivers and groundwater, coming from neighbouring territories. Data measured.

Actual evapotranspiration corresponds to the total volume of evaporation from the ground, wetlands and natural water bodies and transpiration of plants. It is to be distinguished from the potential evapotranspiration which is the maximum quantity of water capable of being evaporated in a given climate from a continuous stretch of vegetation covering the whole ground and well supplied with water.

Theoretically, the maximum volume of available groundwater corresponds to the actual refilling (disregarding restrictions issuing from ecological, economic or technical criteria).

Long term annual average (LTAA) of the volumes corresponds to a minimum period of 20 years.

Surface water is defined as water which flows over, or rests on the surface of a land mass: rivers, streams, brooks, lakes, canals, reservoirs.

Groundwater groups together fresh water which is being held in, and can usually be recovered from, or via, an underground formation. All permanent and temporary deposits of water, both artificially charged and naturally, in the subsoil, of sufficient quality for at least seasonal use. This category includes phreatic water-bearing strata, as well as deep strata under pressure or not, contained in porous or fracture soils.

The two previous categories make up the **freshwater resources**, as opposed to sea water and transitional water, such as brackish swamps, lagoons and estuarine areas, as well as water that is reused after treatment.

Figure 1.11 Precipitations heights in a few countries (mm, LTAA)

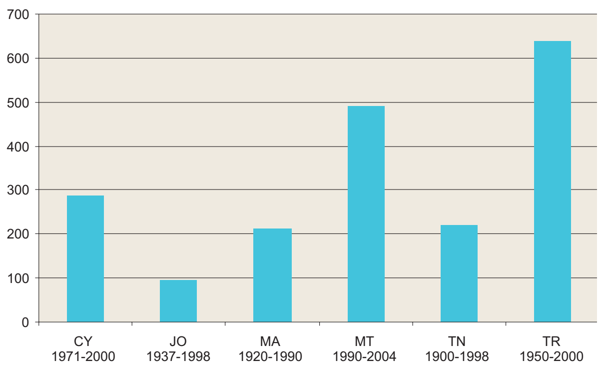
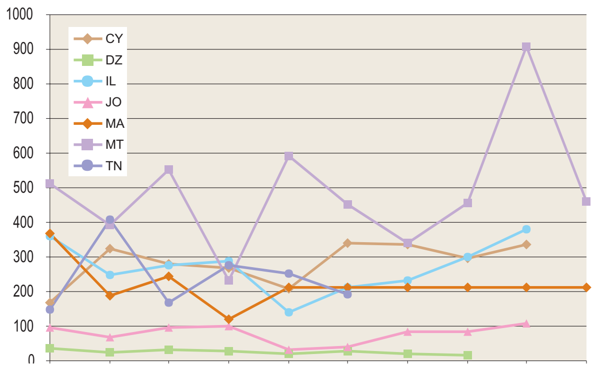


Figure 1.12 Annual rainfalls in a few countries (mm, 1995-2004)



The **recharge** refers to the total volume of water added from outside to the zone of saturation of an aquifer.

Figure 1.11 demonstrates a strong disparity of water resources in the Mediterranean. Precipitation heights on a long term average range from 95mm in Jordan during 1937-1998 period to 639mm in Turkey during 1950-2000 period. These figures refer to the total national surface of each country and therefore do not reflect the extreme heterogeneity of rainfall or the geographic distribution of rainfall within a country. Irregularity of rainfall through time should be considered as well, as average figures may vary according to the period selected. Finally, these data are not indicative of water quantities available for human use (see further down). Figure 1.12 shows annual water heights available for some countries on the last decade.

Table 1.7 and figure 1.13 below demonstrate the high degree of heterogeneity between the countries with regard to dependence on the resource. External inflows are generally very limited, except in Egypt, Israel, Jordan, Syria and Turkey, and to a lesser extent in Tunisia. Egypt is the only country to obtain almost 100% of its total freshwater resource from external inflows. This annual external contribution is only ensured if the international agreements that set the guaranteed discharge are respected by the upstream countries. On the other hand, Cyprus, Malta and Tunisia are dependent on their storage capacity in arid conditions. The groundwater available is the highest in terms of percentage of the total resource in these countries, as is the case in Jordan. It reaches 35% in Malta on average during the last decade with a maximum of 65%. As no long term annual average (LTAA) figures for that latter country were available, data are provided in a separate frame (Cf. table 1.7).

Turkey occupies a special position given that the total actual outflow is 26 times higher than the external inflow. Data for Syria is currently being revised by the Ministry of Irrigation. In the latter country, the Euphrates represents around 90% of the regular freshwater resources 95% of the time. (Cf. figure 1.14)

The sole information for the Palestinian Authority concerns the underground water available for annual abstraction. This volume has been defined by the Oslo agreements and stands at 118 million m^3.

Table 1.7 Fresh water resources in a few countries (Mm³, last year available)

	CY	DZ	EG	JO	MA	TN	TR
LTAA	1971-2000	1910-1993	1985-1998	1937-1998	1920-1990	1900-1998	1950-2000
Precipitation	2 670			8 529	150 000	36 000	501 000
Actual evapotranspiration	2 300			7 662	121 000 [1]	31 830	273 600
Internal flow		12 679		867	29 000	4 170	227 400
Actual external inflow	-		55 055		-	420	6 900
Total actual outflow	118	8 133	13 862			420	178 000
of which into the sea		7 491	13 862				114 000
Total fresh water resources	370	10 986 [2]	56 055		29 000	4 590	234 300
Recharge into the aquifer	180						
Groundwater available for annual abstraction	106		4 356	276 [3]	4 000	1 299 [4]	12 300
Regular freshwater resources 95 per cent time			55 055		16 000	2 100	
Groundwater as a percentage of total fresh water resource	28.6		7.8	*31.8*	13.8	28.3 [4]	5.2

Notes: 1: average over the period 1960-1990; 2: average over the period 1985-1998; 3: average over the period 1990-2000; 4: average over the period 1980-2000.

MT	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Precipitation	162	123	174	74	187	143	108	144	287	146
Actual evapotranpiration	102	78	110	46	118	90	68	90	181	92
Actual external inflow	-	-	-	-	-	-	-	-	-	-
Total actual outflow	10	7	10	4	11	9	6	9	17	9
Total fresh water resources	60	46	65	27	69	53	40	53	106	54
Groundwater available for annual abstraction	20	21	20	18	19	18	16	16	15	15
Groundwater as a percentage of total fresh water resource	33.6	46.2	31.1	65.6	26.8	34.7	40.4	30.7	14.3	27.6

Figure 1.13 Fresh water resources (Mm³, LTAA)

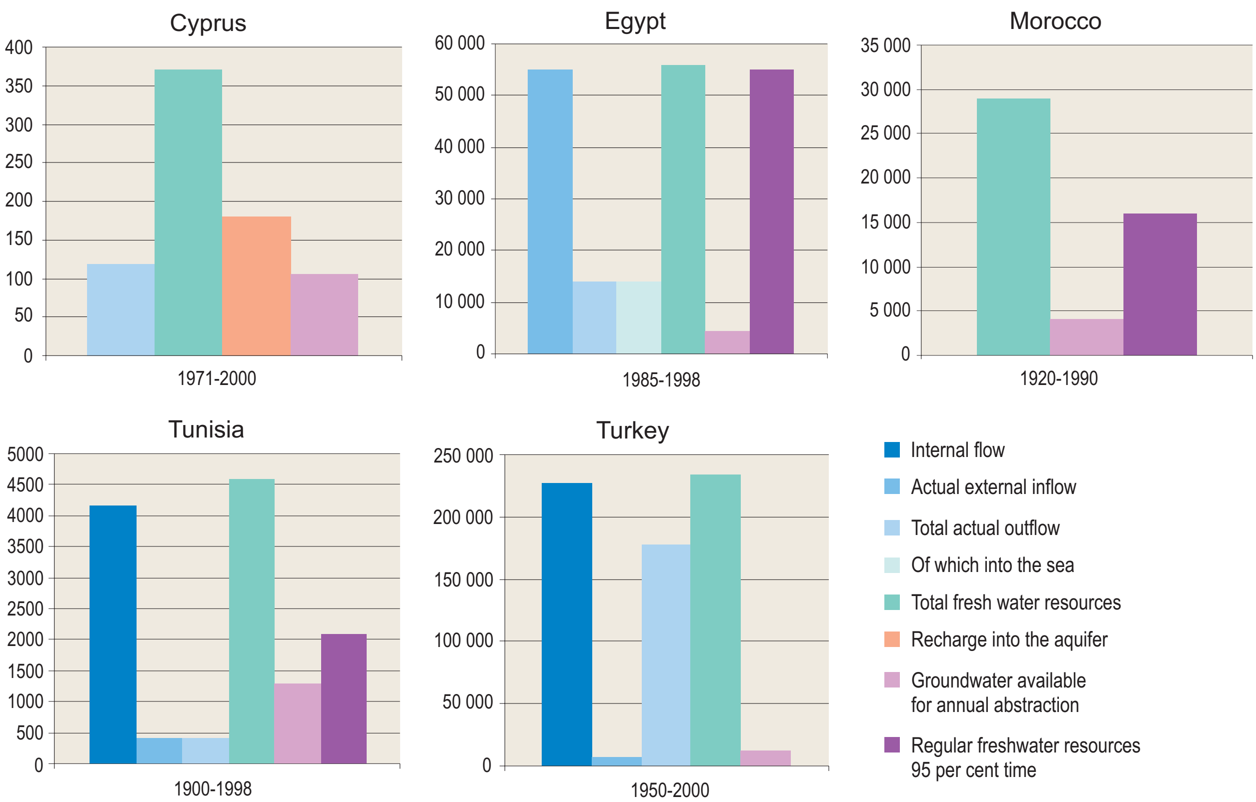
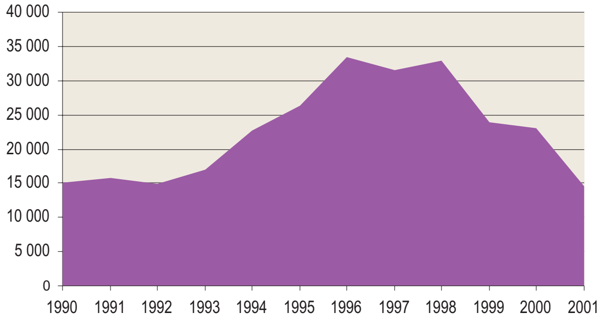


Figure 1.14 Regular freshwater resources 95 per cent time on Euphrates basin, Syria (Mm³, 1990-2001)



Box 1.3 Fresh water resources

Regular data collection concerning water resources is relatively recent in all the countries, as it did not start until 1970. The gross data on precipitation comes from monitoring stations, but the calculation of volume at national level is obtained based on different methods depending on the countries.

Evapotranspiration is defined in most of the countries as a percentage of the rainfall. It is preferably calculated by means of various mathematical models ranging from very simple algorithms to systems representing the hydrological cycle in detail.

If surface flows are well known (when this information is not confidential, as is the case for example in Israel and Jordan), estimations of the reserves and of the groundwater flows remain either unknown or unreliable in most of the countries. As transfers from surface water to groundwater have not been neutralised, the risk of a double count should be taken into consideration as well.

On the whole the data on this resource should be considered with care. Long term average data have proven to be more reliable and are available for at least one period in most of the countries.

Water abstraction and water use

Gross water abstraction (=withdrawal) corresponds to water removed from any source, either permanently or temporarily. Water used for hydroelectricity generation is an in-situ use and should be excluded.

Water supply refers to the delivery of water to final users.

A distinction can be made between:

— **Public supply** by economic units engaged in collection, purification and distribution of water. It corresponds to division 41 (NACE/ISIC).

— **Self-supply** by the user for own final use.

Jordan a reduction of 15%. Interruption in the time series in Israel after 1998 prevents a significant trend being obtained there. Except for Syria, the annual quantities over the last decade are known, thanks to series that are relatively complete and coherent. Egypt and Turkey, with 61 and 40 billion m³ respectively have the biggest gross abstraction. Malta, with 15 million m3 is by far the country with the least quantities withdrawn, even though water abstracted for agriculture has not been counted.

Table 1.9 presents the corresponding value per person for the latest available year. The lowest values can only be explained for countries with little industrial activity. In Malta this figure comprises

Table 1.8 Annual surface and ground fresh renewable water abstraction (Mm³, 1995-2004)

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CY				177	200	182	197	205	214	
DZ [1]							*4 346*			
EG	60 100	60 300	60 870	60 640						
IL [2]	1 928	2 042	2 008	2 164 |		1 178	1 442	1 496		
JO	754	754	743	747	732	745	701	737	735	
MA			13 235	13 450	13 687	13 450	12 196	14 819	13 000	
MT	20	22	21	18	19	19	16	16	15	15
PS [3]				124	92	234	207	242	109	249
TN	1 562	1 847	1 749	1 810	2 150	1 927				
TR	30 112	30 618	31 822	33 630	38 900	39 530	40 010			

Notes: 1: this figure only includes surface abstraction in dams; 2: only ground water abstraction; 3: data related to Gaza Strip are not available in 1998, 1999 and 2003.

— **Water supply for agriculture**, i.e. all system operations for agricultural irrigation which are not individual irrigation systems. This might also include some water from self supply distributed to other users.

Water use refers to water that is actually used by end users for a specific purpose within a territory, such as for domestic use, irrigation or industrial processing. It excludes returned water.

Transport losses (through leakage or evaporation) between a point of abstraction and a point of use are counted separately.

Table 1.8 presents the evolution of the total amount of water withdrawal from renewable resources over the last decade. With the exception of Jordan and Malta, all the countries increased their abstraction during the period under consideration. This increase was from 100% in the Palestinian territories, 43% in Turkey, 38% in Tunisia to 4% in Egypt. Malta recorded a significant reduction of 30% and drinking water supply only. The nature (by gravity or under pressure), the density, the length and the efficiency (maintenance, technicity, and so on) of the water supply networks greatly influence these values.

Table 1.9 Total abstraction per capita and per increasing number (last year available)

		l/inhab/d
MT	2004	102
PS	2004	187
DZ	2001	386
JO	2003	392
TN	2000	552
IL	2002	624
CY	2003	813
MA	2002	1370
TR	2001	1600
EG	1998	2680

The figures in table 1.10 are indicative of the pressure on the resource. This table refers to the share of abstraction from the fresh renewable water resource. When the values go beyond 100%, this means that the countries draw more than the sum of their annual internal flows made up by precipitations and their external inflows. From 100% upwards, the countries draw from their reserve stocks. In the long term this will lead to a dwindling of national reserves.

Thus, Egypt, Jordan and the Palestinian Authorities draw more than 100% of their fresh renewable water resources, with 109% in 1998, 108% in 2003 and 211% in 2004, respectively.

Table 1.10 Share of abstraction in the fresh renewable water resource (%, lat year available)

MT	2003	14
TR	2001	*17* [1]
DZ	2001	*40* [2]
CY	2003	49
MA	2003	51
TN	2000	53
JO	2003	108
EG	1998	109
PS	2004	211

Notes: 1: figure based on average resource available over the period 1950-2000; 2: figure based on average resource available over the period 1985-1998.

During the period 1995-2004 these three countries drew excess quantities almost permanently, as can be seen in figure 1.15. The case of Egypt has to be put into perspective and can be explained by the proximity of the water table, and by numerous drains in the open fields that allow for several uses being made of the same volumes of water. On the other hand, the situation in Jordan is worrying and indicates great dependence during drought periods (1998-2001). This ratio shows that in the Palestinian Authority the relationship between theoretical volumes authorised and the real quantities drawn is inadequate. Turkey is the most regular country and has the most leeway.

Figure 1.16 shows that most of the countries, with the exception of Egypt, Morocco and Turkey, mainly draw from groundwater, from 99% in Malta to 61% in Tunisia.

Jordan and Tunisia are the only countries with a series on abstraction from non renewable water resources (Cf. table 1.11). The share of the renewable freshwater resource that this represents is relatively constant over time. It varies from 7% to 10% in Jordan, and from 30% to 38% in Tunisia. In the latter country, the increase in volume over the last 20 years is by 137%. Abstraction of non renewable water in Malta is nil.

Figure 1.15 Share of abstraction in the fresh renewable water resource (%, 1995-2004)

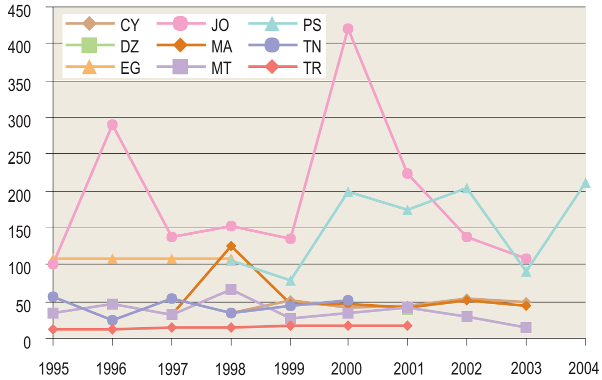


Figure 1.16 Abstraction distribution by type of renewable resource in 2001 (%)

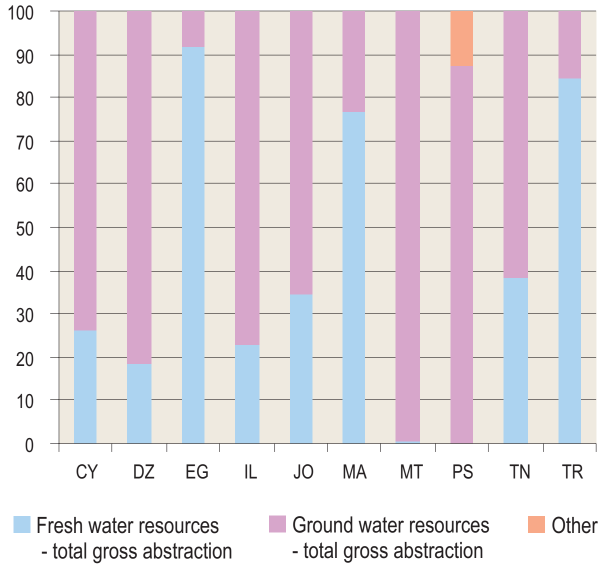


Table 1.11 Non renewable water total gross abstraction (aquifers) (Mm^3, 1991-2000)

	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
JO	66	71	67	61	71	71	73	65	66	62
TN	565	557	554	564	559	658	664	661	665	665

Besides this, some countries have recourse to so-called non conventional resources for water supply (Cf. table 1.12). This includes desalinated water, brackish water and imported water. Insular countries have greater recourse to these resources.

Malta has only recourse to desalinated water. In 2004 this represented 120% of the total abstraction in renewable freshwater resources, compared to 150% in 1995. As the pumping is carried out in the surface water, the level of salinity of this water increases with the intensity of the pumping. Since 1995 the volume of this resource has dropped by half. Cyprus, on the other hand, diversifies the resources for its supplies. Thus recourse to desalinating, to reused water and to brackish water represented 23% of the total abstraction in fresh renewable water resources in 2003, but trends are upwards, especially for desalinating. The volumes used by the energy industry in Cyprus and in Turkey can be noted, but these volumes represent only a small percentage of Turkey's total water resource.

Israel also has recourse to desalinating as well as to reusing water. Finally, the Palestinian Authority is the only one to have recourse to purchasing water from private companies that transport it by lorry. This was 16% of the total water abstraction in 2004. Purchase of bottled water is not controlled in any of the countries as the volume is negligible. In terms of household savings and environmental pollution, consumption of this type of water deserves special attention.

The desalinated water is only used for the public supply (for drinking water), while reused water is used for agricultural and industrial use. This is the case for Tunisia where desalinated water represented 12.7 million m^3 in 2000, while the total amount of reused water was 30.5 million.

The public supply is regularly monitored but it has different definitions depending on the country. It essentially concerns the supply of drinking water to households, and a very variable share of the supply for agriculture and industry (Cf. methodology box 1.5).

Table 1.12 Other sources of water by type and by supply category in a few countries (Mm^3, 1995-2004)

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Non fresh water sources total gross abstraction	MT	31	27	23	22	19	17	17	18	19	18
	TR	2370	2650	3260							
— Manufacturing industry	CY							16	15	14	
	TR						637				656
— of which cooling industry	CY							16	15	14	
— Production of electricity (cooling)	CY							719	884	915	
	TR	1735	1879	2564	2586		1723	2256	2317		2488
Desalinated water	CY			5	11	14	14	22	30	30	29
	IL							12			
	MA	0	2	2	2	3	3	3	3	3	
	MT	31	27	23	22	19	17	17	18	19	18
— Public water supply	CY			5	11	14	14	22	30	30	29
	MT	31	27	23	22	19	17	17	18	19	18
Reused water	CY							4	6	6	
	IL					290	260	266			
— Agriculture, forestry, fishing	CY									6	
— of which irrigation	CY			-	1	1	1	3	5	4	6
— Manufacturing industry	CY							1	0	0	
Imports of water	PS				38	37	38	37	38	43	47

Table 1.13 Public water supply per type of fresh water resource (Mm³, 1994-2003)

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Surface water	CY					14	18	20	24	14	17
	DZ	346	346	318	301	299	288	400	413	326	
	EG	7 220	7 360	7 510	7 660	9 200					
	IL				399						
	JO	46	63	58	58	53	49	53	53	51	54
	MA	1 070				1 580			734		
	MT		-	-	-	-	-	-	-	-	-
	TN	633	447	740	624	656	968	743			
Groundwater	CY					30	36	26	30	33	32
	EG	1 200	1 200	1 300	1 300	1 300					
	IL					1 476					
	JO	170	177	178	178	183	183	186	192	199	207
	MA	610				700			725	725	
	MT		20	22	20	18	19	18	16	16	15
	TN	301	275	260	263	283	300	296			
Non renewable water	JO	8	8	9	9	10	10	9			
	TN	451	447	526	531	529	535	535			
Total	CY					44	54	46	54	46	49
	EG	8 420	8 560	8 810	8 960	10 500		8 300			
	JO	224	248	245	245	246	241	248	246	249	262
	MA	1 680				2 280			1459		
	MT		20	22	20	18	19	19	16	16	15
	TN	1 385	1 169	1 526	1418	1 468	1 803	1 574			

Information concerning the population connected to the public water supply system is only available in a few countries (Cf. table 1.14). This rate continues to rise in the countries that have not yet reached 100%. It increased by 4.7% in Morocco between 1997 and 2003, by 6.95% in the Palestinian territories between 1997 and 2004 et by 10% in Turkey between 1994 and 2004.

This figure covers a heterogeneous situation whether it is rural or urban areas. Thus in Egypt 96% of the urban population is connected, compared to only 71% of the rural population. These statistics reflect neither the situation of the nomadic populations nor that of those in refugee camps or in urban dwellings that are not controlled.

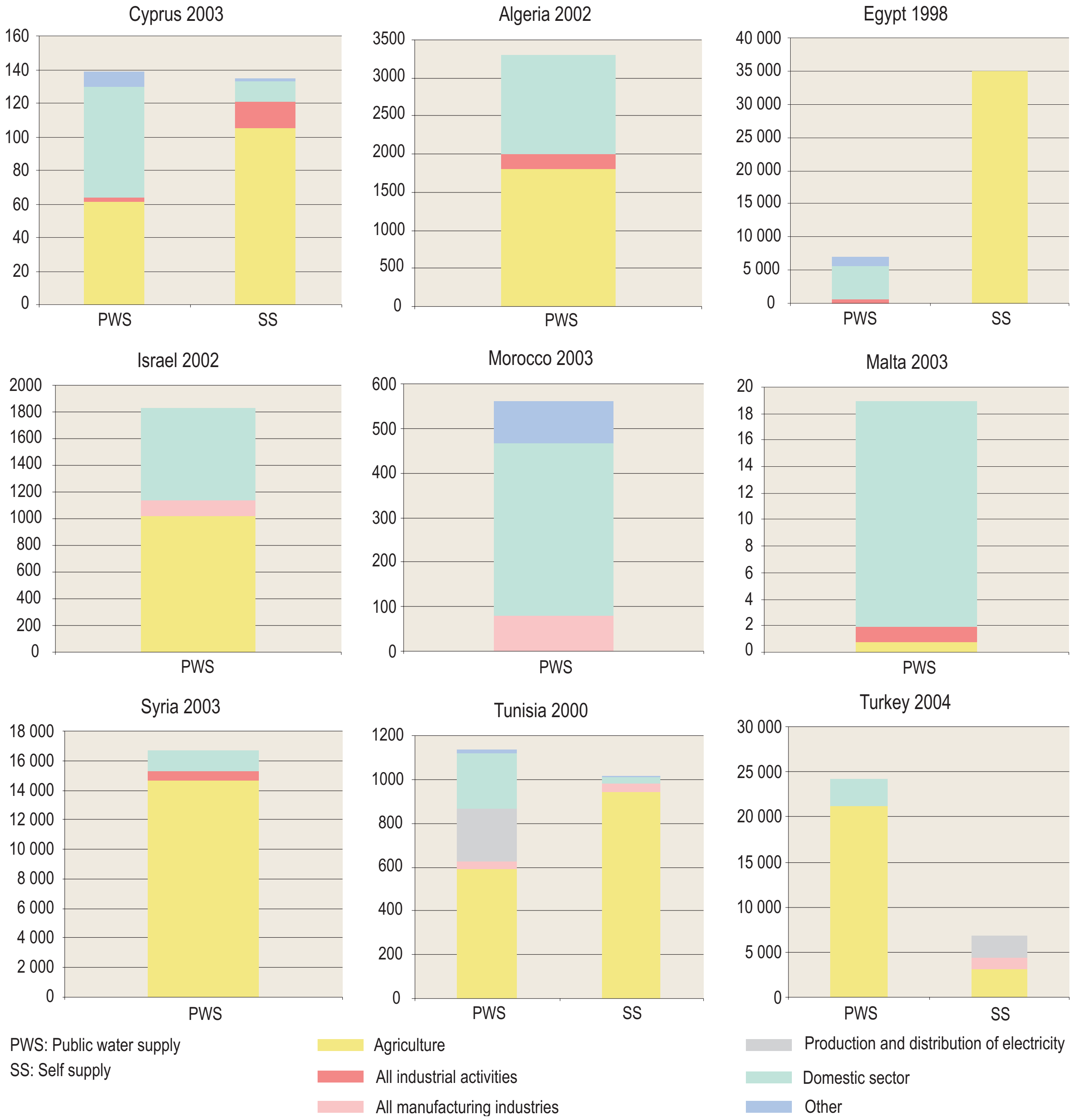
Table 1.14 Population connected to public water supply (%, last year available)

CY	2003	100
DZ	1998	71
EG	1998	83
MA	2003	89
MT	2004	100
PS	2004	89
TR	2004	74

The volumes catered for by the public network are better estimated on the whole than those from self-supplies. Figure 1.17 does not allow comparison between countries, but it shows that self-supply is only partially known and in a few countries. In Algeria the amount of drinking water consumed is estimated on the basis of 150 liter per inhabitant per day (domestic and industrial sectors together).

Irrigated agriculture occupies the greater share of the uses. In Cyprus this is underestimated as the wells have not been included in the count. In Morocco water for agriculture is counted separately. In 1998, the total volume of water used was 3200 Mm³. A decrease of 16% can be noted for the share allocated to irrigation in Jordan between 1990 and 2003. In Cyprus, Morocco, Tunisia and Turkey, the activities connected with electricity production represent a non negligible share of the uses. The self-supply used in Morocco was 4069 Mm³ in the year 2000.

Figure 1.17 Water use by supply category (Mm³, last year available)



Notes: CY: all industrial activities except electricity production; SS for agriculture data 1998; DZ: domestic sector includes water supply of households and industry; TR: SS for agriculture and domestic sector data 1998.

Depending on the type of activity, industries tend to be preferentially connected to the public supply network. This is the case for textile, manufacturing and especially food products in Cyprus and in Turkey (Cf. tables 1.15 and 1.16) that require the quality guaranteed by the public network.

Self-supplies represent volumes from 8 to 27 times greater than the volumes consumed through the public supply. The metal and extraction industries are the biggest users.

Box 1.4 Data sources for water

The information concerning water resources was produced by the meteorological institutes (IL, MT) or hydrological institutes (DZ, EG) or the ministries in charge of the management or development of irrigation (JO, SY) or of water (CY, MA, TN, TR). The total number of producers apart from the NSOs (other directions or ministries) varies from one (CY, PS, TR) to five (DZ, MA, TN) and it is a factor contributing to the limited access to all of the information in some countries. In Jordan, Malta, Morocco, Syria and Tunisia, the NSOs only collect the data from secondary sources.

Table 1.15 Water use by industrial activities through public water supply (Mm³, 1995-2004)

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CY	Total manufacturing industry							2.22	2.44	2.73	
	- food processing industry							1.40	1.51	1.76	
	- basic metals							0.27	0.02	0.03	
	- transport equipment							-	-	0.01	
	- textiles							0.06	0.09	0.02	
	- paper and paper products							0.01	0.02	0.03	
	- chemicals, refined petroleum, etc.							0.10	0.11	0.12	
	- other manufacturing industry							0.38	0.69	0.76	
	Mining and quarrying							0.08	0.01	0.01	
	Construction								0.25		
JO	Total manufacturing industry	6.73	8.40	6.20	6.90	9.84					
	- food processing industry	3.66	3.40	3.40	3.44	1.98		3.46	5.25		
	- basic metals	0.19	0.12	0.11	0.07	0.29		0.53	0.34		
	- transport equipment	-	-	0.01	0.03	0.01		0.02	0.01		
	- textiles	0.21	0.32	0.22	0.12	0.11					
	- paper and paper products	0.19	0.21	0.07	0.09	0.18		0.03	0.22		
	- chemicals, refined petroleum, etc.	0.76	0.94	0.04		4.08		0.01	0.02		
	Mining and quarrying	9.47	9.54	7.79	9.63	14.40		12.24	21.61		
PS	Total manufacturing industry							0.81		0.41	0.40
	Mining and quarrying							0.03			
	Construction							0.08		0.01	0.06
TN	Total manufacturing industry	25.00	30.00	25.00	29.00	30.00	32.00				
TR	Total manufacturing industry	21.08	30.78	29.61			23.50				50.33
	- food processing industry	4.41	7.45	4.40			5.29				7.41
	- basic metals	2.23	0.71	2.15			1.24				5.46
	- transport equipment						0.19				1.24
	- textiles	6.39	10.68	4.43			3.40				10.29
	- paper and paper products	0.53	1.33	1.86			0.93				0.31
	- chemicals, refined petroleum, etc.	1.20	1.09	5.26			1.19				2.71
	- other manufacturing industry	6.32	9.52	11.51			11.26				15.50
	Mining and quarrying	0.18	0.30	0.32							
	Construction		23.71								

Table 1.16 Water use by industrial activities throught self supply (Mm³, 1995-2004)

		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CY	Total manufacturing industry							19.10	17.45	15.90	
	- food processing industry							1.43	0.82	1.06	
	- basic metals							0	0	-	
	- transport equipment							0	0	-	
	- textiles							0.04	0.01	-	
	- paper and paper products							0.01	0	-	
	- chemicals, refined petroleum, etc.							14.94	15.24	13.71	
	- other manufacturing industry							2.68	1.38	1.11	
	Mining and quarrying							1.26	0.62	0.98	
	Construction								0.19		
TN	Total manufacturing industry	37.00	34.00	40.00	39.00	39.00	40.00				
	Mining and quarrying	28.00	31.00	30.00	28.00	28.00	29.00				
TR	Total manufacturing industry	1340.55	1488.71	1507.84			1446.35				1173.29
	- food processing industry	172.42	193.34	185.96			188.41				125.52
	- basic metals	844.28	950.59	944.67			880.09				749.55
	- transport equipment						1.19				0.5
	- textiles	58.03	70.11	103.73			105.53				104.49
	- paper and paper products	81.72	76.24	80.44			49.91				17.68
	- chemicals, refined petroleum, etc.	134.84	155.68	146.3			160.39				108.89
	- other manufacturing industry	49.26	42.75	46.74			60.83				66.66
	Mining and quarrying	35.57	17.96	19.11							

Box 1.5 Water abstraction and water use

The distinction between the volumes drawn and those used is not always made by the data producers. Recourse to distribution organisations facilitates knowledge of quantities, but none of the countries have complete national coverage of water abstracted.

The rate of connection by the population to public supply networks for drinking water or waste water is obtained by censuses or surveys. The latter sometimes cover consumption by sector. The total quantities of water consumed are assessed in some countries on the basis of daily coefficients. These estimates help to offset the lack of facilities (measuring apparatus, standardised networks, and so on), but generally speaking the basic information collected is insufficient to fully allocate the different uses according to the origin of the resource and it does not correspond to precise definitions. Households and the domestic sector are, therefore, not always used in a distinct way. This gives rise to sub-totals that are not very coherent when compared or that are incoherent with regard to the available resource.

Finally, the distinction between public supply and self-supply is not made in all of the countries, nor made in the same way. In Cyprus the definitions vary greatly and so the figures presented in table 1.13 and figure 1.17 should be interpreted with care. Jordan does not make a difference between public supply and self-supply in the statistics communicated. Morocco only counts urban uses in the public supply. In the Palestinian territories, the notion of public supply includes catering to users from artesian sources and wells as well as from imported water. Transport of water by vehicles is not negligible and refugee camps are counted separately. In Tunisia, self-supply corresponds to direct supply from groundwater, i.e. 100% of the water tables (irrigation) and 20% of deeper water.

Great care must be taken when comparing data from one country to another and especially since the scope of the data are very different.

Biodiversity

The geographical specificities (climate, soil, fragmented relief, different frontiers over time between tropical and temperate areas) of the Mediterranean region make it one of the most original bio-geographical regions of the world from the point of view of its biodiversity, but it is also one of the most endangered regions. The figures transmitted by the 12 Mediterranean countries demonstrate that the region is one of the essential reservoirs for biodiversity on the planet. Mediterranean flora includes 25 000 species of seed-plants, i.e. 10% of the world's plant species (the Mediterranean region covering only 1.6% of the world land surface). The diversity of animal life is also considerable. The populations of invertebrates and especially of insects are remarkable for an ecosystem outside the intra tropical zone. At the crossroads of Europe, Africa and Asia, the Mediterranean region is a vast migration area with large bird populations. The marine wildlife is also rich but particularly under threat.

Many species in Mediterranean countries are classified as having a high, even very high risk of extinction at world level. Many species have become vulnerable or scarce through the ever-increasing degradation (quality) and reduction (quantity) of their natural habitats. The response to this degradation generally consists in creating sanctuaries and protected areas for conservation (national parks, natural reserves, etc.). The Mediterranean countries have committed themselves to such programme over the past few decades.

In order to gain information and to qualify the state of the biodiversity in relation to the risks of extinction of the fauna and flora species, the data collection questionnaire used by the Mediterranean countries is based on the categories and criteria developed by the World Conservation Union (IUCN) to establish a Red List of threatened species. According to IUCN methodology, a range of five quantitative criteria enables registration in one of the following categories: Critically Endangered, Endangered or Vulnerable. The various criteria are the fruit of in-depth study aimed at detecting the extinction risk for all the organisms and their various biological cycles. The categorisation process has evolved continually since it was set up in 1963, giving scope to refer to the old system of classification.

The Mediterranean countries have collected and transmitted statistical data on animal and plant species and on their extinction risk according to the following definition.

Total number of known species corresponds to the state of knowledge about living species. Unless otherwise stated, extinct species are not counted.

A species said to be **Critically Endangered** (CR) is a species confronted with an extremely high risk of extinction in the wild.

A species said to be **Endangered** (EN) is a species confronted with a very high risk of extinction in the wild.

A species said to be **Vulnerable** (VU) is a species confronted with a high risk of extinction in the wild, with a high risk of falling into the previous categories if the danger persists.

The term threatened species groups together the three previous categories.

A species said **to be declining** is a species that has been assessed according to the criteria but which does not fulfil the criteria of the categories Critically Endangered, Endangered, Vulnerable or Near Threatened. The species that are widely spread out and abundant are included in this category. This category, used in the collection questionnaire, is similar to the current IUCN category of Least Concern (LC).

The denomination **indeterminate** indicates that the species has not yet been confronted with the quantitative criteria. This denomination corresponds to the current IUCN category Not Evaluated (NE).

A species is said **to be insufficiently known** when there is insufficient available data to directly or indirectly evaluate the risk of extinction as a function of its distribution and/or the state of its population. A species registered in this category could have been the object of in-depth studies and its biology could be well known, without sufficient pertinent data being available on its abundance and/or distribution. It is, therefore, not in an endangered category. This denomination corresponds to the current IUCN category Data Deficient (DD).

A species is considered Extinct (EX) when there is no reasonable doubt that the last individual has died. A species is presumed extinct when exhaustive surveys in known and/or expected habitats, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual.

The Mediterranean countries are characterised by the presence of a wide range of animal and plant species naturally established in these countries (indigenous species). In order to underscore the importance of this regional phenomenon, lists of the number of indigenous species have been compiled. Most of the countries have transmitted statistics on the number of species that grow naturally in their countries, i.e. species that have not been introduced there. As this collection of statistical data is recent, the figures presented should be considered with caution; indeed, some countries might have confused the notion of indigenous species with a notion that is much more restrictive, that of endemic species.

Considerable collection efforts have been made in the last years, and so the figures transmitted by the countries reflect the actual state of knowledge about biodiversity at present. However, no countries have historical series allowing a statistical monitoring of the populations and of their risk of extinction. The lack of data reflects an absence of reliable data or an absence of scientific consensus on the exact state of the populations observed.

Fauna

For each taxonomic group of animal (mammals, birds, reptiles, amphibians, fish and invertebrates) the total number of known species and the number of endangered species, according to the categories defined previously, are given. The number of indigenous species is indicated for each category as well (Cf. tables 1.17 to 1.22).

Mammals

In the Mediterranean, mammals are one of the most known and monitored taxonomic groups. They represent the group which has suffered the greatest genetic biodiversity losses. Local species are particularly abundant for this group. One of the most important Mediterranean species, the Mediterranean monk seal (*Monachus monachus*), is classified as Endangered and is one of the top 10 most Endangered species in the world.

Four countries are particularly affected with a number of Endangered species greater than 40% of the total of the known species (57% for Jordan, 56% for Israel, 47% for Malta and 44% for Algeria). Thus, 100% of indigenous species of Israel are Endangered and 44% of those in Algeria. Even though they are not directly threatened, there are many species of mammals in Cyprus that are declining (59%).

Birds

A little more than 500 species of birds live in the Mediterranean region which constitutes an essential corridor for migratory species.

Egypt and Turkey are the main bird cradles of the Mediterranean region. Algeria, Malta and Turkey have registered high levels of indigenous species (100% for Malta and Turkey, 99% for Algeria).

These indigenous bird species are particularly threatened in Morocco and Algeria where the number of Endangered species is the highest. Israel, Tunisia and Malta also have a large proportion of Endangered species.

The imperial eagle (*Aquila heliaca*, EN), the great bustard (*Otis tarda*, VU), the slender-billed curlew

Table 1.17 Mammals: total number of known species, number of indigenous species and level of threat (last year available)

		Known species		Critically endangered		Endangered		Vulnerable		Declining		Indeterminate	Insufficiently known	
		total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	total	indigenous
CY	2003	32		1	1	3	3	1		19				
DZ	2000	107	107			47	47							
EG	2004	132	6	4		10		16				17	4	
IL [1]	2002	105	3	13	1	26	2	20					2	-
JO	2003	77		2		15		27					2	
MA	1997	113	12	4	-	27	2	4	-	5	-			
MT	2002	32	32			2	2	13	13	11	11			
PS [2]	1997	95												
SY	2003	125	4											
TN	1998	78		7		5		7		3				
TR	2005	126	126											

Notes: 1: known species include five Extinct species; 2: known species do not include marine mammals from Gaza Strip.

Table 1.18 Birds: total number of known species, number of indigenous species and level of threat (last year available)

		Known species		Critically endangered		Endangered		Vulnerable		Declining		Indeterminate		Insufficiently known	
		total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	indigenous
CY [1]	2003	363	7	3		6		7		10					
DZ	2000	336	334			108	108								
EG	2004	514		9		6		11				1		-	
IL [2]	2002	210	-	15		8	-	16	-		-		-	14	-
JO	2003	418		1				2							
MA	1997	317	10	6	-	90	10	2	-	21	1				
MT	2002	182	182			4	4	17	17	-	-				
PS [3]	1997	470				1		3		6					
SY	2003	360	8												
TN	1998	362		4		15		34		20					
TR	2005	510	510					1	1						

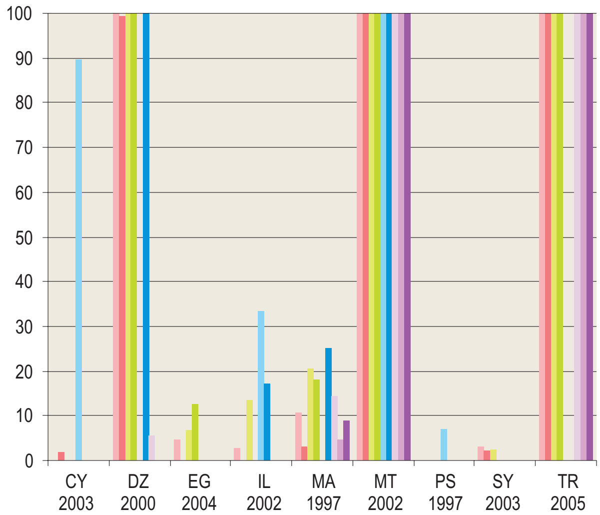
Notes: 1: five indigenous species are sub-species; 2: known species include only sedentary species, of which 15 are extinct; 3:declining species correspond to the old category Rare.

(*Numenius tenuirostris*, CR), and the white-headed duck (*Oxyura leucocephala*, EN) are part of the most Endangered birds of the region.

Reptiles and amphibians

Syria and Israel are home to the largest number of known reptile species, as are Morocco, the Palestinian Authority and Egypt. Algeria, Malta and Turkey have registered the highest number of indigenous species of reptiles and amphibians. Due to the fragility of their ecosystems (e.g. wetlands),

Figure 1.18 Number of indigenous species of animal in percentage of known species (last year available)



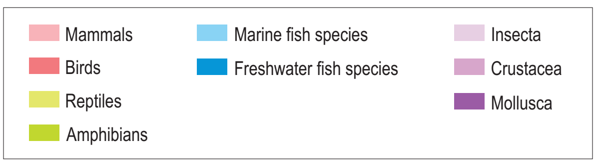


Table 1.19 Reptiles: total number of known species, number of indigenous species and level of threat (last year available)

		Known species		Critically endangered		Endangered		Vulnerable		Declining		Indeter-minate	Insufficiently known	
		total	indi-genous	total	indige-nous	total	indige-nous	total	indige-nous	total	indige-nous	total	total	indige-nous
CY	2003	24		3		1		1		3				
DZ	2000	70	70			8	8							
EG	2004	90	6	5		8		30				-	-	
IL [1]	2002	105	14	13	4	7	2	15	5				4	2
JO	2003	89				3		5						
MA	1997	98	20	11	2	19	1			26	3			
MT	2002	15	15			1	1	12	12	2	2			
PS [2]	1997	93		1										
SY	2003	127	3											
TN	1998	63		6		13		3		21				
TR	2005	75	75											

Notes: 1: known species include three extinct species, indigenous species include regional indigenous species, one of the two endangered indigenous species is a sub-species, one of the five indigenous vulnerable species is a sub-species; 2: the marine turtle species *Caretta caretta* is included into the 93 known species (only two individual have been counted).

Table 1.20 Amphibians: total number of known species, number of indigenous species and level of threat (last year available)

		Known		Critically endangered		Endangered		Vulnerable		Declining	
		total	indige-nous	total	indige-nous	total	indige-nous	total	indige-nous	total	indige-nous
CY	2003	3			-		-	-	-	-	-
DZ	2000	12	12								
EG	2004	8	1	-		-		2			
IL [1]	2002	7	-	2	-	2	-	1	-		-
JO	2003	5									
MA	1997	11	2		-	3	1			3	1
MT	2002	1	1			-	-	1	1	-	-
PS	1997	7									
SY	2003	16									
TN	1998	8		2		2		2		2	
TR	2005	21	21			1	1				

Note: 1: known species include one extinct species.

reptiles and amphibians are particularly fragile taxa, for which the risk of extinction is high.

This is particularly true for the islands. The insular position of Cyprus and Malta exacerbates the pressure on the more fragile taxa especially. In this way, all of the known species of amphibians are threatened in Cyprus and Malta, and 87% of the reptiles in Malta.

The various species of reptiles and amphibians in Egypt, Tunisia and Israel are also highly threatened (48% and 25% for Egypt, 35% and 75% for Tunisia, 33% and 71% for Israel). 42% of the indigenous reptile species are Endangered in Israel and 50% of the indigenous amphibian species are Endangered in Morocco.

The number of reptile species that are declining is considerable in two countries of the Maghreb (Morocco and Tunisia).

Fish

Israel, Jordan and Morocco count the most important number of fish species, mainly marine species. As for the other taxonomic groups, indigenous species remain very high on the islands (Malta and Cyprus) and high in Israel (33%) for marine species. Malta has only one species of freshwater fish. It is indigenous and vulnerable.

The risk of extinction of fish species is not as high as for the other taxonomic groups, except in Morocco where 85 marine species are Endangered.

Invertebrates

Only insects, crustacean and molluscs species have been reported. The region has great biological wealth, in particular of insects. Jordan, Israel and Morocco count more than 10 000 known species of insects. As the scope of knowledge concerning these taxonomic groups is evolving continuously, it is difficult to determine which species are underthreat. Based on the available information, it can be seen that marine invertebrates have a better status regarding the level of threat.

Figure 1.19 Percentage of indigenous threatened animal species (%, last year available)

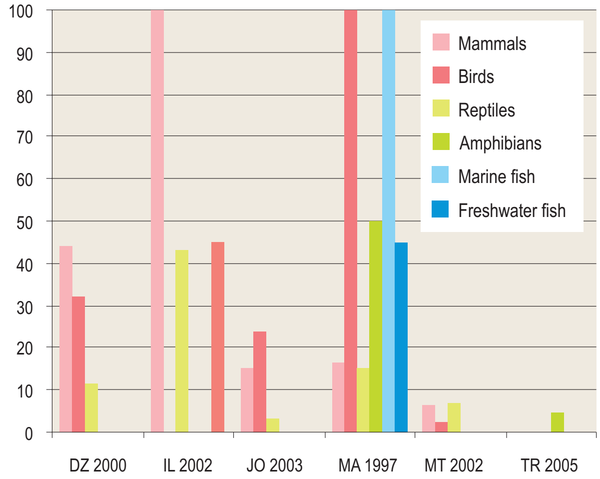


Table 1.21 Fish: total number of known species, number of indigenous species and level of threat (last year available)

		Total number of known species	Of which indigenous	Freshwater species				Marine species			
				Known		Threatened		Known		Threatened	
				total	indigenous	total	indigenous	total	indigenous	total	indigenous
CY [1]	2003	167	136	15	-	-	-	152	136	1	-
DZ	2000	300	70	70	70						
EG	2004	766	-	90	-			676			
IL [2]	2002	1154	377	41	7	6	3	1113	370	2	-
JO	1999	1026		26				1000			
MA	1997	1189	12	44	11	11	9	1145	1	85	1
MT	2002	297	297	1	1	1	1	296	296	-	-
PS [3]	1997	284	20					284	20		
SY	2003	452									
TN [4]	1998	336		336		11					

Notes: the threatened species is a brackish water species classified EN; 2: 360 of marine species are from the Mediterranean and 5 from the Dead Sea; 3: freshwater species are not reported, known marine species refer to the Levantine Basin; 4: marine species are not reported.

Table 1.22 Invertebrates: total number of known species, number of indigenous species and level of threat (last year available)

		Insecta				Crustacea				Mollusca			
		Known species		Threatened species		Known species		Threatened species		Known species		Threatened species	
		total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	indigenous
CY [1]	2003	3 000	-	4	-	95		1		175		3	
DZ	2003	*1 900*	103			522				294			
EG	2004	7 324		887		107		5		468		18	
IL	2000	30 000		2		200				100			
JO	1999	1 000 000 e						1 202		1 307			
MA	2000	13 461	1 950	176		2 183	97	74	1	2 249	198	22	1
MT	2002	1 802	1 802	62	32	280	280	4	4	952	952	16	16
PS	1997					61				66			
SY	2003	1 500											
TN	1998					307		1		27			
TR	2005	5 395	5 395			239	239			93	93		

Notes: 1: known insecta count 52 butterflies species.

Flora

Vascular plants

Mediterranean flora is made up of 25 000 important plant species, i.e. 10% of the known species in the world. Algeria, Morocco and Tunisia have a great diversity of flora, a high number of indigenous species (100% for Algeria and Turkey, 20% for Morocco) and an important number of threatened

Non-vascular plants

Among the non vascular plants, data has only been collected for mosses, lichens, macrofungi and algae. (Cf. table 1.24)

Generally-speaking, little information is available about these taxonomic groups, especially about their risk of extinction.

Table 1.23 Vascular plants: total number of known species, number of indigenous species and level of threat (last year available)

		Known species		Critically endangered		Endangered		Vulnerable		Declining		Insufficiently known	
		total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	indigenous	total	indigenous
CY	2003 [1]	1975	1815	-	-	12	12	17	17	2	2		
DZ	2000	3139	3139			327	327						
EG	2004 [1]	2672	88										
IL	2002 [2]	2238	68	51	13	111	12	176	7			1867	-
JO	2003 [3]	2400				125							
MA	1997	4560	930		-	1641	930						
MT	2005	1410	926			83	83	44	44	174	174		
PS	1997 [4]	2483	149								127		
TN	1998	2924	2163	101		239		24		23			
TR	2005	9153	9153	162	162	670	670	1149	1149				

Note: 1: known species include species, sub-species, variety, forms and hybrids 2: known species include 33 extinct species; 3: estimations; 4: Indigenous species counts 53 species from the Gaza Strip, 127 declining indigenous species correspond to the old category Rare.

species (almost 2 thousand in Turkey and more that 1 thousand in Morocco).

In terms of percentage, the number of threatened species of vascular plants remains equal or below 20% (22% in Turkey), which, in absolute value, still represents a large number of species: 1641 species are Endangered in Morocco, 670 are Endangered in Turkey and 1149 are vulnerable in Turkey. (Cf. table 1.23)

Among the vascular plants, ferns and marine phanerogams are well represented in the Mediterranean area. Thus, among 1975 known species of vascular plants, Cyprus counts 20 species of fern, all of which are indigenous. Algeria counts 44 and Jordan 8.

Among marine phanerogams, posidonia (*Posidonia oceanica*, endemic species of the Mediterranean) are considered as one of the most important ecosystem, even the pivot-ecosystem of whole coastal area of the Mediterranean. Cyprus, sole country which transmits figures on these taxa, counts 3 species of marine phanerogams, of which 2 are Vulnerable.

In the countries where information is available, the number of indigenous species remains very high in Malta and in Turkey for all four groups of non vascular plants and in Cyprus for macrofungi and algae.

Figure 1.20 Number of indigenous species of plants in percentage of known species (last year available)

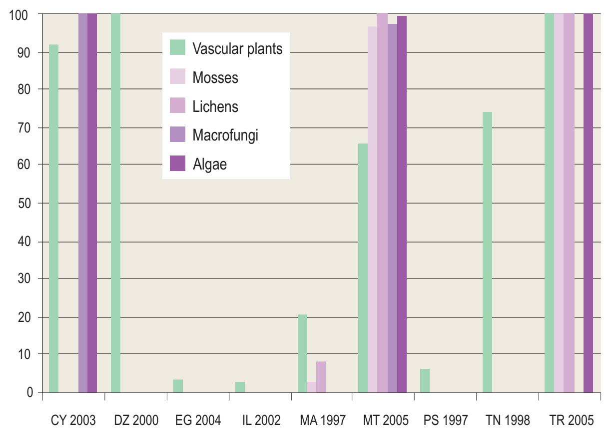


Table 1.24 Non-vascular plants: total number of known species, number of indigenous species and level of threat (last year available)

		Known species		Threatened species		Declining species	
		total	indigenous	total	indigenous	total	indigenous
Mosses							
DZ	2003	2					
MA	2000	350	10				
MT	2005 [1]	135	130	1	1	37	37
TR	2005	2	2				
Lichens							
DZ	2003	600					
JO	2003	150					
MA	2000	760	60				
MT	2005	300	300	-	-	-	-
TR	2005	1082	1082				
Macrofungi							
CY	2003	100	100	-	-	-	-
DZ	2003	78					
EG	2004	700					
JO	1999	134					
MA	1997	820	3	8	-		
MT	2005	155	150	1	1	17	17
SY	2003	641					
Algae							
CY	2003	50	80	-	-	-	-
DZ	2003	468					
EG	2004	912					
JO	1999	150					
MA	2000	500					
MT	2005	680	670	4	4	7	7
PS	1997	10					
TR	2005	1019	1019				

Note: 1: figures refer to the Bryophytes group.

Box 1.6 Still partial knowledge of biodiversity

Gathering of statistical information on biodiversity is complex due to the necessary scientific anchorage needed to set-up an inventory of species.

For most of the countries, the data comes from national inventories on species carried out by scientists at the request of the Ministry of the Environment. As these inventories are often costly, they are not implemented regularly. Nevertheless, because of growing demand for information about the animal and plant populations and about their threatened status (due to the necessity to report the national situation in the framework of international conventions, such as the Convention on Biodiversity or for the establishment of a regional Red List of threatened species), more regular collection is being put in place in the organisations and authorities responsible for the management and the protection of fauna and flora. The data collected in this way, therefore, reflects the results of national studies and research carried out which do not systematically cover all the taxonomic groups.

In Cyprus, the data is compiled by the national statistics office on the basis of the information supplied by the Agriculture, Forests, Fishing and Marine Research departments. In Egypt, the Ministry of Environment, focal point of the Convention on Biodiversity, which is responsible for monitoring the species. In Israel and Jordan, the data is supplied by the bodies in charge of the management and the protection of nature. In Malta, the absence of data on the risk of the extinction of lichens is due to the absence of research concerning this group. On the other hand, the significant increase in the number of known species of Algae in Malta between 2000 and 2002 is due to better knowledge of the field and in particular to the publication of the Cormaci & al inventory in 2002. In Turkey, publications outside scientific spheres are recent. Following the data collection work in the framework of the MED-Env project, privileged access to the data base on animal species (fish are not included) and plants of the national scientific authorities which is recognised in this field, was given to the national statistics office. The data transmitted by Turkey corresponds to extraction from this data base on 31/12/2005.

Protected areas

Information concerning protected areas of the Mediterranean countries is scarce and incomplete most of the time. The countries carried out data collection on the basis of the information supplied by the competent authorities (Ministries of Environment and Forestry) on the basis of two criteria: geographical nature of the protected area (marine, coastal or terrestrial) and their belonging to one of the 6 management categories defined by the World Conservation Union (IUCN).

A **protected area** is, according to IUCN, "an area of land and/or sea especially dedicated to the protection and maintenance of biological diversity, and of natural and associated cultural resources, and managed through legal or other effective means".

In the framework of the MED-Env project, protected areas are classified both by their position on the national territory and according to their management objectives. The geographical categories chosen are the following:

— **Marine**: marine areas situated beyond the continental shelf;

— **Coastal**: inter-tidal and sub-tidal areas, situated on the continental shelf (up to a depth of 200 metres) and the adjacent land up to 100 km inland. (WRI);

— **Terrestrial**: inland areas

Given their location and/or their extent, the protected areas can spread over different geographical areas. In this case, the concerned protected areas are recorded in each geographical category (marine, coastal or terrestrial), but only counted once in the total number of protected areas of the country.

The protected areas are also recorded according to their management objectives. The management categories used correspond to the 6 categories (from I to VI) defined by IUCN:

— Category I a: **Strict nature reserve**,

Area of land and/or sea possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring.

— Category I b: **Wilderness Area**

Large area of unmodified or slightly modified land, and/or sea, retaining its natural character and influence, without permanent or significant habitation, which is protected and managed so as to preserve its natural condition. Category II: National park

Natural area of land and/or sea, designated to (a) protect the ecological integrity of one or more ecosystems for present and future generations, (b) exclude exploitation or occupation inimical to the purposes of designation of the area and (c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

— Category III: **Natural monument**

Area containing one or more, specific natural or natural/cultural feature which is of outstanding or unique value because of its inherent rarity, representative or aesthetic qualities or cultural significance.

— Category IV: **Habitat/Species Management Area**

Area of land and/or sea subject to active intervention for management purposes so as to ensure the maintenance of habitats and/or to meet the requirements of specific

— Category V: **Protected Landscape/Seascape**

Area of land, with coast and sea as appropriate, where the interaction of people and nature over time has produced an area of distinct character with significant aesthetic, ecological and/or cultural value, and often with high biological diversity. Safeguarding the integrity of this traditional interaction is vital to the protection, maintenance and evolution of such an area.

— Category VI: **Managed Resource Protected Area**

Area containing predominantly unmodified natural systems, managed to ensure long term protection and maintenance of biological diversity, while providing at the same time a sustainable flow of natural products and services to meet community needs.

The main tool for the protection of biodiversity is protection through legal devices. All the Mediterranean countries have developed these devices and created protected areas for habitats, species, natural resources, etc. The number of protected areas is constantly increasing. According to the figures transmitted by the countries, most of the protected areas are terrestrial. The Mediterranean region counts a little more than 500 terrestrial protected areas, less than 200 coastal protected areas and only 16 marine areas (Cf. tables 1.25 to 1.28).

Israel and Malta appear as being the two countries with the largest number of protected areas. In terms of surface area, the protected areas are the largest in Egypt, followed by Morocco, Israel, Tunisia and Syria.

As the IUCN categories are only now being taken into account in most of the countries, little information is available about the breakdown of the protected areas by management category. This absence of standard classification of protected areas does not prevent effective protection nationally. National classifications are often spilt into two large categories: national parks (which could correspond to Category II of the IUCN) and natural reserves (Categories IV or VI of the IUCN).

For the three countries for which information is available, it can be seen that most of the protected areas in Egypt and Israel belong to Category IV (more than 7 million hectares of areas managed for habitats and species in Egypt and 381 000 hectares in Israel). In Egypt the protected areas are of several types and can be at the same time marine, coastal and terrestrial areas. As breakdown by type is not available, the total number of protected areas is less than the sum of the various types of area. However, the protected areas in Malta belong to Category I (natural reserves) and concern about 18% of the island. The national categories in Malta cover bird sanctuaries, natural reserves, special conservation areas and sites that are of ecological, scientific or geological importance. The international designated sites correspond to the European Birds Directive (1979) and Habitats Directive (1992), the Ramsar Convention, the Bern Convention and the Barcelona Convention.

Box 1.7 Adoption of the IUCN categories remains complex

There are many classifications/nomenclatures/conventions linked to the protection of natural areas, at both national and international levels, which does not facilitate the precise identification of these areas. Due to this multiplicity of categories, a specific area can be protected for different reasons and thus belong totally or partially to a specific category or class of protection. In the absence of precise zoning (detailed maps of protected areas), it is difficult to avoid overlapping in the calculation of the surfaces effectively protected.

The figures recorded by the countries correspond to the official situation of the national institutions in charge of the protection of natural areas (Ministry of Environment in most of the countries). Only the protected areas that have been legally registered have been counted, which could explain the differences from the figures published at international level (e.g. on the World Database on Protected Areas -WDPA- which counts all the areas that are protected whatever their legal status).

The transposition of a standardised international nomenclature such as that of the IUCN to the national protection situations is underway in the Mediterranean countries. This transposition requires an in-depth analysis of the management objectives of the areas in question with regard to the international classification system. This is even more complex because there are areas recorded as protected while no specific management objectives have been attributed to them. This is the case in Egypt, for instance, where areas are recorded as being protected (limiting especially the scope for real estate) but their status and management objectives will be defined much later.

Table 1.25 Protected areas, date of creation and actual situation

		Total number	of which marine	of which coastal	of which terrestrial	Surface (ha)
CY	1980	50	-	-	50	1 541
	2003	53	-	1	52	1 570
EG	1983	1 [1]	1	1	1	85 000
	2004	24 [2]	3	9	22	9 848 350
IL	2002	427	8	29	390	409 966
JO	1975	1	-	-	1	2 200
	2003	7	-	-	7	114 100
MA	1993	10	-	-	10	362 120
	2003	14	-	1	13	672 788
MT	2005	153 [3]	1	152	-	10 669 [4]
PS	2000	1	-	1	-	325
	2005	1	-	1	-	325
SY	2003	19	2	2	15	213 393
TN	1964	1			1	100
	2004	24	2		5	217 888

Notes: 1: first protected area created which is marine, coastal and terrestrial; 2: protected areas can be mixte (marine, coastal, terrestrial); 3: six additional birds sanctuary exist for a surface of 660 ha; 4: possible overlaps, cartography underway.

There is no available information about protected areas in Turkey. The inventory and official classification is still under way. This explains why the country has not transmitted statistical data on this issue.

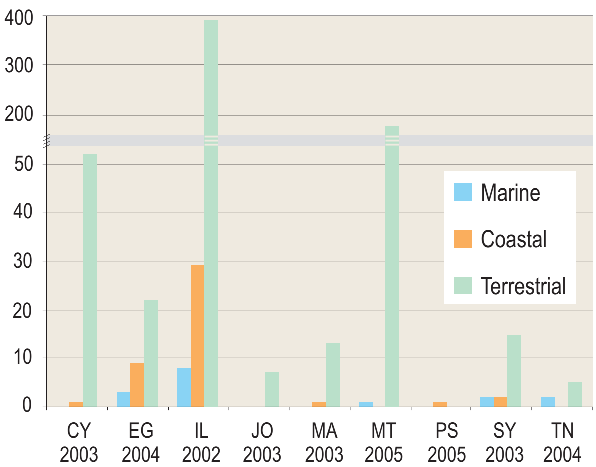
Cyprus and Malta, and to a lesser extent Turkey, are also following the European Habitats and Birds Directives for the setting up of protection for natural areas. Cyprus and Malta regularly transmit data to the European Environment Agency concerning «Natura 2000» designated areas. The Natura 2000 network is composed of sites specifically designated by the member states in application of the European Birds and Habitats directives.

In Egypt, marine areas are particularly protected. Indeed, the first protected area in Egypt was a national park which is marine, coastal, and terrestrial. Since then, most of the protected areas created in Egypt fall under management objectives corresponding to protection of habitats and species (Category IV). This is the case for Israel, too, with 100% of the marine protected areas falling under Category IV. In Malta, the protected marine areas fall under Category VI.

The first protected area in Tunisia is the natural reserve of Chichou. The 24 current protected areas include 8 national parks and 16 natural reserves. In Tunisia the entire surface protected corresponds to the two main national parks of Tunisia (Ichkeul and Zembra/Zembretta).

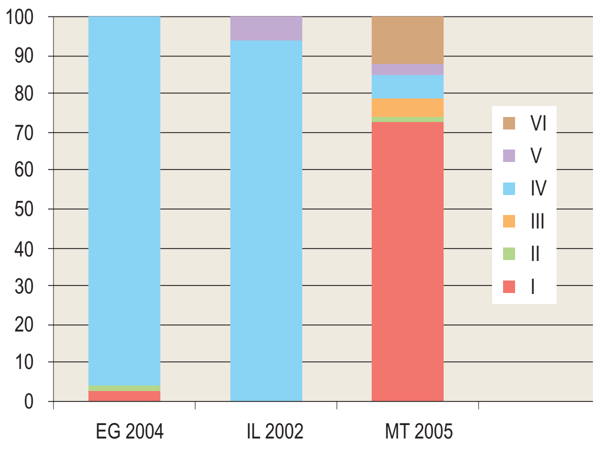
Malta has the most coastal areas, followed by Israel. The protected coastal areas fall into Category I in Morocco and Malta, into Category IV in Egypt and V in Israel. In addition to the coastal area of Wadi Gaza, the Palestinian Authority counts 48 other protected areas only registered nationally.

Figure 1.21 Distribution of marine, costal and terrestrial protected areas (last year available)



For most of the countries, the number and the surface of the protected areas is known, but their breakdown with regard to their management status has not yet been adopted or is underway.

Figure 1.22 Protected areas by IUCN categories for selected countries (%, last year available)



Box 1.8 Mobilisation for the protection of the Mediterranean: the example of the Barcelona Convention and of the Mediterranean Action Plan

The Mediterranean Action Plan and its Barcelona Convention (1976) constitute an example of regional cooperation, an action and regulation framework for the protection of the Mediterranean marine and coastal biodiversity (including terrestrial biodiversity). A first protocol concerning 'Mediterranean Specially Protected Areas (SPA) was effective in 1986, and was then replaced (Barcelona 1995) by a new protocol concerning both protected areas and biological diversity that came into effect in 1999. The latter is now applicable to all the marine waters of the Mediterranean, whatever their legal status, as well as to the sea bottom, to its underground area and to the terrestrial coastal areas. This extension beyond the territorial sea was necessary in order to protect migratory species such as marine mammals. The protocol provides for the establishment of a list of Specially Protected Areas of Mediterranean Interest (SPAMI List). Once these areas are registered on the list, the contracting parties agree not to authorise or undertake activities that could conflict with the objectives that motivated their creation.

152 Specially Protected Areas were counted for the whole of the Mediterranean region in 2003, 47 of which cover marine areas. Among the 12 Mediterranean countries, only Tunisia and Turkey are concerned by these designations. Three Specially Protected Areas are Tunisian: the national park of Zembra/Zembretta (off El Haouaria), the Kneiss islands (off Sfax) and the archipelago of La Galitte. Turkey has 13 sites, 9 of which are coastal, that are Specially Protected Areas, including a site for the protection of the Mediterranean monk seal (*Monachus monachus*) and 4 are nesting places for marine turtles.

Table 1.26 Distribution of marine protected areas by surface and IUCN categories

		Number	Surface (ha)	IUCN categories (%)					
				I	II	III	IV	V	VI
CY	2003	-	-						
EG	1983	1	85 000		100				
	1985	2	108 000		79		21		
	2004	3 [1]	3 668 000		2		98		
IL	2002	8	830				100		
JO	2003	-	-						
MA	2003	-	-						
MT	2005	1	1 307						100
PS	2000	-	-						
SY	2003	2	2 000						
TN [2]	1992	2	17 695		100				
	2004	2	17 695		100				

Notes: 1: the 3 protected area are marine, coastal and terrestrial; 2: correspond to the national park of Ichkeul and Zembra/Zembretta.

Table 1.27 Distribution of coastal protected areas by surface and IUCN categories

		Number	Surface (ha)	IUCN categories (%)					
				I	II	III	IV	V	VI
CY	1990	1							
	2003	1							
EG	1983	1	85 000		100				
	1985	2	108 000		79		21		
	1986	4	3 738 000	2	2		96		
	2004	9	3 912 000	2	2		96		
IL	2002	29	1 966	-	-	-	7	93	
JO	2003	-	-						
MA	2003	1	86 300	100	-	-	-	-	-
MT [1]	2005	152	9 362	82	2	5	7	3	-
PS	2000	1	325						
SY	2003	2	6 850						

Note: 1: possible overlaps, cartography underway.

Table 1.28 Distribution of terrestrial protected areas by surface and IUCN categories

		Number	Surface (ha)	IUCN categories (%)					
				I	II	III	IV	V	VI
CY	1980	50	1 541						
	2003	52	1 570						
EG	1983	1	85 000		100				
	1985	3	108 800		78		22		
	1986	6	3 738 850	2	2		96		
	1989	13	7 465 550	3	1		96		
	1998	18	*7 465 550*	3	1		96		
	2004 [1]	22	9 478 250	2	1		76		
IL	2002	390	407 170				94	6	
JO	2003	7	114 100						
MA	1993	10	362 120						
	2003	13	586 488						
MT	2005	-	-						
PS	2000	-	-						
SY	2003	15	204 543						
TN	1964	1	100		100				
	2004	5	25 150		99		1		

Note: 1: the IUCN distribution is not complete.

2

Impacts, environment pollution

Air pollution

Waste

Water quality and waste water treatment

Air pollution

Emissions of air pollutants are the product of industry, transport and the residential sector. Agriculture is also responsible but, unlike the other activities, it has the capacity to absorb part of the pollutants including carbon dioxide -CO_2 through photosynthesis. After increasing rapidly throughout the 1980s and a large part of the 1990s, emissions of some pollutants tended to stabilise even to decrease at the end of the last decade of the twentieth century in most of the Mediterranean countries. This situation reflects the modernising of the industrial apparatus, coupled with an improvement in the vehicles fleet. Nevertheless, some emissions, especially CO_2 emissions, continue to increase despite the desire of many Mediterranean countries to implement the Kyoto Protocol.

Emissions of pollutants in the atmosphere generate several consequences:

— Upsetting of the climate due to greenhouse gas emissions (carbon dioxide-CO_2, methane-CH_4, nitrous oxide-N_2O, bromides and chlorides compounds);

— Impact on health by hazardous gas emissions (particulates and lead);

— Perturbation of some natural environments - acidification of soil, mainly due to sulphur oxides emissions -SO_x- and nitrogen oxides -NO_x-.

In order to limit and reduce these pollutants emissions, the international community has put in place international conventions and treaties. These treaties mean that contracting states have to the produce information on gases that have trans-border impact, through common calculation methods. Air pollutants monitored in this way are divided into two categories. The first category is greenhouse gases (GHGs) that have potential global impact and these are governed by the United Nations Framework Convention on Climate Change (UNFCCC), the Kyoto Protocol, and the Montreal Protocol. The second category concerns gases that could be responsible for long range transboundary pollution (on the scale of the Euro-Mediterranean region, for instance) that include sulphur oxides (SO_x) and nitrogen oxides (NO_x) the emissions of which are dealt with by the Geneva Convention and its Göteborg protocol.

These gases are reported on an international scale with a common format (Common Reporting Format-CRF) for the greenhouse gases and in the framework of the Geneva Convention by the EMEP–Corinair methodology, a format that is compatible with the CRF. The figures transmitted by the countries in the framework of the MED-Env project on air pollutant emissions were produced by following this nomenclature.

The Mediterranean countries that have ratified the Kyoto Protocol are Algeria, Cyprus, Egypt, Israel, Jordan, Malta, Morocco and Tunisia and those that have ratified the Göteborg Protocol are Cyprus, Malta and Turkey.

As data concerning urban pollution (lead and carbon monoxide-CO emissions, concentrations of lead, concentration of particulates matter, of nitrogen dioxide-NO_2-and sulphur dioxide -SO_2-) is by nature very dependent on local meteorological and topographic conditions, it was collected from the National Statistics Offices in the form chosen by each country.

Emissions of greenhouse gases

The main greenhouse gases are:

— **Carbon dioxide**, CO_2, the majority of CO_2 emissions are produced by fossil energy combustion (thermal power stations or automobile vehicles).

— **Methane**, CH_4, is emitted mainly by rice growing (e.g. Egypt) and breeding. It is a product of the organic decomposition of vegetable fibres in this branch of activity. It is also produced by municipal waste dumps and to a lesser extent by the production and distribution of natural gas.

— **Nitrous oxide**, N_2O, is emitted essentially by the use of fertilisers for agriculture and incomplete combustion in industrial or energy processes.

— **Bromide and chloride compounds**, CFC, HCFC, halons, PFC and SF_6.

The figures for air pollutant emissions transmitted by the countries are reported according to the CRF format. This format distributes all the emissions for each gas in six branches of activity: energy, industrial processes, solvents, agriculture, land use (which is the net balance of sources and sinks) and waste. The energy sector covers the energy industries (electricity production), manufacturing industries, transport and the other energy sectors not covered elsewhere.

The sources of greenhouse gas emissions reported according to the CRF are:

— The energy sector:

- **Fuel combustion** (Sectoral Approach): Total emissions of all greenhouse gases from all fuel combustion activities. CO_2 emissions from combustion of biomass fuels are not included (see Emissions from Biomass Burning). Other greenhouse gases from biomass fuel combustion are considered net emissions and are included. Incineration of waste with energy recovery facilities are included here and not under Waste. Emissions based upon fuel for use on ships or aircraft engaged in international transport are not included.
- **Energy Industries**: Comprises emissions from fuels combusted by the fuel extraction or energy producing industries.
- **Transport**: Emissions from the combustion and evaporation of fuel for all transport activity, regardless of the sector. Emissions from fuel sold to any air or marine vessel engaged in international transport (international bunker fuels) are not included.

— **Industrial Processes**: By-product or fugitive emissions of greenhouse gases from industrial processes. Emissions from fuel combustion in industry are included under Fuel Combustion.

— **Solvent and Other Product Use**: Emissions resulting from the use of solvents and other products containing volatile compounds. When the solvents and other products are, or are produced from, petroleum products, the carbon in the NMVOC emissions will be included in the CO_2 inventory if the Reference Approach for CO_2 emissions from energy is used. All other non-energy emissions not included under Industrial Processes are included here.

— **Agriculture**: All anthropogenic emissions from agriculture except for fuel combustion and sewage emissions.

— **Land-use Change and Forestry**: Total emissions and removals from forest and land use change activities (activities impact on three different carbon sources/sinks: above ground biomass, below ground biomass and soil carbon).

— **Waste**: Total emissions from solid waste disposal on land, waste water, waste incineration and any other waste management activity. Any CO_2 emissions from fossil-based products (incineration or decomposition) are not included here. CO_2 from organic waste handling and decay are not included here.

— **Other**: Emissions that do not fit under any other emission source/ sink categories of the main six categories described above.

— **International Bunkers**: Emissions resulting from fuel use for ships or aircraft engaged in international transport.

The greenhouse gases concerned do not have a direct impact on health and on the environment. It is the increase in their concentration in the atmosphere which is suspected of altering the planet's radiative balance and consequently perturbing climatic cycles. The volumes emitted, as well as the global warming potential of each of these gases, vary considerably. Taking into account these two parameters, the latest work of the Intergovernmental Panel on Climate Change (IPCC) estimates that CO_2 alone represents 69% of the greenhouse effect of human origin, CH_4 18%, N_20 5%; the remainder being linked to emissions of various chloride and bromide compounds CFC, HCFC, SF_6, etc.

Carbon dioxide - CO_2

Table 2.1 CO_2 emissions (1000 t, 1990-2004)

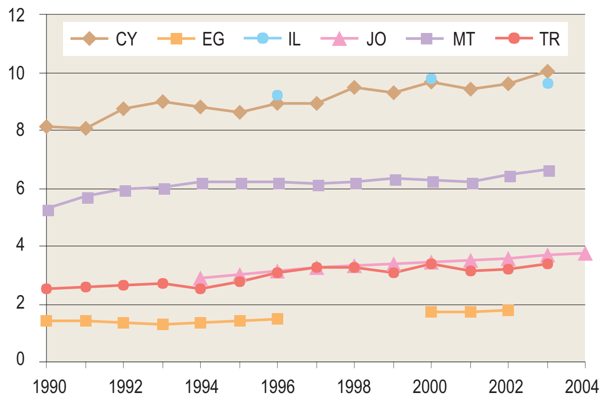
	1990	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
CY	4 640	5 576	5 576	5 866	5 933	6 387	6 352	6 675	6 585	6 790	7 177	
DZ		75 870										
EG [1]	84 459	76 756	82 885	85 262				109 975	110 676	118 262		
IL				51 862				61 007			64 299	
JO [2]		11 690	12 617	13 298	14 113	14 906	15 574	16 259	16 977	17 742	18 600	19 434
MA	32 545	31 908										
MT	1 896	2 310	2 338	2 344	2 348	2 355	2 451	2 444	2 439	2 562	2 636	
PS				1 007						2 185	2 441	
SY	28 700	35 000										
TN [1]		20 827	14 836	15 764	16 466	17 416	18 314	19 208	20 311	20 640	20 778	
TR	140 067	159 670	172 462	191 362	204 680	203 748	202 670	228 150	210 787	216 139	230 157	

Notes: 1: only energy sector for years 1994 to 2003; 2: only energy sector.

Table 2.1 presents the total quantities of CO_2 emitted by the countries. The latter have all been calculated using the IPCC method. With the exception of Israel, the Palestinian Authority and Turkey, these emissions are assessed by external consultants to the local administration. The National Statistics Offices only collect and report the calculations in their statistical yearbook. The respective shares of CO_2 emission of each country are closely correlated with their demographic and economic weight. Thus, Turkey is by far the biggest emitter in the region (230 million tonnes in 2003). Egypt, with an equivalent population emits fewer than half of the Turkish emissions of CO_2 (85 million tonnes in 1990). (Cf. figure 2.1)

Since 1990 the emissions per inhabitant have increased in all the Mediterranean countries (Cf. figure 2.2). When long time series are available, the increase is spectacular: 24% in Cyprus and 32% in Turkey between 1990 and 2003. These increases are the result of the economic development of these two countries. The break in series observed in the Egyptian series between 1990 and 1991 can be explained by a change of methodology for the calculation and the drop in Israel's emissions between 2000 and 2003 by improvement in waste management and the economic crisis.

Figure 2.2 Trend in CO_2 emissions per capita (t/inhab/year, 1990-2004)



Only 2 countries have emission levels per inhabitant comparable to those of the EU-15 (11 tonnes in 2004): Cyprus (10.04 in 2003) and Israel (9.7 in the same year).

Figure 2.3 presents the CO_2 emissions of the countries shared out among the various economic sectors grouped according to the CRF classification, (with the exception of industry which, wishing to get closer to the traditional presentation of the national accounts sectors, aggregates the CRF subsector of energy/manufacturing industries and the CRF sector industrial processes).

Figure 2.1 CO_2 emissions (Mio t, last year available)

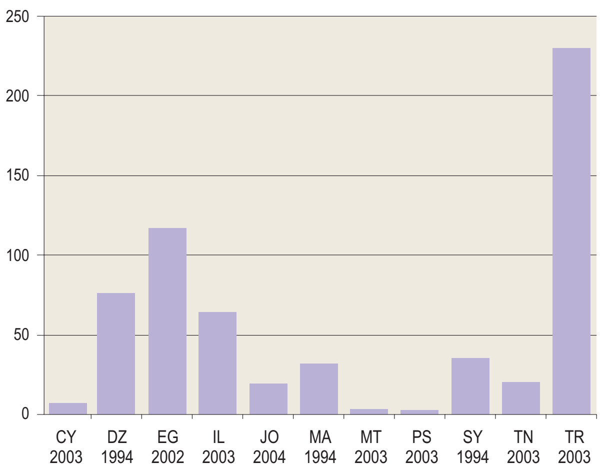
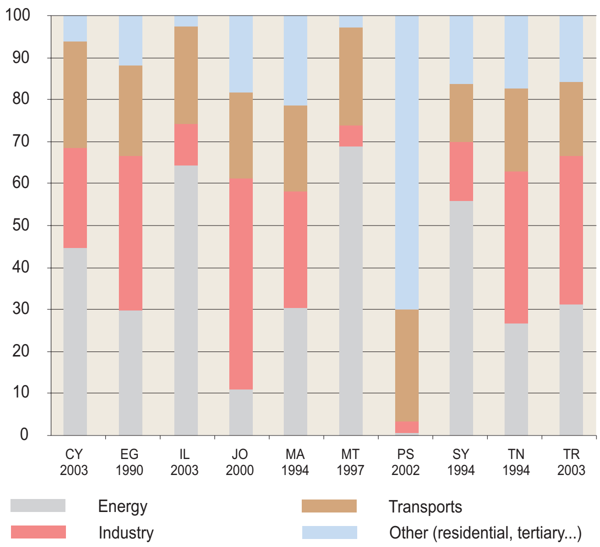


Figure 2.3 Sectoral share in CO_2 emissions (%, last year available)



While in the European Union the main sectors responsible for emissions are transport and residential sectors (according to the aggregation system explained previously), the energy industry is first in the Mediterranean countries.

This can be explained by the weight of the energy industry (in Syria for example) or by the difficulty of modernising the most polluting branches of the national industries (phosphates, potash and fertilisers in Jordan, petrochemicals and the metal industry in Turkey, phosphates and petrochemicals in Egypt). The high levels of emissions from industry in Israel and Malta can be explained by the use of polluting fuel for the production of electricity. There remains an atypical example: the Palestinian Authority for which transport and the residential sectors are the most polluting.

Methane - CH_4

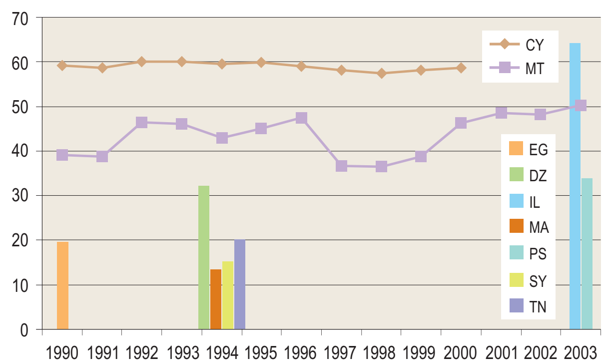
Table 2.2 CH_4 emissions (1000 t, 1990-2004)

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY	34	34	36	37	38	39	39	39	39	40	41			
DZ					914									
EG	1029													
IL							426				439			426
MA	450				349									
MT	14	14	17	17	16	17	18	14	14	15	18	19	19	20
PS							8						11	12
SY	204				206									
TN					180									
TR						1182								

Table 2.2 presents the CH_4 emissions of each country estimated according to IPCC methodology and, just as for CO_2, the calculations were made outside the National Statistics Offices (except in Israel, Palestinian Authority and Turkey). As for CO_2, Turkey and Egypt are the biggest emitters but with a volume of emissions that is very much higher than the other countries compared to the volume for CO_2.

Despite the fact that agriculture is the most important sector contributing to CH_4 emissions, the disparity in terms of emissions per inhabitant remains correlated with the differences in the standard of living: as for CO_2, Cyprus, Malta and Israel have an emission level that is far higher than the others. (Cf. figures 2.4 and 2.5)

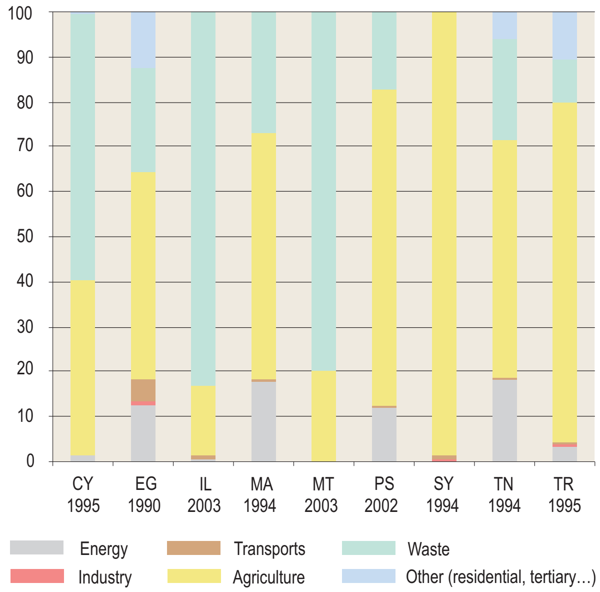
Figure 2.4 CH_4 emissions per capita for the period 1990-2003 (kg/inhab/year)



Notes: Trend for CY and MT ; last year available for EG, DZ, IL, MA, PS, SY and TN.

An absence of series does not permit an analysis of the trends in CH_4 emissions except for the drop in the Israeli emissions linked to improvement in waste management in this country, and the continuing high level of emissions in Cyprus which reflect the persistence of waste management that allows the emission of a considerable amount of methane. It should also be noted that there is a continuous increase in the emissions per inhabitant in Malta that can also be explained by the waste treatment methods.

Figure 2.5 Sectoral share in CH_4 emissions (%, last year available)

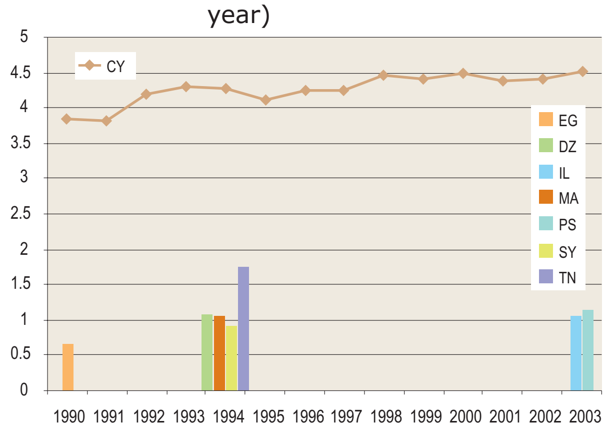


Nitrous oxide - N_2O

Table 2.3	N_2O emissions (1000 t, last year available)	
CY	2003	3
DZ	1994	31
EG	1990	34
IL	2003	7
MA	1994	28
PS	2003	4
SY	1994	13
TN	1994	14

Table 2.3 presents the N_2O emissions of each country assessed according to the IPCC methodology and, just as for CH_4 and for CO_2, the calculations were made outside the National Statistics Offices, except in Israel and the Palestinian Authority. As Turkey did not produce data concerning the total national emissions of this gas, Egypt appears as the first contributor in the region (34 000 tonnes) followed by Algeria (31 000 tonnes) and Morocco (28 000 tonnes). Tunisia emits a non negligible quantity (almost 15 000 tonnes) due to its agricultural development. (Cf. table 2.3)

Figure 2.6 N_2O emissions per capita for the period 1990-2003 (kg/inhab/year)



Notes: trend for CY; last year available for EG, IL, MA, PS, SY and TN.

Counted per inhabitant, the difference between the N_2O emissions of the countries is slight. (Cf. figure 2.6). Except for Cyprus which had 4.52 kg/inhabitant/year in 2003, all the countries emit between 0.65 kg (Egypt) and 1.6 kg (Tunisia). The differences in standard of living do not constitute a discriminating factor for this gas. Agriculture and its degree of intensity (fertilisers and irrigation) would seem to explain these disparities.

Bromide and chloride compounds

Bromide and chloride compounds are used because of their chemical stability in many industrial sectors for very varied applications (pressurised gases for aerosols, expansion of insulating foam for homes and vehicles, cleaning liquids for printed circuits, cold-producing liquids for air conditioning, anti-fire agents for extinguishers, etc.). As the international conventions that govern them are out-of-date, the figures communicated by the Mediterranean countries refer to the pre-inventory monitoring obligations for greenhouse gases and are not an assessment of the emissions but consumption figures of these products.

These chemical compounds are governed by the Montreal Protocol and its amendments. This protocol followed the «discovery» of a hole in the ozone layer in the Antarctic in 1985 and aimed at the progressive elimination of these chemical compounds from 1st January 1989 (see the summary of the control measures for the Montreal Protocol on http://hq.unep.org/ozone/french/Treaties_and_Ratification/control_measures.asp. Malta and Cyprus are «Non article 5» countries, whereas all the other countries are «Article 5» countries). The 12 Mediterranean countries have ratified the Montreal Protocol.

Besides this, bromide and chloride compounds (except CFC and halons) are included in the Kyoto Protocol due to the fact that their decomposition in the air accelerates global warming.

Concerning halons and chlorofluorocarbons (CFC, the sole compounds for which data is available), only Cyprus and Morocco were able to respect their international commitment for halons.

This could be linked to applications concerning strategic stakes such as for security and informatics, or other uses such as air-conditioning for which substitute products are expensive or give other problems (inflammable pressurised gases for aerosols).

Box 2.1 A standardised method for acquiring information about air pollutant emissions

In all the Mediterranean countries, the same assessment methods for the emission of pollutants are used concerning all the gases with potential international impact (i.e. greenhouse gases, nitrogen oxides -NO_x and sulphur oxides -SO_x).

The method used by the countries is that recommended by the Intergovernmental Panel on Climate Change (IPCC) of the United Nations Framework Convention on Climate Change http://ghg.unfccc.int/index.html. The countries use the 1996 version of the methodology guide (www.ipcc.ch).

Article 5 of the Kyoto Protocol requires all the contracting countries to develop a national system by 2007 that works out an inventory of the emissions and the fixations per sink. The protocol does not precisely define what it means by a national system but the protocol retains three elements:

— An institutional framework (the body or bodies that are in charge of making the inventory, of how the work is presented to the political decision-makers, of the budget and manpower mobilised, the control framework, harmonisation with the IPCC inventory and any national inventories made using other methods, etc.) ;

— A description of how the inventory is compiled and how the data is collected;

— A description of assessment procedures for the inventory.

Emissions from all the gases concerned are assessed from coefficients connected to all the human activities and shared out between the various CRF sectors (http://ghg.unfccc.int/definitions.html). More often the Mediterranean countries use the coefficients supplied by the IPCC as they are, which could give some problems of reliability when dealing with sectors linked to natural environments such as agriculture. Except for Israel and the Palestinian Authority, few efforts have been made institutionally to adapt these coefficients to the Mediterranean situations.

IPCC methodology permits comparison of results from one country to the next and is updated every five years, which means that the Mediterranean countries will soon be revised their emission factors and the models they use in order to remain at the level of the requirements of the climate convention. Indeed, most of the Mediterranean countries establish greenhouse gas inventories directly derived from the energy balance sheet and do not, therefore, include either CO_2 emissions linked to land use change, especially concerning forestry activities, or the N_2O and CH_4 emissions connected with agriculture and with waste disposal.

With regard to urban pollution, comparison between the countries needs to be cautious because the emission sources taken into account are very different from one country to another. Apart from this, the information concerning the setting up of urban air pollution control networks as well as the maintenance of these networks has many gaps.

Long range transboundary emissions

Pollutant from long range transboundary emissions are mainly SO_2 and NO_x.

- **Sulphur dioxide**, SO_2, discharges of SO_2 are principally due to the use of sulphured fossil combustibles (coal, lignite, petrol coke, heavy fuel, domestic fuel, diesel oil).
- **Nitrogen oxides**, NO_x, originate mainly from the combustion of fossil combustibles and from some industrial processes (nitric acid production, manufacturing of fertilisers, surface treatment, etc.). Nitrogen oxides are also involved in the formation of photochemical oxidants and indirectly in the increase of greenhouse effect.

For these gases which also have an indirect effect on the climate, the emissions are approached with coefficients. The IPCC supplies the coefficients used in the countries by the bodies that establish the greenhouse gas emissions inventories. In parallel to these evaluations and in order to monitor the output of some energy installations or engine performance, other coefficients have already been used by some technical bodies (Ministry of Transport, energy balance, etc.) and reported in the official statistics for many years. This allows the countries to produce relatively long time series on these two pollutants.

These two gases are produced by combustion. Their emission level depends on the characteristics of the combustible being considered (chemical structure, sulphur content, calorific properties, etc.). Besides their effect on the environment (eutrophication, acidification) their presence in the air that we breathe could be at the origin of lung diseases.

Sulphur oxide - SO_2

Turkey, with 754 000 tonnes in 2003, is the country that emits the most SO_2 in the region, not only because of its large population, but also because of its industrial apparatus which has not yet finished its modernising cycle. Morocco and Syria also emit non negligible quantities (237 000 tonnes in 1996 and 367 000 tonnes in 1995 respectively). Israel's emissions, with 236 000 tonnes in 2003, represent one third of those of Turkey for a population approaching 15% of the latter. (Cf. table 2.4)

Three countries present emission levels per inhabitant higher than 20 kg/inhabitant/year in 2003: 70 for Malta, 63 for Cyprus and 36 for Israel. In these three countries the high sulphur content in the combustibles used for the production of electricity explains these high levels. This is true to a lesser extent for Turkey (11 kg/inhabitant/year in 2003). (Cf. figure 2.7)

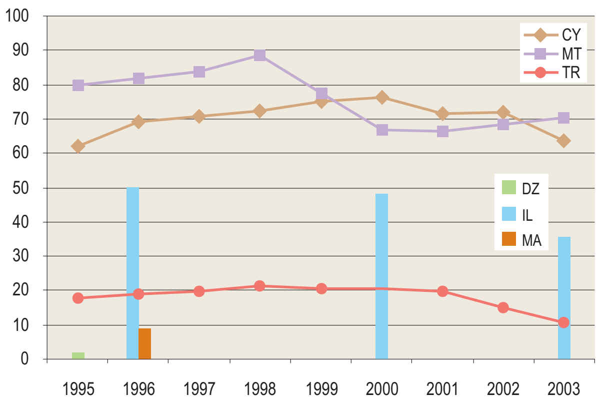
With the adoption of the techniques for filtering emissions (fluidised beds in the electricity power plants, for instance), and control of the energy consumption in industry, there has been during the last decade, despite strong economic growth, a considerable drop in SO_2 emissions in most of the countries of the region (- 27% and - 14% in Turkey and in Israel during the period 1995-2003, - 10% in Cyprus during 1995-2003).

Table 2.4 SO_2 emissions (1000 t, 1995-2003)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY	40	45	47	49	51	53	50	51	45
DZ	49								
EG									
IL		298							236
JO									
MA		237							
MT	30	31	32	34	30	26	26	27	27
PS									
SY	367 [1]								
TN	78 [1]								
TR [2]	1094	1203	1266	1396	1366	1381	1358	1038	754

Notes: 1: 1994; 2: energy and industrial processes only.

Figure 2.7 SO_2 emissions per capita for the period 1995-2003 (kg/inhab/year)



Notes: trend for CY, MT and TR; last year available for DZ, IL and MA.

Nitrogen oxides - NO_x

Table 2.5 NO_x emissions (1000 t, 1995-2003)

	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY	19	21	21	22		22	21	22	21
DZ	180								
EG									
IL		220				237			218
JO	83	86	90	94	98	101	105	109	114
MA		401							
MT	10	9	9	10	10	10	10	11	11
PS		12						11	19
SY									
TN	68 [1]		76						
TR	770	842	850	831	847	920	873	895	941

Note: 1: 1994.

Because of its large population, Turkey is the biggest emitter of NO_x in the region. Israel is also an important emitter because of its high fuel-consuming vehicles stock. (Cf. table 2.5)

At regional level, despite the progress made by automobile manufacturers, unlike SO_2, the NO_x emissions per capita have evolved differently: net drop in Cyprus (8% between 1990 and 2003) and Israel (16% between 1996 and 2003), a net increase in Jordan (9% between 1994 and 2003) and in Turkey (19% between 1990 and 2003). (Cf. figures 2.8 and 2.9)

This evolution can mainly be explained by the state of vehicles in the countries: in Cyprus and in Israel the import of efficient models from North America and Europe is beginning to improve matters, while elsewhere the renewing of vehicles is far too slow and the models are older.

Figure 2.8 NO_x emissions per capita (kg/inhab/year, last years available)

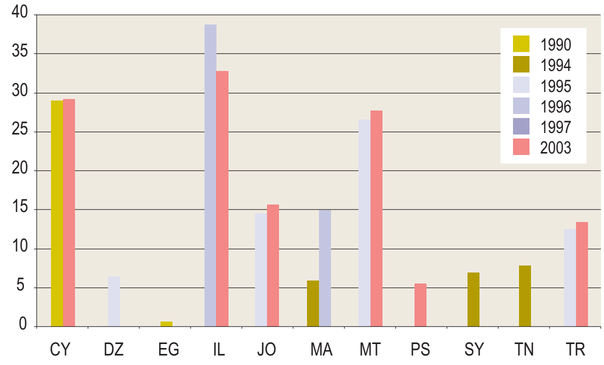
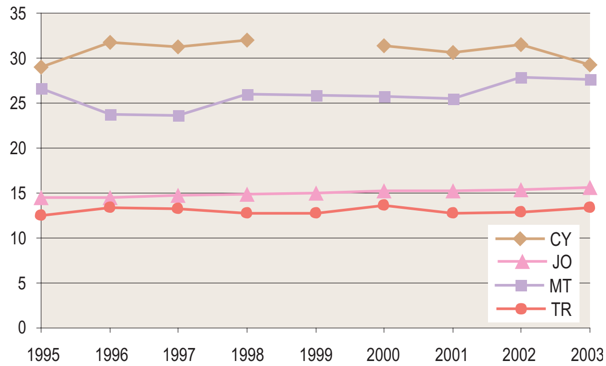


Figure 2.9 Trend in NO_x emissions per capita (kg/inhab/year, 1995-2003)



Urban pollution

In all the Mediterranean towns there is the conjunction of intense automobile traffic and a high level of sunshine. This situation generates the emission of very varied pollutants including lead and particulates matters, which play a large role because of the harmful effects that they have in the short term on human health. These pollutants are suspected to be carcinogenic and likely to cause an increase in the risk of cardio-vascular diseases. This is the reason why their concentrations have been controlled in a number of cities in the Mediterranean since the middle of the 1980s. However, in most Mediterranean countries, their emissions are not controlled or only slightly. Lead emitted by road traffic is monitored by only by some countries and even then only sporadically. That is why it is useful to have recourse to some indirect data to evaluate the real evolution of urban pollution. Among this information, the rate of change to diesel oil for automobiles can give an idea about the evolution of particulate emissions.

Lead - Pb

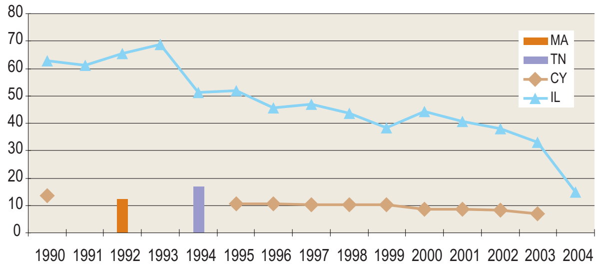
Table 2.6 presents the evolution of lead emissions linked to road traffic (including heavy goods vehicles, but not two-wheeled vehicles). These figures are assessed from coefficients calculated internationally and applied to local traffic which probably leads to underestimation of the total emissions.

A drop in lead emissions can probably be accounted for by the progressive introduction of lead-free petrol (Cf. figure 2.10). If leaded petrol remains the most used fuel in Syria, Lebanon, Tunisia, Morocco and Algeria, (according to Manufacturers Emissions Controls Association 2003), it has been prohibited for new vehicles in Cyprus since 1992, since 1999 in Egypt, 2002 in Lebanon and Tunisia and 2003 in Israel.

Table 2.6 Per capita lead emissions from transport (g/inhab/year, 1990-2004)

	CY	IL	MA	TN
1990	13.62	62.66		
1991		61.02		
1992		65.58	12.11	
1993		68.61		
1994		51.30		16.71
1995	10.66	51.76		
1996	10.50	45.73		
1997	10.36	46.84		
1998	10.25	43.55		
1999	10.13	38.37		
2000	8.60	44.36		
2001	8.53	40.53		
2002	8.39	38.05		
2003	6.78	33.17		
2004		14.82		

Figure 2.10 Trend in lead emissions per capita (g/inhab/year, 1990 et 2004)



Conversion to diesel

Vehicles equipped with diesel engines are the main emitters of suspended particulates. A study of the share represented by these vehicles in the total number of vehicles helps us to understand the evolution in the emission of particulates matters. The figures presented refer only to private vehicles, for all the countries, as the information is extracted from car registration files.

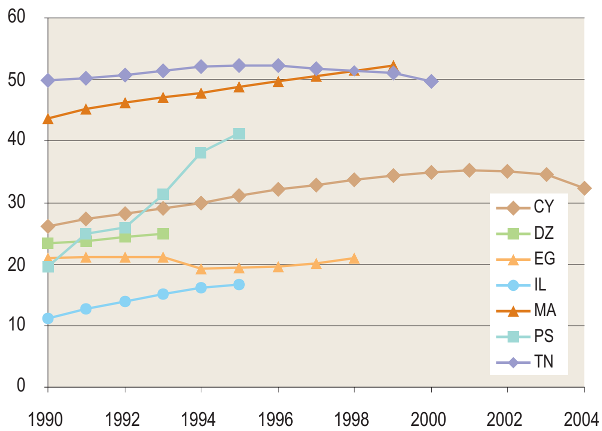
Vehicles with diesel engines are widely used in the Mediterranean countries and their share is continuously increasing (Cf. table 2.7 and figure 2.11).

Four countries out of the 7 for which there is information have more than 30% diesel vehicles out of the total number of vehicles. In Morocco diesel vehicles represented 52% of the total number of vehicles in 2003, 50% in Tunisia in 2000, 41% in the Palestinian territories in 2003 and 32% in Cyprus in 2004. The share of diesel vehicles is rising everywhere except in Tunisia. This share went up from 11% in 1998 to 17% in 2003 for Israel and from 20 to 42% in the same period for the Palestinian territories.

Table 2.7 Share of diesel in vehicle fleets (%, 1990-2004)

	CY	DZ	EG	IL	MA	PS	TN
1990	26.13						49.81
1991	27.27						50.28
1992	28.24						50.77
1993	29.08						51.39
1994	29.89				43.68		52.02
1995	31.07	3.37	21.03		45.14		52.18
1996	32.21	3.78	21.23		46.19		52.19
1997	32.88	4.41	21.13		47.10		51.73
1998	33.68	4.95	21.13	11.20	47.85	19.58	51.47
1999	34.34		19.25	12.65	48.81	24.85	51.01
2000	34.86		19.46	13.96	49.69	25.94	49.66
2001	35.19		19.55	15.17	50.59	31.21	
2002	35.14		20.17	16.15	51.45	38.09	
2003	34.58		20.98	16.69	52.28	41.33	
2004	32.33						

Figure 2.11 Share of diesel in vehicle fleets (%, 1990-2004)



Measuring the concentrations of pollutants

The concentration of some gases and gas compound is monitored over time by various bodies (usually the ministries of the Environment and/or Health) because of their supposed effects on health and the environment. The pollutants selected are:

— Sulphur dioxide -SO_2.

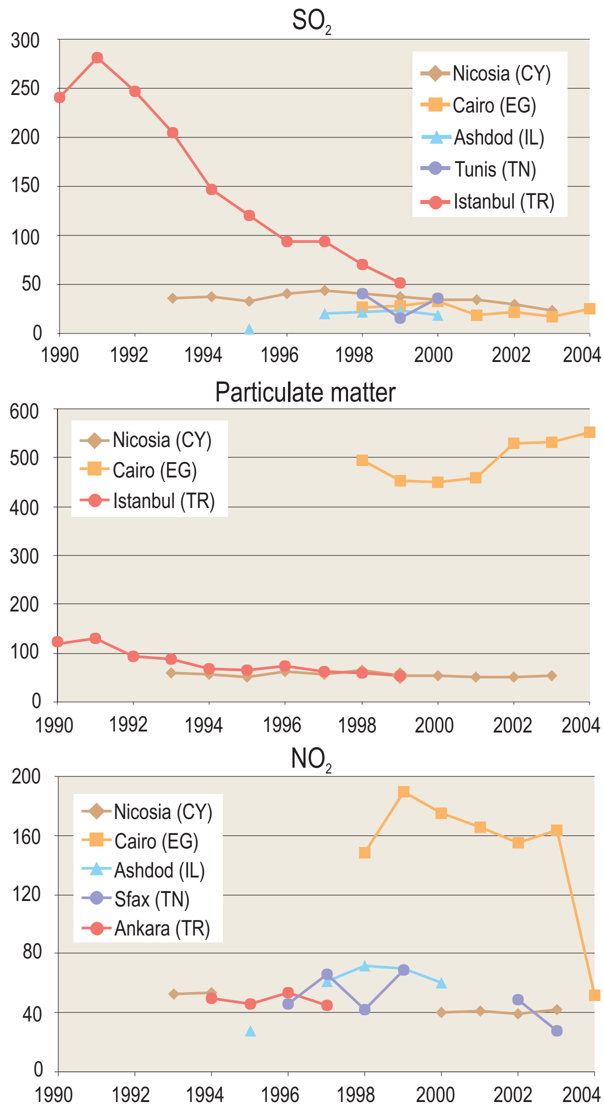
— Suspended particulate matter (PM): these are the solid discharges from combustion which remain present in the air in a state of suspension. The smaller they are, the more hazardous they are. Indeed, when they are micro-particulates (diameter under 5 micrometers) they go through the lung barrier and settle in the vital organs and in this way can cause cancer throughout the body. Four categories can be distinguished: PM 10 (diameter: 10 micrometers), PM 5, PM 2.5 and PM<2.5.

— Nitrogen dioxide -NO_2.

Figure 2.12 presents the average annual concentrations in some Mediterranean towns, either given by monitoring stations or as an average of all the monitoring stations.

The following illustrations are given as examples and demonstrate that in the selected towns, the evolution in the concentrations of the various pollutants is different and so they do not show trends.

Figure 2.12 Air pollutants concentration in a few cities (µg/m³)



Box 2.2 Controlling air quality

The European Union Directive (notably this for «air quality» 2000/69/EC of 16 November 2000) gives to member states thresholds of concentrations that it is not advisable to pass. These thresholds are 20 micrograms per cubic metre as an annual average for SO_2, 40 micrograms per cubic metre as an annual average for particulates PM 10 and 50 micrograms per cubic metre as an annual average for $N0_2$. The limits for these gases are set on the basis of scientific knowledge with the aim of avoiding, of preventing or of reducing the harmful effects on health (cardio-vascular diseases, respiratory troubles) and/or the environment (vegetation necrosis) and they should not be passed in less than a given period of time.

It remains difficult to compare situations from one town to another. On one hand, the monitoring methodologies can vary in the same town from one monitoring station to another. On the other hand, in most of the towns of the 12 Mediterranean countries, the monitoring networks are not always structured according to the protocols for the setting up of stations established on scientifically opposable criteria (but the networks of Nicosia group together the local stations in order to have exhaustive cover of the topographic, sanitary and ecological situation of the town). Finally, they are average annual values that could hide a number of very high or very low pollution episodes.

While taking into account these limits, the concentrations of pollutants referred to above demonstrate a worrying situation with average annual concentrations higher than the European limit values.

Waste

The generation of waste by the various branches of activity in a country, as well as by households, constitutes one of the strongest sources of pressure on the environment. Correlated closely with the economic development of the countries and especially with the evolution in consumption patterns and production methods, the amounts of waste generated are constantly increasing. Waste management (collection, monitoring and reduction in the amounts generated, setting up of treatment and disposal facilities, development of recycling channels, etc.) has become one of the major concerns of the Mediterranean countries.

Knowledge of the quantities of waste produced by each branch of activity, and by households, allows monitoring and better control over the impact on natural resources such as air, water, land, landscapes and in this way on the quality of citizens' life.

In the European Union there are regulations which form a framework for the drawing up of community statistics on waste generation and treatment; this kind of regulation does not exist in the Mediterranean countries (except for Cyprus and Malta).

The purpose of this chapter is to highlight the evolution of the quantities of waste generated by each sector and by waste stream, their composition and the treatment and disposal methods implemented in the Mediterranean countries. Municipal waste, industrial waste and hazardous waste are covered.

Generation of waste by sector and waste stream

The term waste refers to materials that are not prime products and that at a certain moment no longer have any utility for the producers, whether for reasons of production, transformation or consumption and that they wish to eliminate. The recycled or reused residue at the place of generation (e.g. in the establishments), as well as waste directly discharged into water (e.g. waste water) and ambient air are excluded from this definition. Official definitions, when they exist, vary from one country to the next. (Cf. box 2.3)

Waste comes from the extraction of raw products, from the transformation of raw materials into intermediate or end products, from consumption of end products and from all human activities, including household consumption. In some countries waste regulations include liquid sludge.

Municipal waste is considered as a separate sector, although it does not correspond to any specific type of activity, because it is collected by or on behalf of a municipality or, more generally, by urban agglomerations.

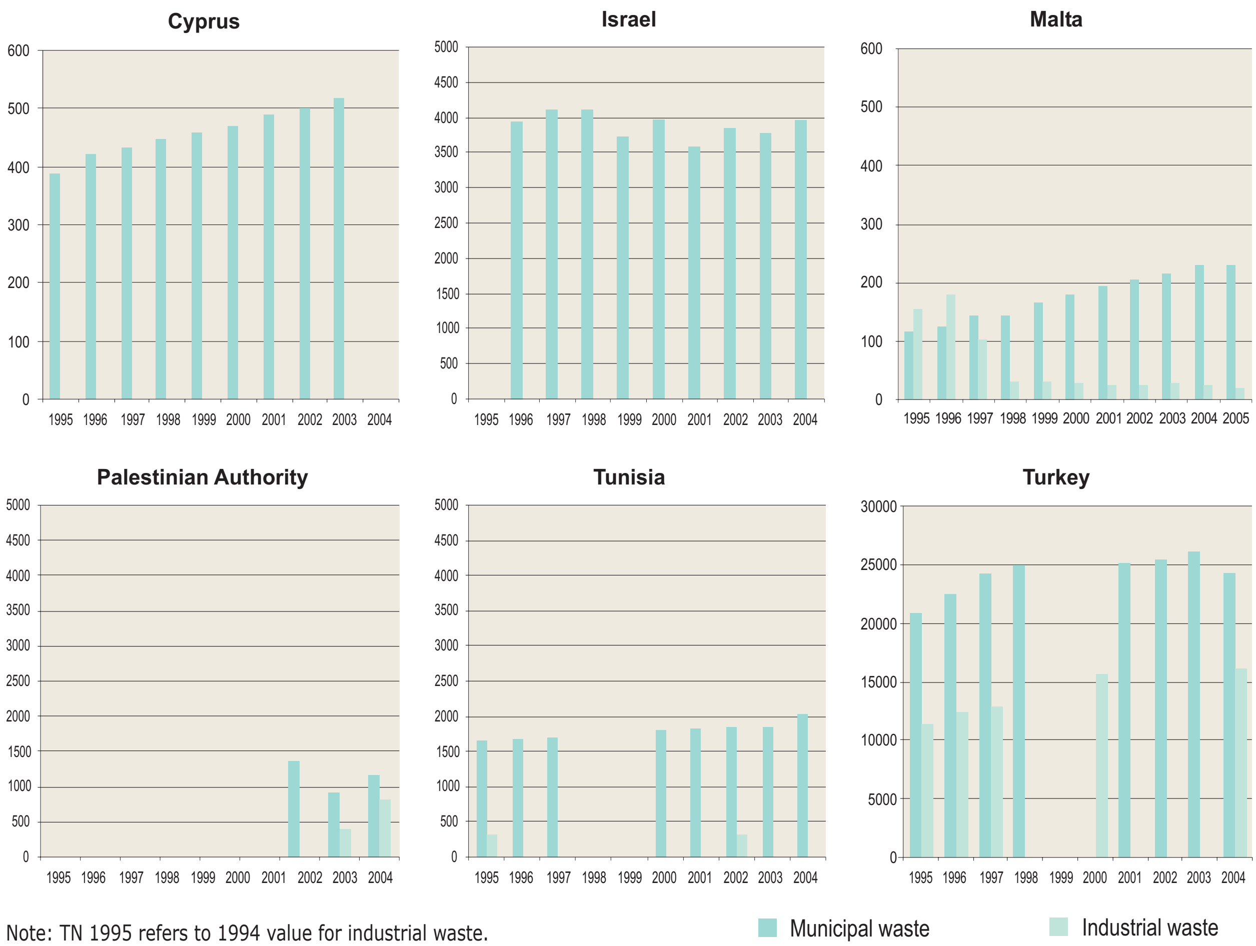
It includes waste originating from households, similar waste from commerce and trade, from private and public services, institutions including schools and hospitals, and often from small craft or small industrial enterprises.

Table 2.8 Amount of primary waste generated by sectors (1000 t, last year available)

		Agriculture and forestry	Mining and quarrying	Manufacturing industries	Energy production	Water purification & distribution	Sewage and refuse disposal	Construction	Other sectors n.e.s.	Municipal waste	Total amount of primary waste generated
	ISIC	01-02	10-14	15-37	40	41	90	45			
CY [1]	2003			84						518	
DZ [2]	2003		212	1 030						8 500	10 737
EG [3]	2000	23 000		4 500		621	1 750	3 500	20 000	14 500	67 871
IL [4]	2004									3 911	4 144
JO	2003							309		2 227	
LB	2005									891	
MA	2000			974				71		6 558	
MT [5]	2005	11	1 196	19			-	9	25	228	1 489
PS	2004			810			0	100		1 166	2 077
SY	2001									3 662	
TN [6]	2004	55		320	13 e	70 e			7 500	2 025 e	
TR [7]	2004		3 624	16 152	26 360		2 307			32 387	

Notes : 1: 1985, ad hoc survey for manufacturing industries; 2: 1997 for mining and quarrying and manufacturing industries; 1.5 millions tons of industrial waste are included in municipal waste; 3: water purification refers only to Cairo and Alexandria; Other sector refers to cleaning of canals and drains; 4: 2002 for total amount; 5: Other sectors include recovered waste and tarmac fine dust, special wastes and recovered waste; 6: 2000 for agriculture, 2001 for energy production and water purification, 2002 for manufacturing industries, Other sectors refer to phosphogypse; 7: 1997 for mining and quarrying.

Figure 2.13 Trend in municipal and industrial waste in a few countries (1000 t, 1995-2005)



Note: TN 1995 refers to 1994 value for industrial waste.

Table 2.8 presents the quantity of primary waste produced by municipalities and the **various sectors of economic activity**, i.e. agriculture, mining and quarrying, manufacturing industries, energy production, water treatment and distribution, sanitation, construction, etc. The breakdown waste per sector of activity follows the main categories of the International Standard Industrial Classification, (ISIC) revision 3.

Available information remains restrained for some sectors of activity (industry and municipal waste, Cf. figure 2.13) in most of the countries. Consequently, the total amount of primary waste produced is not known precisely. In some countries, breakdown per sector is available, but only for a few years or for one single year corresponding to an ad hoc study. In the countries where this information is available, the breakdown varies from one country to another with a preponderance of mining and quarrying in Malta (80% in 2005), of agriculture in Egypt (34% in 2000) corresponding to the enormous volumes of rice straw produced annually, to the miscellaneous sector in Tunisia which includes phosphor gypsum discharges from the phosphate industry and to municipal waste (40% 2004) in Turkey.

Generally-speaking, waste from agriculture, forestry and construction are not quantified separately because this type of waste is dealt with by the sectors in question or reused (for example demolition and construction site waste is used as infill material).

In the **industrial sectors**, the amount of waste generated varies from one country to another and from one sector to another (Cf. table 2.9). The food industries, the non metal mineral product industry and the metal industry seem to be the largest producers of non hazardous industrial waste.

Only a few countries regularly collect data on the production of industrial waste (Jordan, Morocco, Malta, Tunisia and Turkey). The observed trends show great fluctuation in Jordan (for the wood, paper, printing and non metal mineral products industries), an increase in the amounts of waste generated in Morocco (3% on average between 1992 and 2000) and strong increase in Turkey (essentially due to the metal industry and the refineries, i.e. 35% on average between 1994 and 2004). This information comes mainly from ad hoc studies; this is the case for Cyprus (ad hoc study carried out in 1985 in a sample of polluting industries representing 12.4% of the sector and 35% of employment). The data is sometimes obtained indirectly from estimation coefficients. This is the case in Morocco: the quantities of industrial waste are estimated on the basis of industrial production and manufacturing process) or by surveys as in Malta: the figures come from weight recordings at the entrance of the main dumping site. It is also the case in Turkey: survey in the industrial enterprises representing 88% of the production of the sector and 75% of the employment.

Little statistical information is available about the volumes of the various materials making up the

Table 2.9 Waste generated by manufacturing industries (1000 t, last year available)

		CY [1]	DZ [2]	EG	JO [3]	MA	MT	PS	TN	TR
	ISIC	1985	1997	2000	2002	2000	2005	2004	2002	2004
Food, beverages, tobacco	15-16	52	2		15	532				3 441
Textiles & leather	17-19	1	17			50				498
Wood & wood products	20	3				19	1			43
Paper & paper products	21	2			1	41				161
Printing & publishing	22	0	3		3					43
Chemical industries	24	1			38	187				1 483
Rubber & plastics	25	0	3		7		0			86
Refineries	23	0	50							124
Non-metallic mineral products	26	21			33					1 578
Basic metal industries	27	-	956		9	74	0			6 995
Fabricated metal products, machineries	28-35	3			4					1 650
Oher manufacturing industries	36-37	1				131	18			50
TOTAL		84	1 030	4 500		974	19	810	320	16 152

Notes: 1: data are derived from an ad-hoc survey, which covered 12.4% of the enterprises in the manufacturing sector, representing 32.5% of total employment in the sector; 2: wood is included in printing & publishing category, chemical is included in rubber & plastics category; 3: 2003 for paper and rubber categories.

primary waste generated (Cf. table 2.10), but efforts are underway for waste packaging that can be recycled. Indeed, this information is essential to set up national strategies for waste management.

Demolition waste and construction waste are the most common types of waste and represent the most waste in terms of tonnage. A few figures are also available on transport waste (end-of-life vehicles and used tyres). In 2002, a study carried out in Syria estimated the volume of demolition and construction waste at 2 096 thousand tonnes and the volume of used tyresat 12 200 tonnes per annum (i.e. 1 tyre per vehicle per year). The method for estimating the construction and demolition waste used by Syria is based on the number of employees in the construction sector and on the ratios of average composition of this type of waste used in Europe (10% bulky wastes, 90% inert waste, and 0.3% hazardous waste) (TRIVALOR 2004).

Table 2.10 Generation of waste by selected waste streams (1000 t, 2000-2005)

			Construction/ Demolition waste	Dredged spoils	Sewage sludge (dry weight)	End-of-Life vehicles	Used tires	Electric & electronic equipment	Mineral and synthetic oils	Other waste
CY	2000					12	5	5	6	
	2001					13	5	5		3
	2002					12	5			
	2003					7	5			
EG	2000	1	3 500	20 000	1 750					
MA	2000		71							
MT	2000		153		2	10				
	2001		190		2					
	2002		248		1					
	2003		172		1	3		0		
	2004		28		1					
	2005		9		0					
SY	2001	2	126		16					
TN	2000			40	37			13	51	
	2001			40	35			13	51	
	2002				30					
	2003				26					
	2004	3			19		15		47	11

Notes: 1: sewage sludge refers to cleaning of canals and drains; 2: figures refer only to the old City of Damascus, 1997 for sewage sludge; 3: other wastes include 8500 tons of storage battery and 2400 tons of battery.

Table 2.11 Amount of waste generated and recycled (1000 t, last year available)

		CY	DZ	EG	JO	MT	TN	TR
		2003	2003	2003	2003 [1]	2005 [2]	2004	2003
Paper & paper-board	Amount generated	140				2	23	
	Amount collected for recycling	7			40			1226
Glass	Amount generated	6				0	41	
	Amount collected for recycling	1						141
Aluminium	Amount generated							
	Amount collected for recycling	2						
Other non-ferrous metals	Amount generated							
	Amount collected for recycling	3						
Ferrous metals	Amount generated					0	81	
	Amount collected for recycling	34						
Plastics	Amount generated	58			6 985	0	142	
	Amount collected for recycling	2					6	
Packaging material	Amount generated		1 954	3 000			530	
	Amount collected for recycling	47	4	2 000				

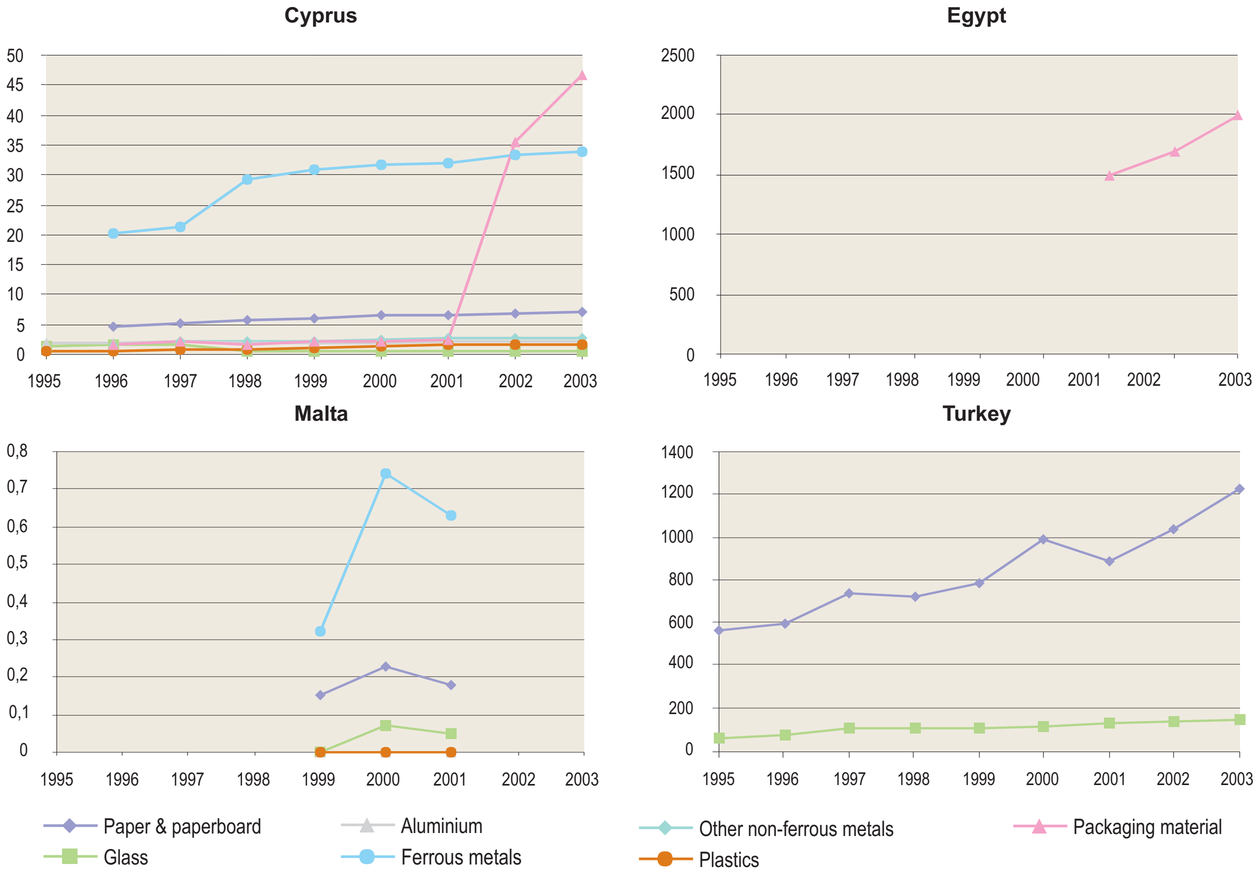
Notes: 1: 1999 for plastics; 2: 2003 for paper & paperboard and for glass category.

Part of the waste generated is concerned by separate collection (especially municipal waste) and goes through recycling channels. The amounts collected for recycling are still limited (Cf. table 2.11). Recycling concerns mainly metal, glass and paper. The amounts of recycled waste remain relatively stable, except for packaging, despite an increase in the generation of this recyclable waste.

Out of the quantities recycled, Cyprus recycles mainly glass (10% of the recycling percentage, compared to 5% for paper and paper-board, and 3% for plastic materials in 2003), Malta recycles ferrous metals (89% in 2001). As for packaging waste, it is controlled via the volumes of municipal waste collected (see following paragraphs) and rarely according to the total amounts effectively generated.

A large part of the recycling is carried out in an informal way and is not indicated in the statistics presented. Some countries have implemented programmes aimed at reducing the dumping of recyclable waste: this is the case of the ECOLef programme in Tunisia and of the remunerated cardboard and plastic collection in Turkey and Cyprus.

Figure 2.14 Trend in waste collected for recycling for a few countries (1000 t, 1995-2003)



Boc 2.3 Variety of methods for waste data collection

In each country, the statistics on waste are established from different sources depending on the waste categories, even if the survey methodology used by the countries for the same category of waste is quite similar.

Thus, the surveys concerning waste producers (industrial and household waste), the waste collection services (municipal waste), administrative registers (hazardous waste) and the waste treatment plants are used as sources of information. Moreover, the surveys can take the form of exhaustive surveys or polls; in the latter case, estimators are used («waste coefficients») to estimate the total. The reliability of the data differs considerably from one method to the other.

When reading the tables, readers should bear in mind that big differences exist in the various countries with regard to the survey definitions and methods used.

Recent figures (2004, 2005) indicated for Cyprus, Malta and Turkey have been specifically provided for this publication; therefore, these figures can differ from those published elsewhere.

Municipal waste : generation, composition and treatment

The following tables present trends concerning the quantities of municipal and household waste, their average composition and the treatment and elimination methods used.

Municipal waste is waste generated in a municipality or an urban district that is collected and treated by this municipality or by a service provider on behalf of the municipality. It includes household waste, bulky waste, similar waste from commerce and trade, offices and institutions (including schools and hospitals) and small craft or industrial enterprises, garden rubbish, street cleaning, the contents of public litter bins and market waste. The definition excludes waste from municipal sewage networks and treatment as well as municipal construction and demolition waste. However, waste of the latter type is often found mixed with household waste in most cities of the Mediterranean region.

Some industrial waste or particular waste (minerals, chemicals, slaughterhouse waste, tyres, wood, etc.) can also be collected and put on dumping sites with the household waste.

Generation of municipal waste

Table 2.12 Municipal Waste generated and collected (1000 t, last year available)

		Municipal waste generated	Of which from households	Municipal waste collected	% of the population connected by a municipal service of waste
CY [1]	2003	518		518	100
DZ [2]	2003	8 500		8 500	
EG	2000	14 500 e		*12 781*	
IL	2004	3 911		3 911	100
JO	2003	2 227			
LB	2005	891			
MA	2000	6 558		4 550	70
MT	2004	228	145	228	100
PS	2004	1 166	984		85
SY	2001	3 662		2 687	69
TN	2004	2 025 e	1 429	1 316	65
TR	2004	32 387	24 237	24 237	78

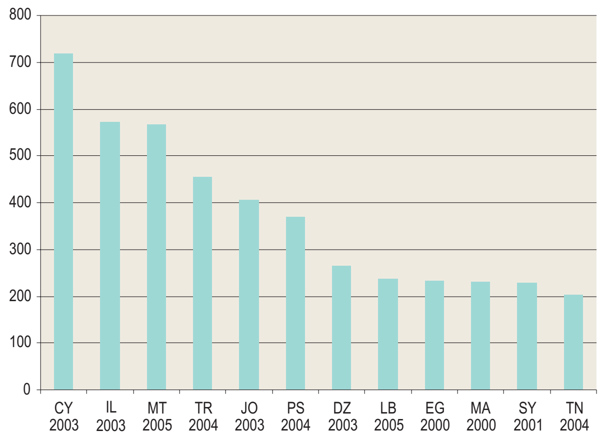
Notes: 1: data refer to municipal waste delivered to landfills. There may exist a small proportion of recycling before disposal to landfills; 2: 1.5 millions tons of industrial waste are included in municipal waste.

Municipal waste is the type of waste most covered by statistics in all of the countries and it gives rise to specific surveys at regular intervals. This information is particularly important to implement management plans at national level (e.g. by indicating the sizes for treatment and disposal sites, for the organisation of the collection, the development of recycling apparatus, etc). However, in some countries the volume of generated waste is confused with the effective volume collected by or on behalf of a municipality (Cf. table 2.12).

The volumes of municipal waste generated are rising considerably, reflecting the evolution of consumption patterns as well as an increase in packaging. However, many differences exist between the countries and reflect, with the uncertainty of exact measurements, the consumption patterns and the very different income levels in the region. Concerning the countries for which long time series are available, an increase of 37% can be noted in Malta between 1999 and 2005, with an average annual growth rate of 5% ; the rise is also considerable and regular in Cyprus, with an increase of 34% between 1995 and 2003 (i.e. an average annual growth rate of 4%), there is also a high rise in Morocco (15 % between 1995 and 2000), in Tunisia (21% between 1996 and 2004), in Turkey (46% between 1995 and 2004). Tunisia assesses the volumes of waste generated in the areas that are not served (rural areas) by a municipal waste service at 709 000 tonnes.

Thus the indicator for the annual production of municipal waste per inhabitant (Cf. figure 2.15) varies from single to a little less than quadruple depending on the country: from 204 kg/inhabitant in Tunisia to 718 kg/inhabitant in Cyprus, i.e. an

Figure 2.15 Municipal waste generation per capita (kg/inhab., last year available)



average regional value of 383 kg/inhabitant during the period 2000-2005 (the average for the European Union in 2003 was 534 kg/inhabitant) (European Commission, 2005).

Except in Cyprus, Malta and Israel, for which the figures declared show that all the population is regularly served by a municipal waste service, in the other countries the rate of the population served is much lower and varies from 65% in Tunisia to 85% in the Palestinian Authority. In Syria, for 2001, the value ranged from 100% in the old town of Damascus to 26% in Dera, with a value for all the country of 69%. The urban populations are in general better served than the distant rural ones that do not benefit from this service.

Box 2.4 Quantification methods of municipal waste

Quantifying the exact amount of municipal waste generated remains difficult. Systematic weighing of waste or regular reporting of volumes and quantities effectively generated is not frequent in most of the countries and it is often only reserved for residential urban areas. Thus, the quantities of municipal waste generated are estimations made by the National Statistics Offices from ad hoc surveys establishing a specific production per inhabitant and per day (the case for Egypt, Algeria, Jordan, the Palestinian Authority and Tunisia), or by extrapolation of statistics (method of the nearest neighbour in Israel). Consequently, the quantities reported are confused with the quantities effectively collected by or on behalf of the municipalities. Few time series are available and the values reported are often for reference years that do not allow comparison or observation of trends.

Given these methods for acquiring data, it is still difficult to identify the origin of municipal waste. For most of the countries, household waste and municipal waste are mixed. Malta and Cyprus, as new members of the European Union and Turkey are setting up new surveys and research in order to meet the requirements of the European regulations on waste statistics. In this way, statistics are available in Malta on the origin and type of municipal waste collected from 1999. Cyprus is implementing more in-depth surveys so as to be able to supply this type of information in a more regular and reliable way.

Besides this, some waste, especially recyclable waste, is counted numerically (number of glass bottles, number of plastic bottles, etc.) and not in the equivalent tonnage because the collectors of this waste (private or public) are remunerated on a numerical basis.

Composition of municipal waste

Table 2.13 Composition of municipal waste collected (1000 t, last year available)

	CY [1]	DZ	EG	IL	MA [2]	MT	SY	TN [3]	TR [4]
	2003	2003	2000	1999	2000	2005	2001	2004	2004
Municipal waste collected	518	8 500	*12 781*	*3 726*	*4 550*	228	2 687	1 316	24 237
Paper & paperboard	140		*1 917*	1 192	*865*	25		121	*1 522*
Textiles	31		*524*	-	*91*	6		24	*254*
Plastics	58		*959*	1 341	*182*	18		133	*761*
Glass	6		*383*	75	*182*	6		36	*507*
Metals	50		*543*	149	*114*	6		48	*254*
Organic material	194		*6 391*	708	*3 117*	84		819	*16 239*
Bulky waste						48			
Other waste	38		*2 812*	261	-	35		24	*5 836*

Notes: 1: bulky waste are included in the category «other»; 2: figures are based on an estimation in percentage of 1999; 3: 2003 for the different categories of waste; 4: figures are based on an estimation in percentage of 2002.

The organic share is the largest fraction of the municipal waste collected in all of the countries, i.e. an average proportion for the region of 57% between 1995 and 2003, followed by paper and cardboard (15%), the other shares being less than 10%. (Cf. table 2.13).

Considerable differences can be noted in the composition between the countries, reflecting the consumption patterns and the average income level, and the difference between urban and rural areas. Thus, even though the organic share is the highest, it is below 40% in Cyprus, Malta and Israel (38%, 19% and 37% respectively). Plastics are over represented in the household waste in Cyprus, Israel, Syria and Tunisia. On the other hand, the rate of plastics is lower in Egypt, Morocco and Turkey, but it is this share that is increasing the most.

Except for Cyprus and Israel, the fraction with high calorific power materialised by paper/cardboard does not go beyond 20%.

In terms of evolution, waste composition is marked by a decrease in the organic share and an increase that is almost the same for packaging, plastics and uncollected toxic waste such as solvents, batteries, automobiles, paint, etc. (Miscellaneous Category).

The composition of municipal waste is also very variable from one district of a town to another. Besides this, seasonal variations are important from the point of view of the composition and from the point of view of the specific quantities generated. This is particularly true of tourist and seaside resorts that have enormous increases, even a doubling, in the quantity of waste in summer. Seasonal surveys (the case for Cyprus) are set up in order to take this aspect into account.

In Malta, bulky waste is a large part of municipal waste and this trend is increasing, going from 17% to 21% in 2005. As this waste is collected separately, the increase can be considered as a positive factor for waste management and reusing compared to mixed waste.

Box 2.5 Waste composition

The obtaining of reliable data permitting the monitoring of the evolution in the composition of municipal waste at national level or in a large urban area is delicate. This supposes the implementing of surveys based on a selection of waste and quantification in weight of the different types of waste.

A first type of survey is carried out directly in a sample of voluntary households that agree to check their waste over a period of several weeks and to weigh the various categories or to indicate which waste types are a priori the most representative of their households (case of the Palestinian Authority). The results are collected by field investigators (case of Malta and Turkey). The quite heavy and costly organisation of this type of survey nevertheless gives precise results about the composition of household waste.

Another method for quantifying the composition of municipal waste consists of taking, before the normal collection, the content of bins of a well targeted sample from the residential, commercial or service areas. Centralised selection and weighing can be carried out for all the waste collected in a day. The choice of the survey days over a year and of the representative area is important. The advantage is to group together municipal waste and not only household waste.

The third method and that most often used (in Cyprus and in Damascus in Syria) is carried out beforehand by poll on the arrival of waste trucks at the dumping site The geographical origin of the waste collection should be taken into account in the poll which should cover all the municipality, as well as any seasonal or weekly variations. If the samples are taken after collection, the composition has already been altered because of any informal recuperation activity carried out by itinerant collectors before official collection.

Treatment of municipal waste

Usual treatment reserved for municipal waste is two-fold: treatment for the recovery of materials and that for final disposal. Recovery operations include recycling, composting and incineration with energy recuperation.

Recycling is defined as any reusing of materials in a production process that diverts them from the waste flow, except for reusing as fuel. Recycling for the same type of product or for other objectives is included. On-site recycling of materials in the industrial plant is excluded.

Composting is defined as the transformation of organic waste by biological processes in order to use it for land fertilising.

The quantities recycled or composted have to correspond to the quantities collected for these operations and should be adjusted for quantities that are not really recycled or composted as end products.

Final disposal is carried out by definitive dumping or by incineration. The dumping sites (landfill) can be of "controlled" type, i.e. whose access and whose hazards are controlled, or they could be simple storage areas that are more or less managed. The amounts of waste intended for final disposal include the amounts directly eliminated, as well as the amounts eliminated after selection for other types of treatment such as recycling, etc.

Other types of treatment could include discharge into water, including the sea.

The total of the amounts of waste treated or eliminated could be higher than the total amounts of waste generated. Indeed, the residue from some types of treatment (such as incineration, composting or recycling) is disposed on dumping sites afterwards and is therefore counted several times.

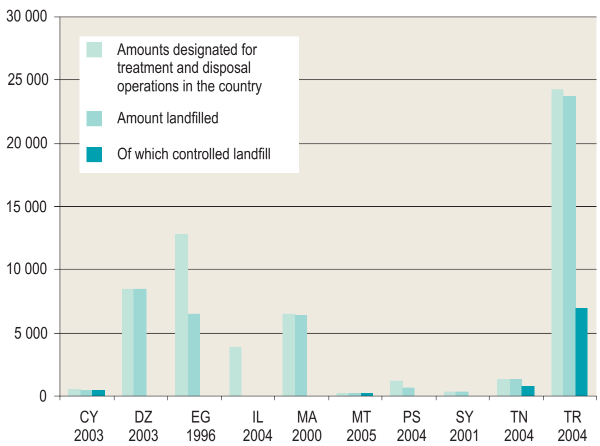
For most of the countries landfill is the most dominant treatment method for municipal waste (Cf. table 2.14). Despite very high organic matter content in the waste, composting is little used formally as the production costs for compost still remain very high. Only Egypt, Syria, Tunisia and Turkey have operational composting facilities: five units in Turkey, two sites in Syria, one in Damascus (with a capacity of 180 000 tonnes /year) and the other in Lattakia. Recycling is quite well developed in Cyprus, in Egypt, and in Israel and to a lesser extent in Morocco and in the Palestinian territories. In Syria only the old town of Damascus has an official separate collection scheme. For the other countries, an informal system for the reusing of the recyclable share of the household waste such as paper, cardboard, plastic, ferrous metals, and so on, exists but is not counted in the statistics.

Table 2.14 Treatment and disposal of municipal waste (1000 t, 2000-2005)

		Amounts designated for treatment and disposal operations in the country	Recovery operation				Amounts going to final disposal			
			Total amounts	Recycling	Compos-ting	Incineration with energy recovery	Incineration without energy reco-very	Final disposal		
								Landfill	Of which controlled landfill	Other
CY	2000	469 e	46	46	-	-	-	423	423	-
	2001	490	48	48	-	-	-	442	442	-
	2002	500	50	50	-	-	-	450	450	-
	2003	518	51	51	-	-	-	467	467	-
DZ [1]	2000	5 200						5 200		
	2003	8 500		6				8 495		
EG	1996	12 801		3 840	2 432			6 529		
IL	2000	3 968	983	983	-	-	-	2 984		
	2001	3 590	1 019	1 019	-	-	-	2 572		
	2002	3 855	1 085	1 085	-	-	-	2 770		
	2003	3 847	1 161	1 161	-	-	-	2 686		
	2004	3 911								
MA [2]	2000	6 558	130	130	-	-	-	6 370	20	6 350
MT	2000	179	31					148	148	
	2001	193	32					161	161	
	2002	204	16					188	188	
	2003	216	24					191	191	
	2004	226	35					191	191	
	2005	228	41					188	188	
PS [3]	2004	*1 166*		*8*	-		*400*	*702*		
SY [4]	2000	330			71			259	-	
	2001	347			70			278	-	
TN [5]	2000	*1 739*			1			1 169	600	569 e
	2001	*1 680*		1	1			1 180	680	500 e
	2002	*1 195*			1			1 194		
	2003	*1 656*			1			1 204	753	451 e
	2004	*1 316*			1			1 316		
TR	2001	*25 144*			218	10	-	24 471	8 304	445
	2002	*25 382*			383	9	-	24 573	7 061	417
	2003	26 118			326		-	25 305	7 432	487
	2004	24 237			349		-	23 714	6 991	174

Notes: 1: recycling counts 4029 tons of plastic and 1464 tons of metal; 2: controlled landfill of Essaouira; 3:estimation based on amount of waste generated; 4: figures refer only to the old City of Damascus; 5: waste collected by the informal system are not included, other waste correspond to waste release into natural area.

Figure 2.16 Final disposal of municipal waste (1000 t, last year available)



Note: SY: figures refer only to the old City of Damascus.

Egypt has quantified the recycling carried out before collection or done directly at the dumping sites by the private or informal sectors such as the Zaballeens (traditional collectors of household waste in the big cities of Egypt). The organic share is used for breeding and composting, bringing the share of recycling to 30% and that of composting to 19%.

The incineration on a large scale of municipal waste is also little used in the Mediterranean countries and is often reserved for hazardous clinical waste as in Egypt, Turkey and in Syria (Damascus). On the other hand, the burning of waste in the open air is widespread, but rarely counted officially. The Palestinian Authority estimates that the share of open air burning is 34% compared to 40% for deposits in dustbins and 19% deposited on unofficial dumping sites. In Cyprus, part of the waste collected since 1996 has been exported for recycling (i.e. about 11% of the total collected waste in 1999).

The municipal waste survey in Turkey shows that the other types of elimination (1% of collected volumes) also include open air burning as well as discharge into rivers and lakes. Absence of data for the years 1999 and 2000 in Turkey is connected with the fact that there were no surveys during this period due to reallocation of national budgets for management of the earthquake.

There is still not much information about the technical characteristics (surface area, remaining capacity, annual input) of the treatment and final disposal facilities for municipal waste in most of the countries. (Cf. Table 2.15). However, it is interesting to note the progression in the number of controlled dumping sites. Uncontrolled dumping is still the main disposal method for waste in the Mediterranean region. Most of the dumping sites are unofficial (canals in Egypt, "oueds" in Tunisia), even though in some countries the municipalities designate the places for waste disposal (without control or weighing). Burning in the open air, not quantified statistically, represents a widely used practice. This practice is not only a source of air pollutants, but also presents sanitary risks (formation of dioxins) related to the composition of the household waste that contains more and more hazardous waste (plastics, solvents, batteries, etc.) The incineration units counted do not usually treat municipal waste; they eliminate hazardous clinical waste. The other treatment centres that have been identified are transfer units.

The existence of plans or projects for waste management in the countries, nationally or locally at various stages of progress, complicates the situation as well as complicating the inventory of the treatment and disposal sites. This situation stresses the need to set up official statistical operations on a wide scale and repeated over time. In Malta, in order to encourage waste separation at source and to divert significant amounts of municipal waste from landfills, a system of "bring-in sites" has been developed. In 2003, the Maltese government introduced local "bring-in sites" where the public can dispose of clean, dry, recyclable plastics, metal, glass and paper waste. In June 2005, 75 public bring-in sites had been set-up and this figure should rise to 400 by the end of 2006 (MEPA, 2005).

Table 2.15 Municipal waste treatment and disposal installations (last year available)

		Landfill							Incineration plants	Treatment plants	Other
		Total			Controlled landfill			Non controlled landfill			
		Nb	Area km²	Annual input 1000 t	Nb	Area km²	Annual input 1000 t	Nb	Nb	Nb	Nb
CY	2003	8	0	467	8	0	467		-	-	-
DZ	2003	2 100	220					2 100			
EG [1]	2000	60 e			-			60	3	44	2
IL	1999	212							-	1	
MA	2003			6 370	2				-		
MT [2]	2004	2	1	307	2	1			1		4
PS	2003	194			-			194			
SY [3]	2001	1	1		-			1	-	1	
TN [4]	2001	85			5		753		-	3	
TR	2002	*2 436*		23 714	16	13	6 991	2 420	-		

Notes: 1: number of landfill estimated on an average of 2 to 3 non controlled landfill per governorates; incineration plants refer to medical waste; 2: incineration plants refer to clinical waste; 3: figures refer only to the old City of Damascus; treatment plant is a composting unit; 4: total number of landfill correspond to wild landfill of Tunis, Sousse, Sfax and Gabès, 9 other controlled landfill exist but are not yet operational.

Hazardous waste : generation, composition and treatment

Hazardous waste comes mainly from industrial activities and hospitals. This type of waste can be subject to recovery operations (incineration with energy recovery, recycling/composting, or be prepared for final disposal) or eliminated. The treatment and disposal operations for hazardous waste can be physical and chemical, biological, thermal (incineration without energy recuperation), or the waste can be landfill or buried, discharged in water or stored permanently.

The amount of hazardous waste generated by the Mediterranean countries is still not very high (Cf. table 2.16). Available data on hazardous waste concerns mainly pharmaceutical and clinical waste as well as waste from the chemical industry. This waste is often aggregated for a specific industrial sector without distinction being made concerning their potential danger. Because of this, interpretation of the data remains delicate.

Management of hazardous waste and in particular of its trans-border movements is the object of international agreements and regulations including the 1989 Basel Convention. This convention provides for the monitoring of the generation of hazardous waste according to a standardised classification (codes Y1 to Y18) based on the physical-chemical nature of the waste and monitoring of their international movements (Cf. Table 2.17). Eight countries (Cyprus, Algeria, Egypt, Israel, Morocco, Malta, Tunisia, Turkey) are controlled and reported on to the secretariat of the Basel Convention. Nevertheless, some countries continue to use a different national nomenclature (Tunisia) or a regional one (European Waste Catalogue for both Cyprus and Malta, and underway for Turkey) and a specific type of control.

Analysis of the annual variations and comparison between countries remains difficult and has to be linked to the existing industrial facilities and to the ways the statistical information is acquired. For instance, the setting up of one or several industrial units in Malta can considerably influence the amount of waste generated.

Taking into account the current facilities, some countries are not in a position to treat their hazardous waste locally and so it has to be exported (this is the case for Cyprus, Algeria, Egypt, Israel and Morocco). The waste from Cyprus is exported for recycling.

The total amount of all the types of disposal could be higher than the total amount of waste, because the residue from some types of treatment, such as incineration and composting, is disposed of dumping sites.

Little information is available about the types of treatment used for hazardous waste (Cf. table 2.18). Recovery operation and dumping are used by the three countries for which information is available. Israel also has recourse to physical/che-

Table 2.16 Production of hazardous waste (1000 t, 2000-2004)

		Production (A)	Imported amounts (B)	Exported amounts (C)	Total amounts to be managed in country (A+B-C)
CY	2000		-	3	
	2001	84 e	-	2	81
	2002		-	2	
	2003		-	2	
DZ	2003	325	-	1 [1]	
EG	2003	110 [2]	-	0 [3]	
	2004		-	0 [4]	
IL	2000	281	6	9	277
	2001	324	5	11	319
	2002	294	3	14	283
	2003	297	4	12	290
MA	2000	131 [5]		1 [6]	
MT	2000	5			5
	2001	4			4
	2002	16			16
	2003	24			24
PS	2000	5	-	-	5
	2001	17	-	-	17
	2002		-	-	
	2003	14	-	-	13
	2004	14	-	-	
TN	2001	150			70
	2002	144			144
TR	2000	1 166			*1 166*
	2001	73 | [7]			*73 |*
	2002	64 | [7]			*64 |*
	2003	68 | [7]			*68 |*
	2004	1 195			*1 195*

Notes: 1: correspond to 500 voltage transformers; 2: correspond to hazardous waste from households in 2000; 3: Industrial waste; 4: Military waste; 5: according to the Basel Convention, the 2001 production was 987 000 tons (975 000 for Industry, 12 000 for Hospitals); 6: according to the Basel Convention in 2001; 7: Correspond only to medical waste.

Table 2.17 Generation of hazardous waste according to the Basel Convention categories (tons, last year available)

	CY [1] 2001	DZ [2] 2003	EG 2000	IL 1999	JO [3] 2003	MA 2000	MT [4] 2003	PS 2004	TN [5] 2001	TR [6] 2000
Total amount generated (Basel Convention)	83 920 e			62 439		130 810	24		150 200	1 166 000
Y1 Clinical waste	450 e	58 108	110 000 e	13		12 000	3	13 660		71 110
Y2 Waste from the production of pharmaceutical products	5 e					500			3	
Y3 Waste pharmaceuticals, drugs, medicines	3			441	93		0			21 000
Y4 Waste from the production of biocides and phytopharmaceu-ticals	480 e			234					930	
Y5 Waste from the manufacture and use of wood preserving chemicals	550 e								1	-
Y6 Waste from the production and use of organic solvents	15	1583		12 489					7	4 600
Y7 Waste from heat treatment and operations containing cyanides				152					1	2
Y8 Waste mineral oils	520 e									206 800
Y9 Waste oil emulsions, mixtures	990						2		209	
Y10 Waste containing PCBs, and/or PCTs, and/or PBBs	50			94					2	150
Y11 Waste tarry residues from refi-ning, distillation and pyrolytic treatment										133 810
Y12 Waste from the production and use of inks, dyes, pigments, paints, lacquers, varnish	37 500								5	13 460
Y13 Waste from the production and use of resins, latex, plasticizers, glues/adhesives	500								3	190
Y14 Waste chemical substances (not identified and/or new) from R&D or teaching activities					730				-	14 695
Y15 Waste of an explosive nature, not subject to other legislation									-	4 900
Y16 Waste from the production and use of photographic chemicals and processing material	54								3	
Y17 Waste from surface treatment of metals and plastics	3 000								19	1 300
Y18 Residues from industrial waste disposal operations									47	
Other hazardous wastes, national classification only		325 000			32 544		0		7 555 000	1 125 490

Notes: 1:1995 for Y3, 1999 for Y9; 2: Y1 correspond to medical waste; Y6 aggregate halogen organic solvents and non-halogen organic solvents; 3: 1997 for Y14 and for amounts under national classification; 4: 2001 for Y1, Y3, Y9; 2000 for amounts under national classification ; 5: 2002 for Y1, Y4, Y9, national classification corresponds to 7. 5 million t/year of phosphogypse and 55 000 t/an of hazardous waste classified under the category «other»; 6: 2004 for Y1 & national classification.

Table 2.18		Treatment and disposal of hazardous waste (1000 t, 2000-2004)					
		Recovery operations	Physico/chemical treatment	Biological treatment	Thermal treatment	Landfill & other deposit into or onto land	Release into water bodies
IL	2000	195	16	0	16	36	0
	2001	210	14	2	15	50	0
	2002	170	16	2	20	33	0
	2003	103	16	3	24	59	0
	2004		13	11	31	43	
TN [1]	2001	14				3650	
TR [2]	2000	366				800	
	2001	10			0	63	
	2002	9			0	55	
	2003	14			0	54	
	2004	446			0	749	

Notes: 1: recovery operation correspond to regeneration of lubricating oil; Landfill refers to permanent storage of phosphogypse; 2: thermal treatment and landfill refer to medical waste collected separately.

mical, thermal treatment and, to a lesser extent, biological treatment. With higher volumes of waste being generated and a greater variety of waste to be treated, the countries are starting to develop specific channels for the treatment and elimination of hazardous waste. The annual quantities at the Ramat Hovav landfill in Israel went up from 17 573 tonnes in 1995 to 27 627 tonnes in 1999. The quantities incinerated in Turkey went up five-fold between 1995 (date of the start of activities) and 2004, and most are with energy recovery (i.e. 0.07 toe in 2002).

There are few treatment plants specifically for the elimination of hazardous waste (Cf. table 2.19). The existing facilities are on-site treatment facilities (hospitals, industries) which are not always counted under national legislation, but which treat non negligible amounts of waste.

The incinerators in the Mediterranean countries are mainly used for the treatment of hazardous clinical waste.

Table 2.19		Treatment and disposal installations for hazardous waste (last year available)					
		Landfill		Incineration plants	Treatment plants	Permanent storage	Other
		Number	of which controlled				
CY	2003		-	-	-	-	-
DZ	2003			236			
EG [1]	2005	2	-	3	44		705
IL	1999	1	1	-	1	1	
MA	1998			38	1		
MT	2005			7	80		5
PS	2003	-	-				
SY [2]	2001	-	-	2	1		
TN [3]	2003	-	-	-	3		3
TR [4]	2004			3			

Notes: 1: the 2 landfills concern only the cities of Cairo and Alexandria; 2: incineration plants are situated in Damascus; 3: the category «other» concerns three storage dams of Phosphogypse; 4: of which 2 with energy recovery.

Box 2.6 Knowledge of the treatment facilites for waste disposal

An inventory of the number of waste treatment and disposal facilities is difficult to make. Indeed, national legislation does not, for the moment impose a precise, regular inventory of the facilities, including those on-site (industries, hospitals, other establishments). This count is thus made with information from many sources: institutional ones such as regional government, municipalities or associations, or from private enterprises and so on. There is no harmonised definition for the treatment and disposal facilities and this limits comparison between countries concerning waste management and waste facilities.

Assessment of treated quantities is based on knowledge of the capacity of the facilities and of the intermediate movements of the waste before final storage. Unofficial dumping sites are difficult to quantify in number and in capacity, as is the waste rejected in the environment. The very frequent recourse to burning of waste in the open air (both household and industrial waste) is also difficult to quantify while it could represent very large amounts of waste. The results of the latest survey «Local Community Survey» conducted in 2005 by the Palestinian Authority shows that 68% of the economic establishments use this method for eliminating their solid waste.

Available information on waste treatment and disposal facilities remains confined to a few years that are not really comparable because of evolution in the survey and assessment methods.

Water quality and waste water treatment

A quantitative and qualitative assessment of water rejected into the natural environment remains problematic in most of the countries because of the low rate of connection of the populations to the collection and especially the treatment facilities for waste water. These systems can be collective networks or individual ones. The evacuation of waste water is a real stake for public health, especially in the highly populated countries.

If the number of waste water treatment plants is relatively well known, statistical knowledge of the state of their functioning, capacities and treatment processes remains insufficient. At the same time, control of the production and elimination of treatment residue is still not very advanced.

The result of this is pollution of the natural environment and degradation of the quality of the waterways and lakes that a more or less representative network of monitoring stations can survey. The pollutants covered are organic and chemical ones mostly coming from agricultural and industrial effluents and from domestic discharges. Direct or indirect discharges (rainfall and run off carrying pollutants in cities or in agricultural areas) in inland waters also affect the ecosystem by phenomena such as eutrophication in fresh water.

At the end of the hydrological cycle, coastal waters receive all the surface and ground run off that end up intoxicating both the plant and animal populations.

Waste water refers to water which, after having been used or produced during a specific activity, no longer has any immediate value for this activity. This water can be collected or not, discharged in the environment without treatment or after treatment.

Waste water collection system means a public system or private individual mean which collects and evacuates waste water. Collecting systems are often operated by public authorities or semi-public associations.

Waste water treatment is aimed at making waste water fit to meet applicable environmental standards or other quality norms for recycling or reuse.

Three broad types of treatment are distinguished in the questionnaire: primary, secondary and tertiary. For purposes of calculating the total amount of treated waste water, volumes and loads reported should be shown only under the «highest» type of treatment to which it was subjected.

Urban waste water treatment plants are usually operated by public authorities or by private companies working by order of public authorities. Includes waste water delivered to treatment plants by trucks.

Industrial waste water is treated in non-public treatment plants, generally on-site and these are entered in the category other types of waste water treatment. Septic tanks and cesspits are classified as independent treatment, i.e. systems of collection, preliminary treatment, treatment, infiltration or discharge of domestic waste water from not connected to an urban waste water system.

Primary treatment operates by a physical and/or chemical process involving settlement of suspended solids, or other process in which the biological oxygen demand measured during 5 days (BOD5) of the incoming waste water is reduced by at least 20% before discharge and the total suspended solids of the incoming waste water are reduced by at least 50%.

Treatment plants classification:

Category	Treatment efficiencies					Count faecal coliforms
	TSS	BOD	COD	N	P	
Primary treatment	> 50 %	> 20 %				
Secondary treatment		> 70 %	> 75 %			
Tertiary treatment		> 95 %	> 85 %	> 70 %	> 80 %	< 1000/100 ml

Source: Joint questionnaire 2004 Eurostat/OECD, inland water section

Secondary treatment involves biological treatment with a secondary settlement or other process, resulting in a BOD removal of at least 70% and a chemical oxygen demand (COD) removal of at least 75%

Tertiary treatment (additional to secondary treatment) concerns nitrogen and/or phosphorous and/or any other pollutant affecting the quality or a specific use of water: microbiological pollution, colour etc. The different possible treatment efficiencies cannot be added and are exclusive.

Sewage sludge designate accumulated settled solids separated from various types of water either moist or mixed with a liquid component as a result of natural or artificial processes.

Sludge treatment aims at rendering sludge fit to meet applicable environmental standards, land-use regulations or other quality norms for recycling or reuse.

Table 2.20 demonstrates a very much contrasted situation among the countries concerning the rate of connection of the population to a waste water collection system, with or without treatment. The absence of significant series over time does not permit a description of the recent progress, except in Tunisia and in Turkey. In Tunisia, the population connected to a collection system went up from 32% to 45% between 1993 and 2001 and the rate of connection with treatment from 12% to 39% for the same period, while in Turkey this latter rate was still at 29% in 2001. In Algeria, the very low rate of connection of the national resident population to an urban waste water collection system with treatment can be explained by the fact that only some of the waste water treatment plants are in operation. In 1987 the Algerian government launched a widespread programme to construct decanting basins, of which there were 435 in 1995 shared out in 31 *wilayas* (one *wilaya* is similar to NUTS 3), in order to compensate for the lack of facilities.

These connection rates hide, nevertheless, great disparity between urban and rural areas. In Egypt 77% of the urban population is connected, while only 17.9% of the rural population is in the same position. As there is a lack of data on treatment plants as such, the figures in table 2.20 should be interpreted with caution. In the Palestinian territories 99.6% of the urban population is connected to a waste water collection system, while the connection of the economic sector is only 67.9%.

Independent treatment (septic, tanks, cesspits) is more used in rural areas or in areas with difficult access.

In Algeria the 1998 census counted 669 977 septic tanks and cesspits, the equivalent of almost 30% of the population. In Cyprus and in Jordan all of the independent systems are equipped with treatment. The figures communicated by Jordan for independent treatment exclude the nomadic populations.

A count of the waste water treatment plants is not available in all of the countries (Cf. table 2.21). Besides this, they are not all in working order. This is the case in Algeria: 7 plants are in construction, while 24 have to be rehabilitated. Figure 2.17 gives the im-

Table 2.20 National population connected to waste water collecting system (% of national resident population, last year available)

		Urban			Independent
		without treatment	with treatment	total	
CY	2000	-	35	35	65
DZ	1998	62	4	66	
EG	1996		45	45	
IL	1999	11	89	100	
JO	1997	-	52	52	48
MA	1996	70		70	
MT	2004	87	13	100	
PS	2004			43	55 [1]
SY	1994	49	10	59	
TN	2001	6	39	45	
TR	2004	26	37	63	

Note: 1: independent treatment is 51.9% porous cesspit and 2.8% tight cesspit, data 2005.

pression that it was also the case in Israel for the secondary treatment plants in 1999. 11 waste water plants were counted in the Palestinian territories, with only one in operation since 2002 (Al-Bireh). In Turkey the number of plants has increased the most in the last decade compared to the other countries, but a few of them are not operational.

In Cyprus, out of the 30 stations counted, two nitrogen removal plants have been counted. In Turkey, the four tertiary treatment plants include two nitrogen removal plants and two phosphorus removal plants.

Figure 2.17 Distribution of population connected to urban waste water treatment plant by type (%, last year available)

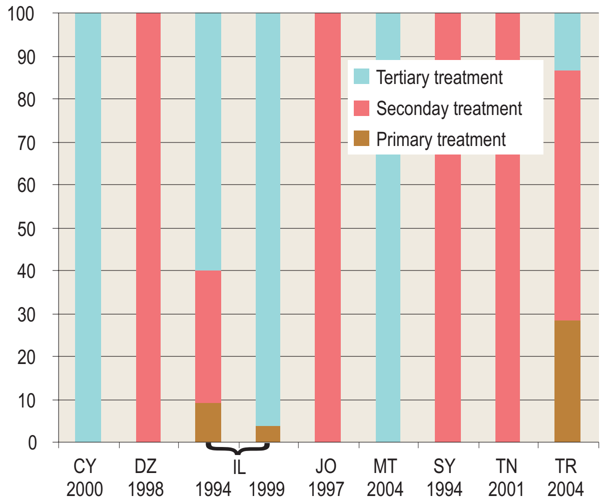
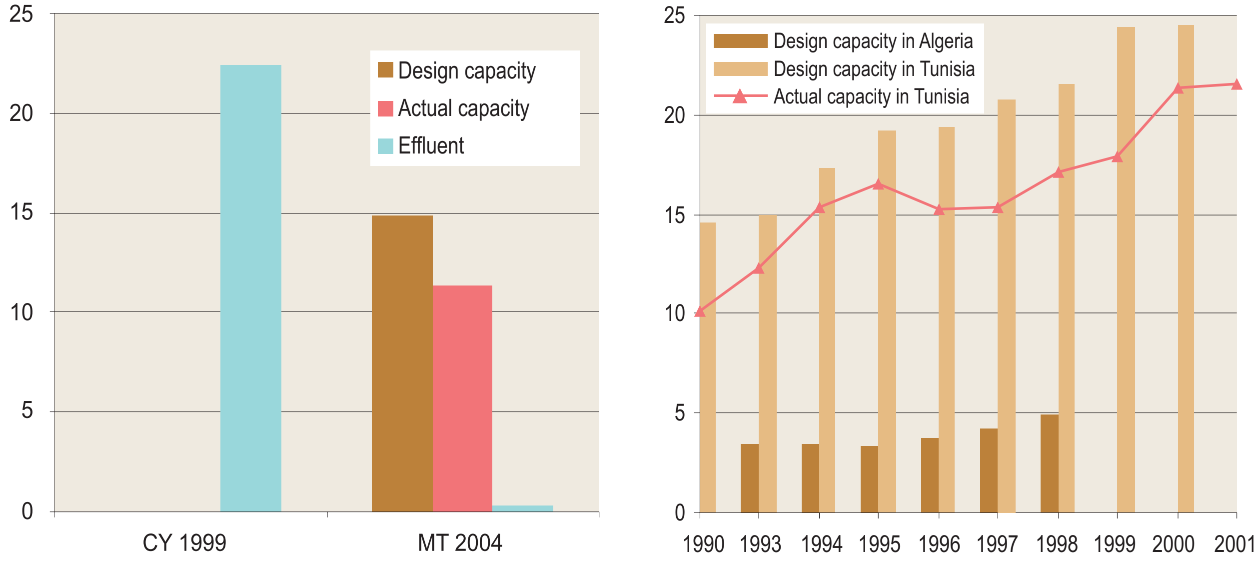


Table 2.21 Number of waste water treatment plants and other infrastructures (1995-2004)

			1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Urban waste water treatment plants [1]	Total	CY					30	30				
		DZ	41	42	45	48						
		IL				90	91	91	89	89		
		JO			24	29	32	32				
		MT			1	1	1	1	1	1	1	1
		SY	1	1	1	1	1	2	5			
		TN	48	50	52	55	60	61	61			
		TR	46	55	67	80			122	145	157	165
	primary	IL				16	16	16	15	15		
		MA					62					
		TR	3	7	9	13			24	28	33	34
	secondary	IL				53	53	53	51	50		
		MA					28					
		TR	43	48	59	67			95	114	120	127
	tertiary	IL				21	22	22	23	24		
		TR	-	-	-	-			3	3	4	4
Independent treatment		CY					400					
		DZ										
Other waste water treatment	primary	CY					1					
		DZ	22									
		TR	90	90	105	4 [2]						
	secondary	TR	166	184	217							
	tertiary	CY					1					
		TR	216	228	261	2 [2]						

Note: 1: data in this table should be compared with the information in figure 2.17; 2: concerns only thermal power plants.

Figure 2.18 Treatment capacity of waste water treatment plants in a few countries in terms of BOD (kg/inhab/d, 1990-2004)



The volumetric capacity is the total volume of waste water expressed in m³/day that can be treated daily by a waste water treatment plant. The treatment capacity of waste water treatment plants in terms of biological oxygen demand (BOD) is the total quantity of oxygen-demanding material that a waste water treatment plant is designed for which can be treated daily with a certain efficiency. For secondary treatment plants the BOD-capacity is mostly limited by the oxygenation capacity, i.e. the quantity of oxygen that can be brought into the water to keep the oxygen concentration on a suitable level. The actual capacity is the level of activity during the year underway (Cf. figure 2.18).

In Algeria, it is estimated on the basis of 54 g BOD/inhab/d. In Cyprus, this estimate is based on water consumption of 100 l/inhab/d and a production of 70 g BOD/inhab/d.

Water pollution control is one of the main challenges for sustainable development. It begins with knowledge of the discharge of waste water in the environment. Table 2.22 shows that this knowledge is still sporadic in the Mediterranean region and appreciably better concerning discharges from the domestic sector that are higher in terms of quantity and more dependent on collective services.

In Algeria the volume produced by the domestic sector is estimated on the basis of 150 l/inhab/d (households and industries included). In Cyprus, the total volume produced by industry is collected. In the Palestinian territories the waste water from industry does not go through a distinct network

Table 2.22 Waste water generated by domestic and industrial sector (Mm³, 1990-2004)

		1990	1993	1994	1995	1996	1997	1998	1999	2000	2001	2004
CY	domestic								4			
	industrial								0			
DZ	domestic	785			970			1275				
	industrial						288					
IL	domestic			389				418	430			
JO	industrial					16	12	17				
MA	domestic	370	500									
MT	domestic	21										
	industrial	3										
TN	domestic	260	301	314	301	309	313	355	378	400	424	
	industrial	37	53	52	57	57	22	25	27	34	35	
TR	industrial			1421	2519	2686	3362	2598		2508	2014	3112

from urban waste water. The amounts of waste water produced are unknown. The quantities indicated in table 2.22 are under-estimated for Cyprus and Jordan compared to other international sources (ratio of 1 to 10 with FAO).

Treated waste water is recycled for agricultural purposes in Cyprus and in Jordan. The reuse rate for treated water in Jordan is one of the highest in the world since it is 22% of the water produced (FAO, Aquastat).

Residue from waste water treatment plants is not yet monitored regularly, except in Syria, Tunisia and Turkey as can be seen in table 2.23 and figures 2.19 and 2.20. The increase in the volumes reused in Syria is particularly significant, with a rise of 40% between 1996 and 2003. In Egypt, the effluents from urban waste water treatment plants are estimated at 22.9 and 24.2 billion m³ in 2002 and 2003 respectively.

Figure 2.19 Waste water generated by domestic sector (Mm³/year, 1960-2002)

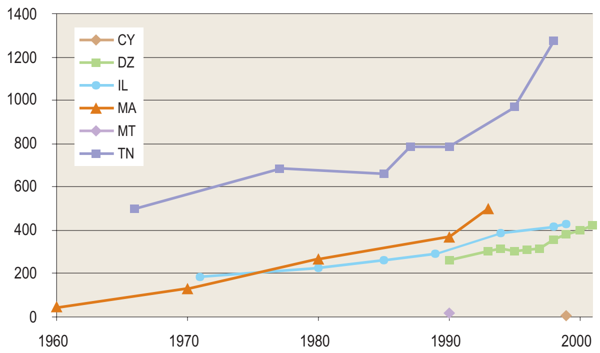


Figure 2.20 Effluents of urban waste water treatment plants in Tunisia and Syria (Mm³, 1975-2003)

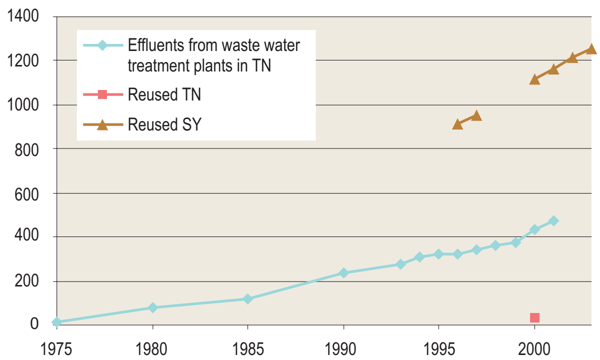


Tableau 2.23 Effluents of urban waste water treatment plants in Turkey (1000 m³, 1994-2004)

	Effluents des stations d'épuration des eaux usées urbaines	dont rejetés	Rejets totaux dans les eaux intérieures	Rejets totaux dans les eaux marines
1994	150 015	150		
1995	169 360	169	1 216	2 757
1996	201 845	202	1 208	2 966
1997	366 825	367	1 392	3 633
1998	590 520	591	1 163	3 573
2000				2 161
2001	953 020	1 207	1 442	2 998
2002	1 231 900	1 380	1 475	3 364
2003	1 533 170	1 671	1 512	953 [1]
2004	1 684 610		2 163	3 387

Note: 1: effluents from thermal powerplants are not included.

In Cyprus the total sludge production from the waste water treatment plants of Limassol-Amathus and Larnaca reached 55 000 m³ in 1999, of which 21 000 m³ were eliminated by incineration. In Israel, only effluents into the sea were communicated; they reached 531 000 m³ in 2004; incineration is not used there. In Tunisia, all the dry substance is reused for agriculture (Cf. table 2.24). In Turkey, treatment of sludge from thermal power plants is monitored (Cf. table 2.25).

Tableau 2.24 Sewage sludge disposal in Tunisia and Syria (1990-2001)

		1990	1993	1994	1995	1996	1997	1998	1999	2000	2001
TN	Total sludge production 1000 m³	1511.70	1277.80	1293.30	1274.70	1420.40	2199.30	1648.12	1458.50	1460.00	1416.30
	Total sludge production D.S. 1000 t	0.19	0.17	0.24	0.28	0.29	0.39	0.48	0.60	0.61	1.40
	Agricultural use D.S. 1000t	0.19	0.17	0.24	0.28	0.29	0.39	0.48	0.60	0.61	1.40
SY	Total sludge production 1000 m³			36.50	36.50	36.50	36.50	36.50	36.50	56.50	88.50
	Total sludge production D.S. 1000 t			16.43	16.43	16.43	16.43	16.43	16.43		

Table 2.25 Sewage sludge treated from thermal power plants (ash slag) (1000 t dry solid, 1994-2004)

	1994	1995	1996	1997	2004
Total production D.S.	1731.85	2359.23	2665.59	2848.69	2306.50
Total disposal D.S.	1731.85	2359.23	2665.59	2848.69	2306.50
Agricultural use D.S.	154.69	52.64	199.07	134.23	234.30
Landfill D.S.	332.25	480.05	560.37	599.98	705.10
Dumping at sea D.S.	14.45	37.59	151.48	0.63	-
Incineration D.S.		12.45	18.96	7.43	101.30
Other D.S.	1230.46	1776.50	1735.70	2106.41	1265.80

Box 2.7 Generation and treatment of waste water

Data on the population connected to a collection system with or without treatment is obtained by censuses, surveys, via the municipalities or from estimates based on coefficients. Exhaustive coverage should be possible with household as well as establishment surveys. The connection rate to an independent system is only available in Cyprus and in Jordan. Data is only available annually in Malta, Tunisia and Turkey, and the time series mostly start after 1990 (the oldest available data goes back to 1970 in Algeria, 1987 in Israel and 1975 in Tunisia). Connection to treatment plants does not necessarily mean that all of the amounts are treated, yet it would seem that this distinction is not always made in the figures communicated by the countries.

The nomenclature used by the countries and the competent institutions to designate the types of treatment operated by the plants is far from being homogeneous. Finally, the mechanisms needed for the monitoring of the effluents, of their quality and of the quality of the environment are sometimes the major limiting factor.

3

Environmental indicators for sustainable development

Land and forest

Water

Waste

Air pollution

Biodiversity

Coastal regions

Environmental indicators for sustainable development

During the United Nations Conference on Environment and Development (UNCED) that was held in Rio de Janeiro in 1992, Agenda 21 and the Rio Declaration on the environment and development were adopted. Both of them are based on the definition of sustainable development: "Sustainable development meets the needs of the present without compromising the ability of future generations to meet their own needs "(WCED, Brundtland Report, 1987).

At the prompting of the United Nations Sustainable Development Division, many countries and regions of the world developed and calculated sustainable development indicators to improve knowledge of their situation with regard to the principles and objectives connected with sustainable development or to follow in a more precise way the objectives of their national strategies and/or policies.

In 1999, in the framework of the Mediterranean Commission on Sustainable Development (MCSD), all of the Mediterranean countries adopted a common set of 130 indicators for sustainable development in the Mediterranean. The activities of the MED-Env project concentrated on sixty or so indicators concerning the environment. Some of these indicators are also on other international lists:

- The list of indicators of the United Nations division for sustainable development which is being revised (UN-DESA, 2001);
- The set of sustainable development indicators for the European Union (European Commission, 2005);
- The limited set of indicators for the follow-up of the Mediterranean Strategy for Sustainable Development adopted in 2005 (PAM, 2005).

The «Millennium Development Goals» adopted during the World Summit on Sustainable Development in Johannesburg in 2002 also contain some of these indicators (UN, 2005).

These environmental indicators are not necessary the same as those of the set of sustainable development indicators for the European Union Only the indicators which were the object of calculation by most of the partner countries during the project and which are suitable for analysis, even partially, are presented in this part. The definitions of these indicators do not include the definitions of the basic statistics needed for their calculation when they are already included in other parts of this compendium. Comments have been concentrated on the long-term series starting in 1970 most of the time and with intervals of 5 to 10 years. Plan Bleu calculated or completed some indicators that were not supplied by the countries. The indicators connected with all the surface area of the territory, the population or the gross domestic product, were also calculated by Plan Bleu (see the value used and the definitions in the appendix).

Land and forest indicators

The partner countries' lands are fragile, especially the agricultural land. They are subject to the pressures of erosion, water and wind, as well as those from the extension of urbanisation and transport facilities. Generally-speaking, the Mediterranean countries are not countries with a lot of forests, but the Mediterranean forests suffer not only from problems due to fires and firewood collection, but also those due to over-pasturage and the extension of artificial areas and agricultural areas.

Land use change: This indicator describes the changes over time in the distribution of the main land use types in a country. It can also be made up of a matrix of transition indicators, expressed in surface area, from one land use type to another for a given period of time. For reasons of simplification and harmonisation, categorisation in the 7 classes described in the chapter entitled Land and Forests in Part I is proposed.

Arable land change: This indicator is defined as the ratio of the surface area of the arable land during year Xn to the surface area of the arable land in reference year X0.

If the value of the indicator is greater than 100, this means an increase in the arable land area compared to the reference year.

Forest area: This indicator concerns the surface area of natural or planted forests and its evolution over time. Given the specificities of the Mediterranean region, notably the number of shrub formations, and the definitions used by the FAO, it is proposed «other wooded areas» be added to it and to calculate the indicator based on the surface area of the forests and the other wooded areas.

Forest's protection rate: This is the surface area of the protected forests expressed as a percentage of the total surface area of the forests. It is also proposed that the surface areas of the forests and other wooded areas be used as the total surface area of the forests. According to the World Conservation Union, a protected area is a portion of land and/or sea where the preservation and conservation of wildlife and associated cultural resources are implemented by legal or other means.

Annual burnt areas: these are the surface areas of forests and wooded areas burnt during the course of a year, expressed in hectares.

Land use change

For want of matrices on land use changes which require some data not available from the partner countries, such as data coming from the geographical information systems, it is the evolution, as a percentage of the national territory, of some classes of land use (agricultural land, forests and wooded areas and built-up land) that is presented here.

When data is available, it can be seen that the surface areas of built-up land and connected land are increasing; this is the case in Turkey and in Syria. In Malta and the Palestinian Authority built-up land is also considerable, with 23% and 10% respectively (Cf. figure 3.1). The available data does not allow us to show the extension of the urbanised areas on agricultural land.

Agricultural land (Cf. figure 3.2) covers a large part of the national territories; more than 50% in Syria, Tunisia and Turkey. In the other countries, except in Egypt (3%) it covers between 13% and 34% in Morocco and Malta respectively. Certain stability

Figure 3.1 Share of the built-up and related land area in the national territory (%, 1970-2000)

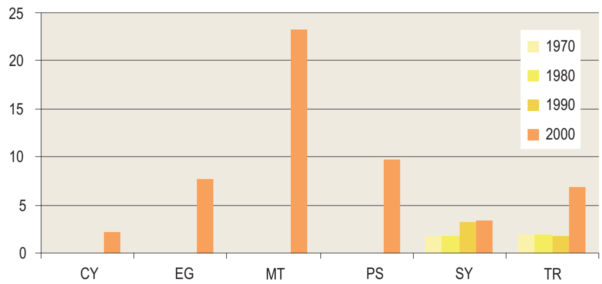
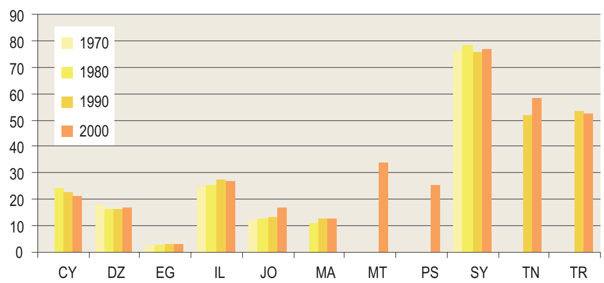


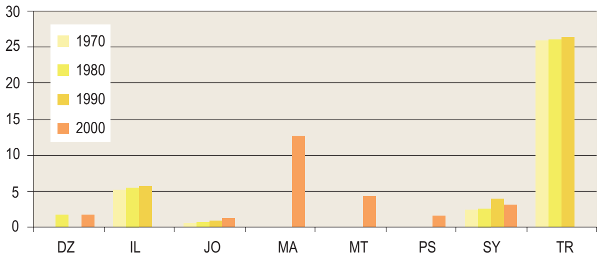
Figure 3.2 Share of the total agricultural land area in the national territory (%, 1970-2000)



can be observed in the partner countries, there is a relative increase in Israel, Jordan and Tunisia, while there is a considerable decrease in Cyprus, for instance.

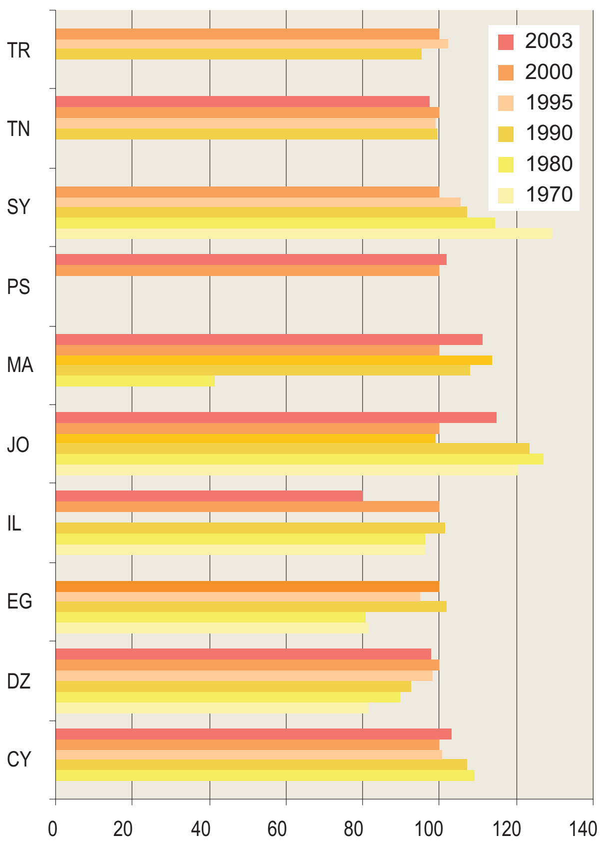
As a share of the national territory, the surface areas of the forests and other wooded areas (Cf. figure 3.3) represent 26% in Turkey but hardly more than 1% in Jordan and Algeria and a tiny share of the Egyptian territory.

Figure 3.3 Share of the forest and other wooded land area in the national territory (%, 1970-2000)



Arable land change

Figure 3.4 Arable land trend (index 100 in 2000, 1970-2003)



The surface area of arable land per inhabitant in the Mediterranean countries varies highly: from 9 ha/1000 inhabitants in the Palestinian Authority to 376 ha/1000 inhabitants in Turkey. The area is equal to 21 ha/1000 inhabitants in Malta. In Israel, Egypt and Jordan, it is between 40 and 50 ha/1000 inhabitants. In Cyprus there are 140 ha/1000 inhabitants. Morocco, Algeria, Syria and Tunisia possess between 220 and 290 ha of arable land per 1000 inhabitants.

Figure 3.4 presents the evolution of arable land area between 1970 and the last available year by using an index equal to 100 in 2000.

The rise in arable land area is high and regular in Algeria, while it is stabilising in Morocco and in Egypt. In Cyprus and in Turkey growth has begun again since 2000. There is also relative stability in Tunisia and Turkey, a considerable, regular drop in Syria and a decrease in Israel after 2000.

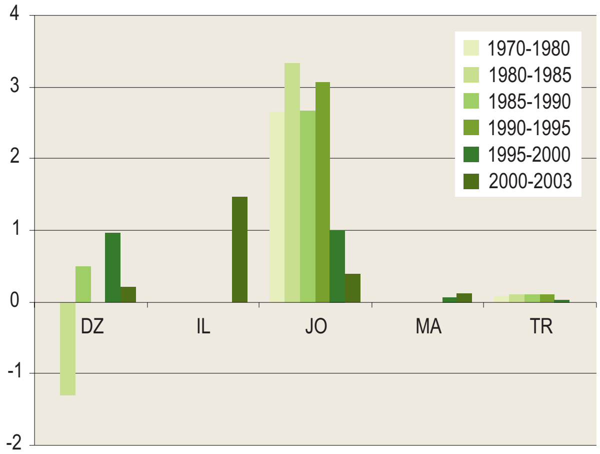
Forest area

Table 3.1 Forest and other wooded land area (last year available)

		Area (ha)	Share of natinal territory (%)	Area per inhabitant (ha/ 1000 inhab)
CY	2002	386 300	*41.76*	*522.18*
DZ	2003	4 071 000	*1.71*	*125.79*
EG	2000	1 235	*0.00*	*0.02*
IL	2003	196 600	*8.88*	*28.89*
JO	2003	103 373	*1.16*	*19.60*
LB	2004	13 438	*1.28*	*3.58*
MA	2003	9 101 000	*12.80*	*297.99*
MT	2004	1 337	*4.23*	*3.33*
TN	1995	830 740	*5.08*	*83.64*
TR	2000	20 713 000	*26.43*	*288.53*

The forest area is very variable, depending on the country, going from more than 1000 ha in Egypt and Malta to almost 21 million hectares in Turkey. The variation in the available forest area per inhabitant is also large. From about 3 ha per 1000 inhabitants in Lebanon and in Malta to almost 300 ha per 1000 inhabitants in Morocco and in Turkey. Even in Cyprus it is 522 ha per 1000 inhabitants. In Egypt, there are only 0.02 ha of artificial forests per 1000 inhabitants. In some countries such as Cyprus these values should be considered with caution because all the areas managed by the authorities or ministry in charge of forests are counted in the forest areas. The growth rate for the forests and other wooded areas (Cf. figure 3.5) is low, except in Jordan where the initial area was small and where all the plantations along the roadside have been counted.

Figure 3.5 Forest and other wooded land area: annual average growth rate (%, 1970-2003)

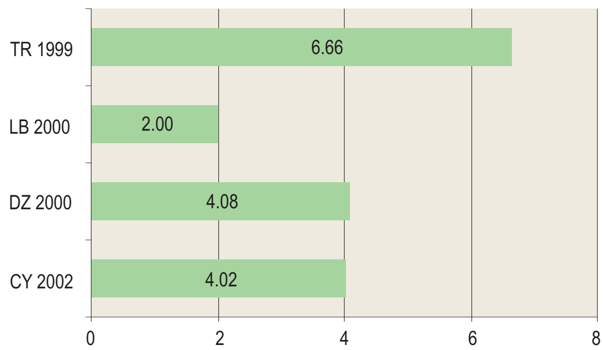


Forest's protection rate

Table 3.2 Protected forest area (1000 ha, last year available)

CY	2002	15 543
DZ	2000	165 000
LB	2000	269
MT	2004	1 337
TR	1999	1 382 829

Figure 3.6 Forest's protection rate (%, last year available)



The protection rate for forests, expressed as a percentage of the surface area of the forests and other wooded areas is less than 7% in the countries for which data is available (Cf. figure 3.6). Only Malta protects all of its forests that are made up of a recreational area of 1337 ha (Cf. table 3.2).

Annual burnt areas

Table 3.3 Forest and other wooded land: annual burnt areas (last year available)

		(ha)	%
DZ	2004	31 676	0.78
IL	2003	700	0.36
JO	2003	62	0.06
MA	2002	60	0.00
TN	2004	189	0.02

Over recent years, the surface areas burnt have been limited, less than 1% of the total forest area in 5 countries, with a maximum of 0.8% for Algeria in 2004.

An analysis of trends over long periods shows a decrease over the last few years whether for Israel, Morocco or Tunisia for which three-year averages are presented in figure 3.7 for the decade 1994-2003.

The same is true for Algeria and Jordan, for which the averages over ten-year periods from 1960 and 1970 present first growth and then a net decrease from 2000. (Cf. figure 3.8)

Figure 3.7 Burnt areas trend - 3 years average (1000 ha, 1994-2003)

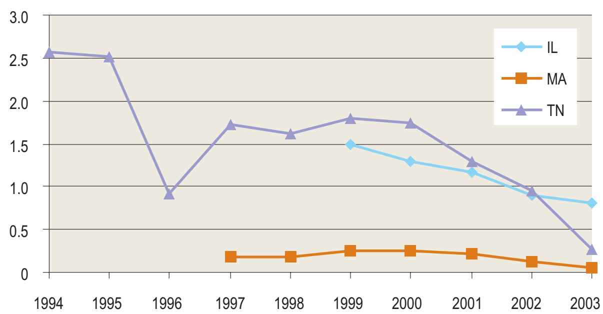
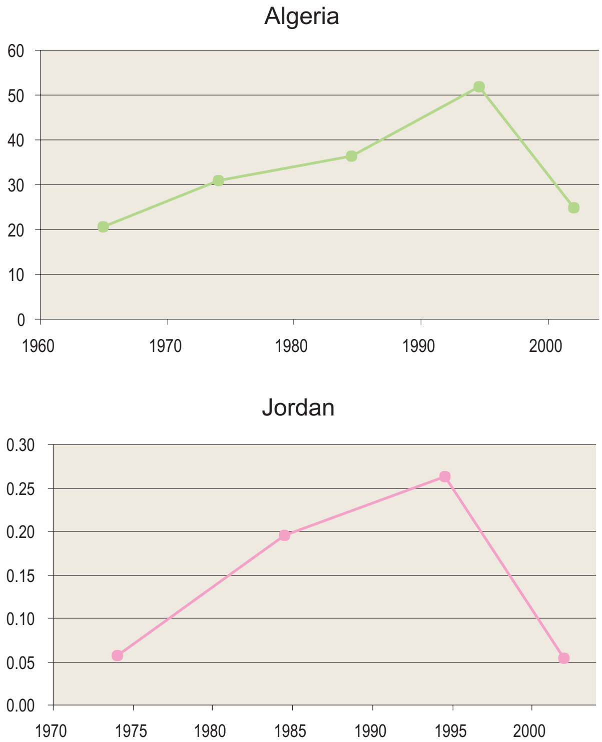


Figure 3.8 Burnt areas trend - decennial average (1000 ha, 1960-2004)



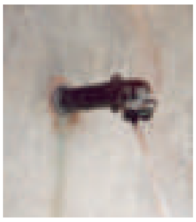
Box 3.1 Environmental indicators for sustainable development and institutions

Sustainable development indicators have become a subject of preoccupation in many institutions of the Mediterranean countries because of their transversal nature. Just as for environmental statistics, the sources of information are widely dispersed among technical ministries, research centres as well as the ministries of the environment and the national statistics institutes.

The distribution of responsibilities for the collection of data needed for the calculation of environmental indicators for sustainable development differs from one country to the next. Indicator production is usually shared among several institutions, including the National Statistics Offices and the Ministries of the Environment.

In Cyprus, in the Palestinian Authority and in Turkey, the National Statistics Institutes produce most of the indicators, while in Egypt and in Syria the Ministry of the Environment is the main producer. However, in all the countries, the national statistics offices supply the socio-economic data needed for the calculation. The calculation of sustainable development indicators is also made in various frameworks depending on whether or not there is a national commission for sustainable development and/or a national strategy for sustainable development that could be concerned with all the sustainable development issues or with only a few specific ones such as water or energy.

Water indicators



Better access by the populations to basic services, drinking water of good quality and waste water treatment, is one of the major objectives of the Mediterranean countries connected to the declaration of the millennium. The fresh water resources in these countries are scarce and heavily used for human activities, especially agriculture that draws 80% or more. The quality of this resource is affected by all sorts of pollution such as untreated domestic and industrial waste water, as well as agricultural effluents and residue.

Access to safe drinking water: This indicator is the share of the population that has reasonable access to an adequate quantity of drinking water (20 l of water per day and per person minimum). The indicator measures the access rate of the population to the drinking water facilities. Drinking water is water that does not contain pathogenic or chemical agents in concentrations that could harm health. This includes surface water that has been treated or not but which is not contaminated, such as spring, drilled or well water. Water from waterways and lakes should be considered as drinking water if the water is regularly controlled and considered acceptable by the authorities in charge of public health. Reasonable access to water means either the existence of a provision of water at home or within 15 minutes walking distance.

Share of distributed drinking water not conform to quality standards: this is the proportion of units for the distribution of drinking water that have at least one analysis per year that is not in conformity with the quality standards set by the national legislation for the consumption of drinking water or, failing this, by the World Health Organisation.

The main parameters considered are:

— Bacteriological parameters (mainly E. Coli),

— Salinity,

— Nitrates,

— Iron,

— Aluminium,

— Fluorine

— Turbidity

Among the organisms that indicate contamination of faecal origin (faecal coliforms including thermotolerant coliforms, faecal streptococcuses, clostridium sulphito-reducer spores), E. coli is generally considered as the most specific indicator. The presence of faecal streptococcuses is also frequently looked for as a complementary indicator.

A distribution unit is considered as not being conform when at least one parameter has exceeded its limit value during at least one analysis in a period of one year

Share of collected and treated waste water by the public sewerage system: This is the share of waste water produced that is collected in a collective network (from households, institutions, industries) and treated sufficiently to allow it to be discharged in the environment without engendering harmful impact on human health or on the ecosystems.

The total volume of waste water produced is equal to the volume produced by the domestic sector, to which can be added that produced by industries that do not have on-site treatment.

The volume of treated waste water is the volume of water collected and transported to the place where it is treated (excluding treatment on industrial sites).

Exploitation index of renewable resources: This indicator measures the pressure connected with the annual drawing of the resources of natural, renewable, conventional freshwater expressed as a percentage. (Cf. chapter on water in Part I)

The sum of the annual volumes of natural, renewable, conventional water drawn for all uses, including losses during transport, when referring to a specific year and the average annual flow of the resources of natural, renewable, conventional water. The resources of each country are defined by the surface and groundwater formed or the water coming into the country, estimated on the basis of hydrologic data over a period of time that is long enough to consider the average values used as stable and which probably include surface and groundwater.

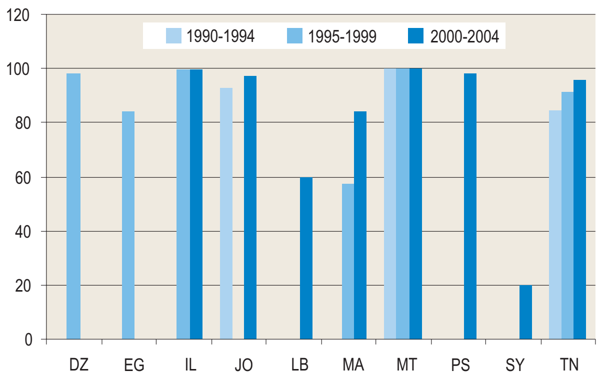
Share of irrigated agricultural land: This is the irrigated land area expressed as a percentage of the total surface area of the agricultural land.

The irrigated areas are the parts of land equipped to supply crops with water. This includes the areas equipped for full or partial control of the irrigating, the areas irrigated by rises in the water level, the equipped wet areas.

The total area of agricultural land (permanent and temporary) is defined by the sum of the arable land and the permanent crops. (Cf. chapter on land and forest in Part 1)

Access to safe drinking water

Figure 3.9 Access to safe drinking water (%, 1990-2004)



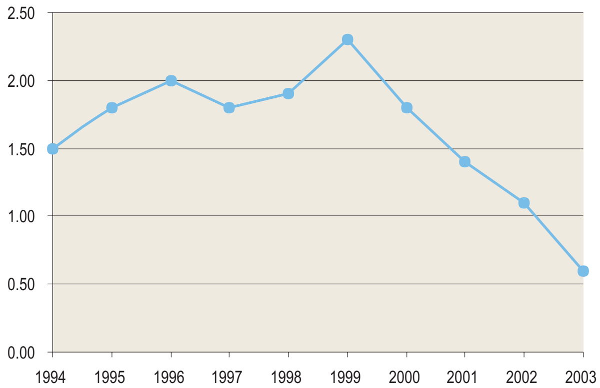
The indicator for the access to drinking water corresponds to the proportion of the population with access to an improved water source that is a Millennium indicator. The objective in the Declaration of the Millennium is to reduce by half by 2015 the percentage of the population that does not have sustainable access to a supply of healthy drinking water. This indicator is different from the number of people connected to a drinking water network (Cf. Chapter on water in Part 1).

Eight countries reached a level of access greater than 80% by 1995. This rate is equal to 99-100% in Israel and Malta. Since 1995 an improvement in access to drinking water can be seen in Jordan, Morocco and Tunisia. The lowest rates are for Lebanon and Syria with 60 and 20% respectively

Share of distributed drinking water not conform to quality standards

Data on the portion of drinking water distributed that is not in conformity with quality standards is available only in three countries: Israel, Tunisia and Malta, where the last available value was 0.5%, 0.6% and 5% respectively. For Tunisia, the series in the graph shows net improvement since 2000, after having reached a peak of 2.3%.

Figure 3.10 Share of distributed drinking water not conform to quality standards in Tunisia (%, 1994-2003)

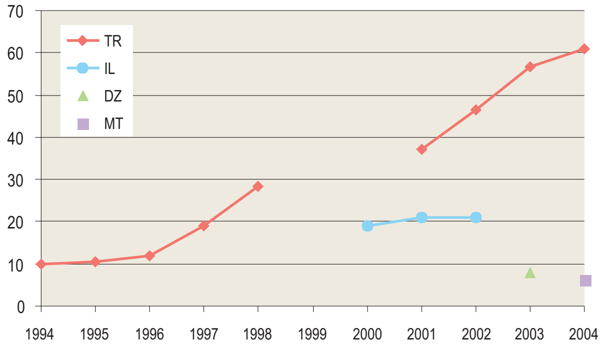


Share of collected and treated waste water by the public sewerage system

This indicator on the collection and treatment of waste water was only supplied by four countries: Malta, Algeria, Israel and Turkey. The proportion of waste water collected and treated by the public waste water treatment systems is equal to 6%, 8%, 21% and 61%, respectively. (Cf. figure 3.11). The development of waste water treatment in Turkey is reflected in the proportion of waste water collected and treated by the public waste water treatment plants which have gone up six-fold in 10 years. (Cf. chapter on water quality and waste water treatment).

The indicator could be balanced with the output of the waste water treatment plants, in order to measure the percentage of domestic and industrial waste water connected to the domestic network that treats the water sufficiently to permit evacuation into the environment without causing environmental impact. The notion of treatment groups together a wide range of processes that permit treatment at a more or less high level (mechanical, biological and biochemical)

Figure 3.11 Share of collected and treated wastewater by the public sewerage system (%, 1994-2004)



Exploitation index of renewable resources

Table 3.4 Exploitation index of renewable resources (last year available)

	Regular freshwater resources 95 per cent time		Total gross abstraction of surface and ground water		Exploitation index of renewable resources
	Period	Mm³	Year	Mm³	%
CY	1951-1980	150	2003	214	143
DZ	1990-1998	4 675			
EG	1985-1998	55 055	1998	60 640	110
IL	1999	1 978 [1]	2002	1 496	76
JO	1937-1998	867 [2]	2003	735	85
MA	1920-1990	16 000	2003	13 000	81
MT	1995-2004	51	2004	15	29
PS			2004	249	
SY	1995-1998	34 704			
TN	1900-1998	2 100	2000	1 927	92
TR	1950-2000	234 300 [3]	2001	40 010	17

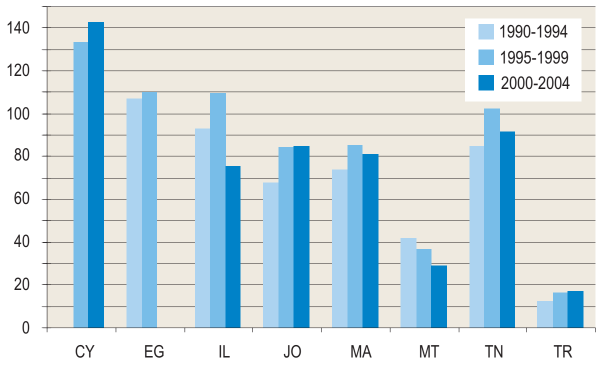
Notes: 1: available water for annual abstraction; 2: internal flow; 3: total resources.

Pressure on water resources is very high in the Mediterranean countries. All the countries (8) for which calculations were made, except Malta and Turkey, have an exploitation index of the renewable resources that is higher than 75%. This index is even equal to 143% in Cyprus where it continues to rise. In Egypt, Israel and Tunisia, it was higher than 100% before 2000. Since 2000 there has been a more or less significant decrease in this index in Israel, Morocco and Tunisia. In Turkey only 12 to 17% of the renewable resources are used and in

Malta the index has gone from 42 to 29% because of the production of non conventional water by the desalting plants. (Cf. figure 3.12)

The choice of the period for the estimation of the renewable fresh water resources is very important and can strongly influence the value of the indicator. For instance, in Cyprus, if the index is calculated by using the average of the resources over a period of 30 years (1971-2000), it drops to about 50% instead of 143%.

Figure 3.12 Exploitation index of renewable resources (%, 1990-2004)



Share of irrigated agricultural land

Table 3.5 Share of irrigated agricultural land (%, 1990-2004)

	1990	1995	1997	1998	1999	2000	2001	2002	2003	2004
CY	17.45	19.95				19.87	19.42	19.60	19.33	
DZ	0.10	1.12				1.20				
EG				100.00	100.00	100.00	100.00	100.00	100.00	
IL						33.62		32.26		
JO		3.76				5.06 [1]				
LB										30.90
PS			11.11	10.47	11.40	10.67	10.84	10.70	10.31	
TN					3.47	3.57	3.64	3.68	3.83	

Note: 1: in Jordan, the share of irrigated arable land is 33 % in 2000.

Figure 3.13 Share of irrigated agricultural land (%)

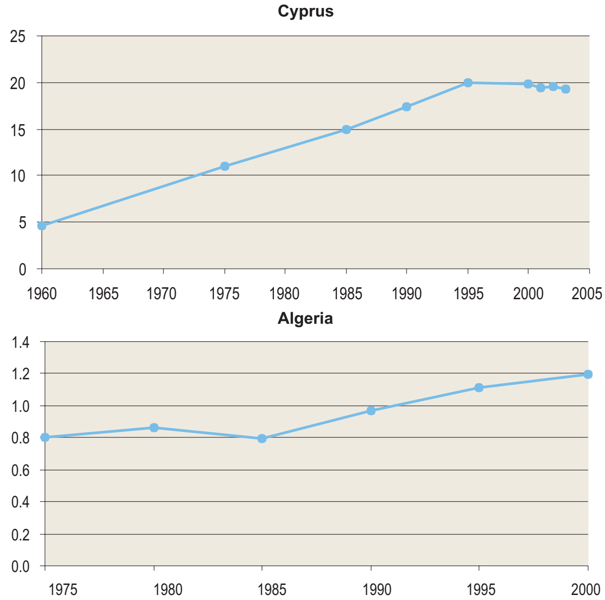
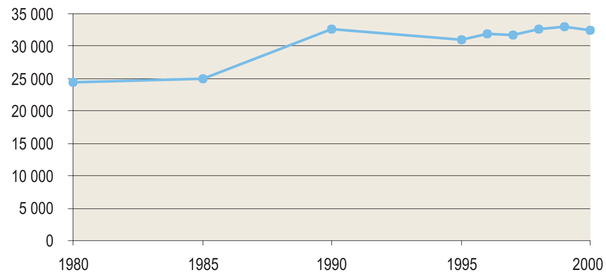


Figure 3.14 Superficies of irrigated agricultural land in Egypt (1000 ha, 1980-2000)



Depending on the methods used, irrigation needs large quantities of water and that is why it is important for the indicator for the use of fresh water resources for the portion of irrigated agricultural land to evolve. This varies from 1% in Algeria to more than 30% in Israel and in Lebanon and 100% in Egypt. The sustained increase over decades in the share of irrigated agricultural land in Cyprus should be noted in particular. It has quadrupled (400 %) in 40 years but with only a doubling in absolute value. It is also true in Algeria, but to a lesser extent, with an increase of 150% in percentage and absolute value over 25 years. In Egypt, all the agricultural land is irrigated and this went up from 2.5 million hectares in 1985 to more than 3.2 million hectares in 1990, but the situation has stabilised since then.

Waste indicators

The treatment of municipal and industrial solid waste is one of the important challenges taken up by the Mediterranean countries. The total quantities and per inhabitant have continued to increase due to economic development and consumer methods induced.

Generation of municipal solid waste: This indicator measures the generation of municipal solid waste measured by weight at the place of generation and as a ratio of the population, expressed in tonnes per inhabitant and per year.

The definition of solid waste is variable depending on the countries, but it can be said to be material that no longer has a use and has therefore to be disposed of. This material has no commercial value for the producer, even if it can have a value for others.

Municipal waste is waste collected by or on behalf of municipalities. It includes waste produced by households, municipal services (roads, gardens and parks), commercial and craft activities, offices, institutions such as schools, administrative buildings and small enterprises whose waste is treated in the same installations as that collected by the municipalities. The definition excludes waste from the municipal sewage networks and treatment and municipal waste from construction or demolition.

Rate of collection of household waste: This is the proportion of the total generation of household waste collected and that goes through the treatment/ storage channels organised by the local bodies.

Household waste includes normal and special household waste, bulky waste and animal corpses.

Generation of industrial solid waste: This is the total annual generation of solid waste by industries measured by weight at the place of generation and as a ratio of the population, expressed in tonnes per inhabitant and per year.

The national definitions and national nomenclatures for industrial waste are variable from one country to the next. The quantities produced are shared out according to the International Standard Industrial Classification, revision 3.

Generation of municipal solid waste

In most of the Mediterranean countries where there is a generation of solid municipal waste, the latter continues to increase (Cf. figure 3.15). As a ratio of the population, the generation of municipal waste is increasing considerably in Jordan and Morocco, less in Tunisia, but also in Cyprus where more than 700 kg per inhabitant per year is produced (Cf. figure 3.16). In Israel there is a slight drop, remaining at a high level of 575 kg per inhabitant which is in the European average (25 countries) for the quantity of municipal waste collected per inhabitant. In many countries it is between 224 kg/inhabitant (Morocco) and 321 kg/inhabitant (Palestinian Authority).

Figure 3.15 Generation of municipal solid waste (1000 t, 1990-2004)

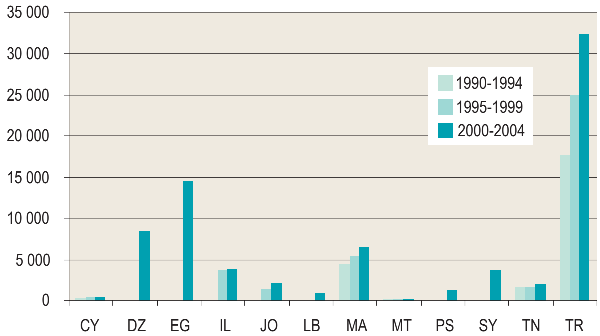
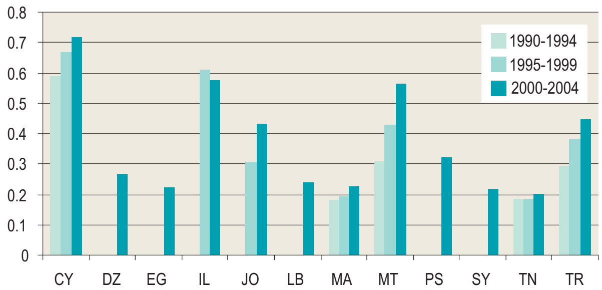
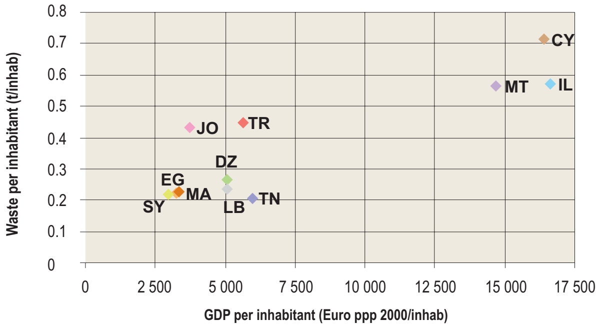


Figure 3.16 Generation of municipal solid waste per inhabitant (t/inhab., 1990-2004)



The quantities of municipal waste produced per unit of GDP varies from 34 kg/1000 euros in Israel and Tunisia to about 70 in Egypt and Morocco and 117 in Jordan. Figure 3.7 shows the level of municipal waste production per inhabitant in each of the Mediterranean countries according to their GDP per inhabitant expressed in euros constant 2000 PPP for the last available year. (Cf. annexes)

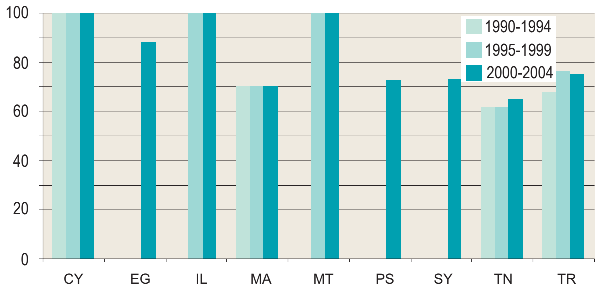
Figure 3.17 Generation of municipal solid waste per GDP unit (last year available)



Rate of collection of household waste

The rate of collection of household waste has gone up slightly or remained stable since 1990. It is higher than 65% in nine countries where this rate was supplied (Cf. figure 3.18). Cyprus, Israel and Malta collect all of their household waste.

Figure 3.18 Collection rate of household waste (%, 1990-2004)



Generation of industrial solid waste

In most of the countries, the manufacturing industry is the sector of activity that generates the most waste after municipal waste. It is the big countries like Turkey and Egypt that generate the most, with 16 and 4.5 million tonnes respectively (Cf. figure 3.19). Turkey and the Palestinian Authority stand out with a little more than 200 kg per inhabitant. In the other countries, the quantities per inhabitant are less than 70 kg per inhabitant. A marked decrease can be noted in Malta, with the production per inhabitant going from nearly 500 kg per inhabitant in 1994 to about 60 kg per inhabitant in 2004 (Cf. figure 3.20), mainly due to the closure of many industrial plants. It should be noted that the generation of solid industrial waste may not take into account all the sectors of activity, as part of the industrial waste could have been counted as municipal waste. Figure 3.21 shows the rate of generation of industrial waste per inhabitant in each of the partner countries, according to the GDP per inhabitant as expressed in euros constant 2000 PPP for the last available year. The quantities of industrial waste produced per unit of GDP vary from 4 kg/1000 euros to 40 in Turkey.

Figure 3.19 Generation of industrial solid waste (1000 t, 1990-2004)

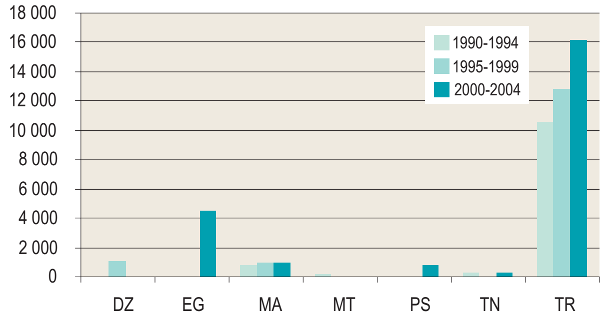


Figure 3.20 Generation of industrial solid waste per inhabitant (t/inhab., 1990-2004)

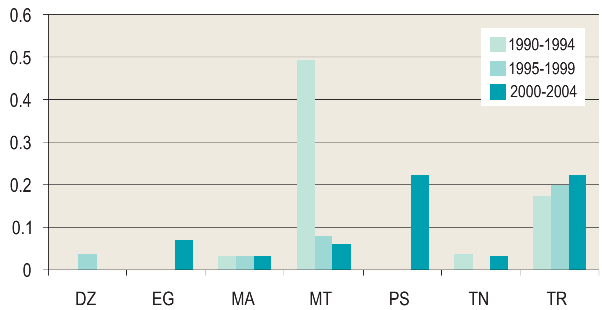
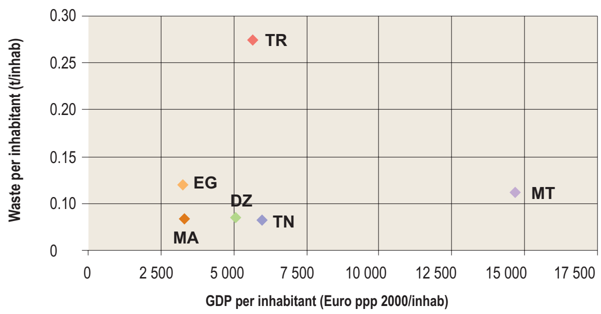
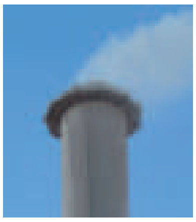


Figure 3.21 Generation of industrial solid waste per GDP unit (last year available)



Air pollution indicators



The Mediterranean countries emit more and more greenhouse gases, without reaching the emission level per inhabitant of most of the European countries. These emissions are the object of the Rio Convention on the climate and of its Kyoto Protocol that aims at reducing them in function of national objectives. Air pollution is considerable in the large cities of the Mediterranean that are becoming equipped with control networks for air quality so as to be able to anticipate and inform the population of pollution highs that are hazardous for health.

Emission of greenhouse gases: This indicator corresponds to the aggregated national annual human-related emissions of the main greenhouse gases: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). It is expressed in gigagrammes (Gg) of equivalent CO_2 per period of 12 months.

The estimates of the emissions of greenhouse gases are carried out according to the IPCC methodology (Cf. chapter on air pollution in Part 2)

The emissions of CH_4 and N_2O are expressed in equivalent-CO_2 by using as the balancing coefficient their global warming potential in 20 years time. The global warming potential of CH_4 is 56, and that of N_2O is 580. This indicator can also be calculated for in 100 years time with different global warming potential coefficients: 21 for CH_4 and 310 for N_2O.

Share of clean motor fuels consumption: This refers to the proportion of the total volume of clean fuel consumed by country's motor vehicle stock, expressed as a percentage.

Consumption is equal to production + importation - exportation (+/-) variations in stock.

For this indicator, clean fuels refer to unleaded petrol, liquefied petroleum gas (LPG) and compressed gas. The motor vehicles stock is made up of passenger cars and heavy goods vehicles. Annual statistics of consumption should supply the elements needed to calculate the indicator, using special treatment such as the conversion of values into equivalent volumes.

Share of agglomerations of more than 100 000 inhabitants equipped with an air pollution monitoring network: Only the cities equipped with a network of fixed monitoring stations are taken into account. The number of stations and the parameters monitored can be stipulated (SO_2, Particulates, NO_2, lead, Ozone-O_3).

Emissions of greenhouse gases

In all of the countries for which data is available, we observe that the emissions of greenhouse gases are increasing (Cf. figure 3.22). Whereas Algeria and Egypt are the countries that emit the most greenhouse gases among the 8 partner countries, Israel and Cyprus emit the most compared to their population with around 10 CO_2 tonnes equivalent per inhabitant, which is slightly less than the average European (25 countries) emissions. Israel is lowering its greenhouse gases per inhabitant. Morocco and Tunisia manage to limit them while being at a lower level of 2 and 3.5 CO_2 tonnes equivalent per inhabitant. (Cf. figure 3.23).

By relating the total emissions of greenhouse gases to the gross domestic product (GDP) expressed in euros constant 2000 PPP (Cf. general statistics in the appendix), it is possible to check if there is decoupling between greenhouse gas emissions and economic development. A decoupling is observable in figure 3.24 for Cyprus, Israel and Tunisia. The greenhouse gas emissions continue to increase more than the GDP in Jordan and Morocco. In Jordan, the emissions reach a high of almost 1 equivalent kg of CO_2 per euro. Four countries (Cyprus, Israel, Morocco, Tunisia) emit around 700 equivalent g of CO_2 per euro.

Figure 3.22 Emissions of greenhouse gases (1000 t CO_2 eq., 1990-2004)

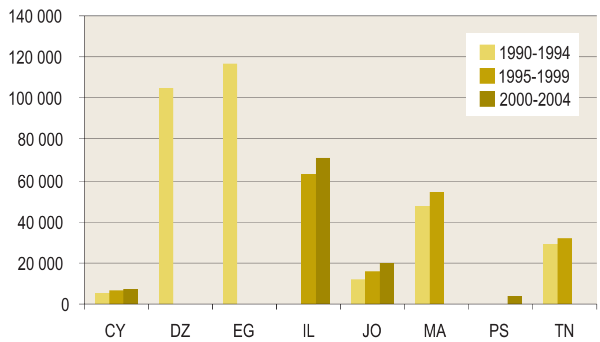


Figure 3.23 Emissions of greenhouse gases per inhabitant (t CO_2eq./hab, 1990-2004)

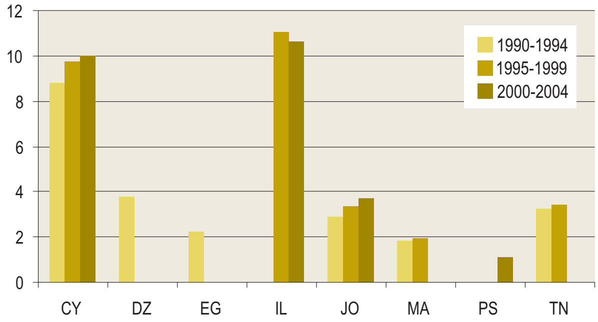
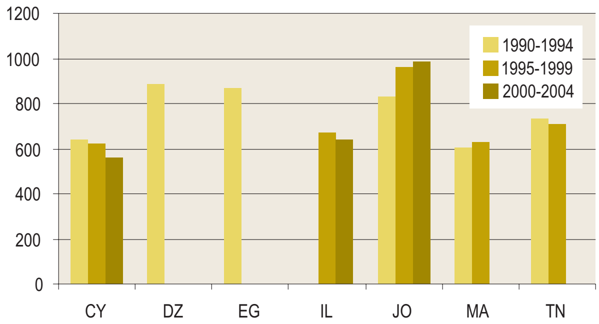


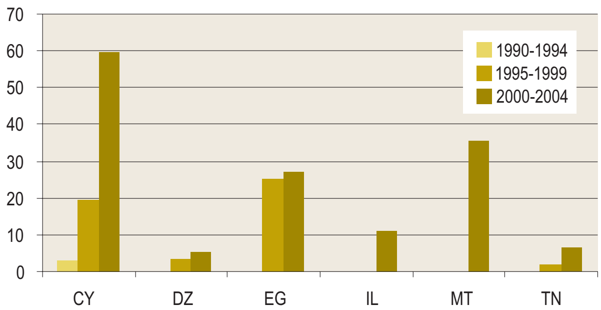
Figure 3.24 Emissions of greenhouse gases per GDP unit (g CO_2 eq. /Euro ppp 2000, 1990-2004)



Share of clean motor fuels consumption

In all of the countries there is an increase in the share of clean motor fuel consumed by vehicles (Cf. figure 3.25). This share is growing especially in Cyprus where it has a high of 60%, and in Egypt and in Malta the values are high at 27 and 35%. Algeria and Tunisia are developing the use of clean fuel too, but their share is only at 5 and 7% respectively.

Figure 3.25 Share of clean motor fuels consumption (%, 1990-2004)



Note: MT: figure refers to import and not to consumption.

Share of agglomerations of more than 100 000 inhabitants equipped with an air pollution monitoring network

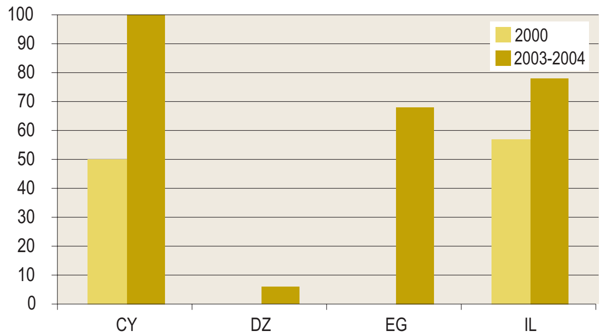
Table 3.6 Agglomerations over 100 000 inhabitants equipped with a air pollution monitoring network (last year available)

		Total number	Number with a network
CY	2004	2	2
DZ	2003	32	2
EG	2003	28 [1]	19
IL	2004	9	7

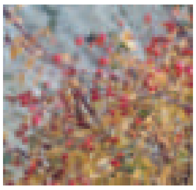
Note: 1: 1996.

It is first of all necessary to point out that the number of urban districts with more than 100 000 inhabitants varies from 2 in Cyprus to 28 and 32 respectively in Egypt and Algeria (Cf. table 3.6). The rate of equipment of the countries with air pollution monitoring networks estimated for these agglomerations of more than 100 000 inhabitants is high in Cyprus, Egypt and Israel where it is greater than 60%, whereas it is at 6% in Algeria. (Cf. figure 3.26)

Figure 3.26 Share of agglomerations over 100 000 inhabitants equipped with a air pollution monitoring network (%, 2000-2004)



Biodiversity indicators



The Mediterranean is rich in wildlife, but the threats to its survival are considerable too. Knowledge of the Mediterranean species and of the degree of threat that they face is still insufficient to calculate reliable indicators. Marine biodiversity is suffering from industrial fishing with trawlers which spare neither the sea bottom nor the marine species. The Mediterranean countries have made efforts at protection, especially of coastal areas, and these efforts must be continued.

Indigenous threatened species: This indicator measures the number of indigenous endangered species as a percentage of the total number of indigenous species.

The endangered species are those which risk extinction, notably the Critically Endangered species, the Endangered species and the Vulnerable species, in conformity with the definitions of IUCN, the World Conservation Union. Extinction refers to fauna that no longer exists anywhere in the world, at least in a wild state, and should be distinguished from extermination which refers to the disappearance of a species in a given country or territory. The species concerned are indigenous ones, not those that have been introduced into a country or territory. (Cf. chapter on biodiversity in Part I)

This indicator can only be calculated for classes where the total number of species is known.

Percentage of the fishing fleet using barge: This indicator is defined by the ratio of the trawlers' power out of the total power of the engine-powered fishing fleet. Trawlers correspond to three categories: 01, 02 and 03 of the FAO - International Standard Statistical Classification for Fishing Vessels (ISSCFV). Only engine-powered boats are taken into account.

Surface of the coastal protected areas: This indicator is defined for a given year by the sum of the surfaces of the protected areas that are totally or partially coastal ones. (Cf. chapter on biodiversity in Part I)

Indigeneous threatened species

Because of the current level of statistics collected on the species dependent on scientific knowledge and research, it was not possible to measure in terms of time the evolution in the percentage of endangered indigenous species. Knowledge of the total number of indigenous species and its evolution has an influence on the rate of threat.

The number of indigenous species is on the whole considerable in the island states, as is the case for Malta and Cyprus. Indigenous species are highly threatened in Israel and Morocco but often only for a small number of known indigenous species. For instance, 100% of indigenous mammals are threatened in Israel out of the 3 species known (Cf. table 3.7). In Morocco, 100% of the birds, the marine species and the vascular plants are endangered out of a total of 10, 12 and 930, respectively, of the known endemic species.

Table 3.7 Indigeneous threatened species (%, last year available)

	DZ 2000	IL 2002	JO 2003	MA 1997	MT 2002	TR 2005
Mammals	44	100	15	17	6	
Birds	32	0	24	100	2	
Reptiles	11	43	3	15	7	
Amphibians		0		50	0	5
Freshwater species		45		45	0	
Marine species				100	0	
Vascular plants		37	5	100	9 [1]	9

Notes: Marine species concern only territorial waters; 1:2005.

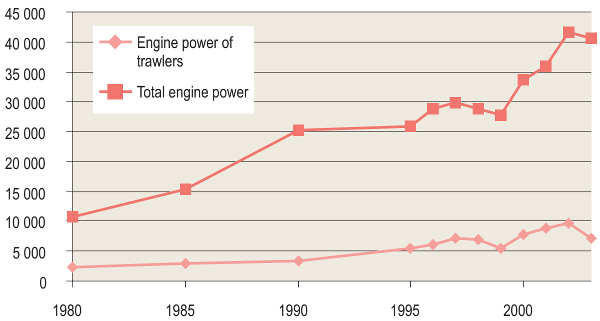
Percentage of the fishing fleet using barge

Few countries supplied information about their fishing fleet. The percentage of the fishing fleet using trawlers varies from 3% in Tunisia to 48% in Morocco (Cf. figure 3.27). In Cyprus, where the percentage has been equal to 21% on average since 1990, the fleet of trawlers has quadrupled in 13 years (Cf. table 3.8). In Malta the percentage of fishing trawlers is only 1%.

Table 3.8 Share of fishing fleet using barge (% of the power, 1990-2004)

	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003
CY	13	21	21	24	24	20	23	25	23	18
MA						52	52	53	51	48
TN				3	3	3	3	4	3	3

Figure 3.27 Fishing fleet trend in Cyprus (horsepower, 1980-2003)



Surface of the coastal protected areas

The surface of the coastal protected areas, that can include a marine part, vary widely: from 325 ha in the Palestinian Authority to almost 4 million hectares in Egypt. The comparison of the protected areas to the surface area of the national territory gives an idea of the countries' efforts for protection. While this ratio is less than 1% in Algeria, Israel, Morocco, the Palestinian Authority and Syria, it is 4% in Egypt and 30% in Malta.

Table 3.9 Surface of the coastal protected areas (ha, last year available)

DZ	2002	199 597
EG	2004	3 912 000
IL	2002	1 966
MA	2003	86 300
MT	2005	9 362
PS	2000	325
SY	2003	6 850

Box 3.2 Indicators and Indicators for sustainable development: definitions and criteria

An indicator is a parameter, or a value derived from parameters, that points to, provides information about and/or describes the state of the environment or a geographical area, and has a significance extending beyond that directly associated with any given parametric value, (OECD, 1994) where a parameter is a measured or observed property.

According to the OECD, an indicator has two main functions:

— To reduce the number of measurements and parameters that would normally be required to give an exact presentation of a situation and

— To simplify the communication process by which the results of measurement are provided to the users.

An indicator can refer to various contexts and topics as well as to different uses.

Indicators for sustainable development should cover the three pillars or dimensions of sustainable development, i.e. economic, social and environmental areas as well as the relations and interaction between these three areas. They should be selected according to several criteria that have been used in most types of experience, in various contexts and at various geographical levels (internationally, nationally, regionally).

For instance, the United Nation's indicators for sustainable development were mainly chosen according to the following criteria (UN-CSD, 2001):

— Being relevant to the main objective of assessing progress towards sustainable development;

— Being Broad in coverage of Agenda 21 and sustainable development;

— Being understandable, clear, simple and unambiguous;

— Being conceptually robust;

— Being applicable within the capabilities of national Governments;

— Being limited in number, remaining open-ended and adaptable to future developments;

— Being representative of international consensus;

— Being established with data that are readily available or available at a reasonable cost, adequately documented, of known quality and updated at regular intervals.

It is acknowledged that an indicator for sustainable development can also have several objectives such as:

— To inform about a situation and about the evolution of sustainable development issues;

— To alert and help in defining sustainable development strategies and policies;

— To ensure the follow-up of the implementing of these sustainable development strategies and policies.

Indicators for the costal regions

The extension of urbanisation and the development of infrastructures in the Mediterranean costal regions, still considerable in most of the Mediterranean countries, is a crucial stake for sustainable development in these countries. This development is often unavoidable and requires better consideration of the environment with a reduction in pollution and more protection of the coastline and the marine areas of interest.

Artificial coastline/total coastline: This indicator is defined by the ratio of the length of the artificial coastline to the total coastline as a percentage.

A segment of the coastline is considered as artificial when part or all of the area 100 metres from this segment on both sides is or has recently been the object of physical alteration of human origin that modifies the original physical state (housing, embanking, facilities). The term «segment of coast» is used because it depends greatly on the method of calculation used and its size can vary according to the techniques used.

Waste water treatment rate before sea release for the coastal agglomerations of more than 100 000 inhabitants: This is the share of waste water produced by the coastal agglomerations of more than 100 000 inhabitants that is the object of sufficient treatment to allow discharge into the environment without causing harmful impact on human health or the ecosystems.

The coastal agglomerations being considered are the agglomerations of more than 100 000 inhabitants, one of whose limits is situated on the coastline.

The indicator measures the ratio between the volume of waste water produced and that which is sufficiently treated by the public waste water treatment system.

Artificial coastline/total coastline

The share of the artificial coastline permits the measurement of the pressure of human and economic activities on the coastline. In Algeria, on the coastline between the bays of Zemouri and Bousmail, the share of artificial coastline has gone up from 36% to 51% in thirty years. In Tunisia, 6% of the coast is artificial. In Malta the artificial coastline went up from 14% to 17% between 2000 and 2003; which corresponds to almost 9 km more in three years, bringing the length of the artificial coast to 46 km out of the 271 km of coast (Cf. table 3.10). It is not possible to compare figures between the countries because of the methods for establishing them are different.

Table 3.10 Share of artificialized coastline (%, 1972-2003)

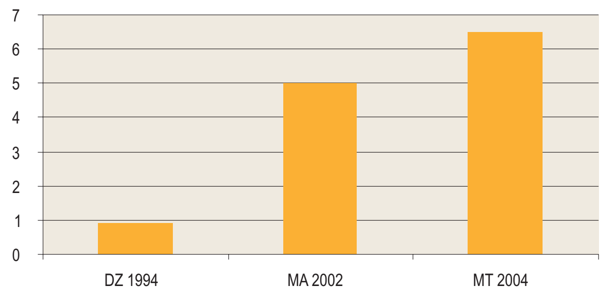
	1972	1997	2000	2003
DZ [1]	36.0			51.2
MT			13.8	17.0
TN		6.2		

Note: 1: coast between Zemouri bay and Bousmail bay.

Waste water treatment rate before sea release for the coastal agglomerations of more than 100 000 inhabitants

Except in Israel, where 100% of the waste water from coastal districts of more than 100 000 inhabitants is treated before discharge into the sea, the rate is globally low. It is less than 7% in two of the countries, Morocco and Malta, for which information is available (Cf. figure 3.28). In Algeria, on the coast, less than 1% of the waste water is treated.

Figure 3.28 Wastewater treatment rate before sea release for coastal agglomerations over 100 000 inhabitants (%, last year available)



4

Annexes

General statistics
List of acronyms
List of sources
List of illustrations
References
Instructions for use of the CD-ROM

General statistics

This annex contains the basic data used for the calculations of the indicators and other ratios.

Total area

The total area of the country includes the surface of the land and inland waters (lakes, rivers etc.). It does not include territorial waters.

Table 4.1 Total area (km[2], last year available)

CY	9 251
DZ	2 381 741
EG	1 001 450
IL	20 700
JO	89 342
LB	10 492
MA	710 850
MT	316
PS	6 208
SY	185 180
TN	163 610
TR	783 562

Average population - mid-year population

The average population during a calendar year is generally calculated as the arithmetic mean of the population on 1st January of two consecutive years (it is also referred to as the mean population). However, some countries calculate it differently, use the population based on registers or estimate it on a date close to 1st July (mid-year population).(Cf. Table 4.2)

Population on 1st January

This is the total number of inhabitants in a determined area on 1st January of a calendar year (or, in some cases, on 31st December of the previous year). The population is based on data from the most recent census adjusted by the components of population change produced since the last census, or based on population registers. (Cf. Table 4.3)

Table 4.2 Mid-year population (1000 inhabitants, 1975-2005)

	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
CY	502	509	542	580	651	694	702	710	723	740	
DZ		18 666	22 204	25 334	28 324	30 416	30 879	31 357	31 848	32 364	
EG		41 130	47 148	52 448	58 133	64 634	65 960	67 302	68 312		
IL	3 457	3 879	4 233	4 691	5 542	6 289	6 439	6 570	6 690	6 806	
JO	1 811	2 183	2 650	3 306	4 190	4 755	4 880	5 005	5 135	5 275	
LB										3 754	
MA	17 006	19 332	21 791	24 177	26 386	28 705	29 170	29 631	30 088	30 541	
MT	309	318	343	360	377	390	393	396	399	401	
PS						3 149	3 275	3 394	3 515	3 638	
SY				9 045 [1]	14 285	16 320	16 720	17 130	17 550	17 793	18 138
TN	5 612	6 392	7 261	8 154	8 958	9 564	9 674	9 782	9 840	9 932	
TR	40 026	44 439	50 307	56 098	61 532	67 420	68 529	69 626	70 712	71 789	

Note: 1: year 1989.

Table 4.3 Population on 1st January (1000 inhabitants, 1975-2005)

	1975	1980	1985	1990	1995	2000	2001	2002	2003	2004	2005
CY	506	506	538	573	645	690	698	706	715	730	749
EG		40 554	46 545	51 911	57 510	63 976	65 292	66 628	67 976	68 648	
IL	3 422	3 836	4 200	4 560	5 472	6 209	6 369	6 509	6 631	6 748	6 864
JO	1 811 [1]	2 133	2 599	3 144	4 139	4 690	4 820	4 940	5 070	5 200	5 350
LB										3 754	
MT	309	318	341	358	376	389	391	395	397	400	403

Note: 1: year 1976.

The gross domestic product in constant purchasing power parity 2000

The gross domestic product (GDP) is sum of gross value added by all resident producers in the economy plus any product taxes (less subsidies) not included in the valuation of output. It is calculated without deducting for depreciation of manufactured capital assets or for depletion and degradation of natural resources. Value added is the net output of an industry after adding up all output and subtracting intermediate input.

Purchasing Power Parities (PPPs) are currency conversion rates that both convert to a common currency and equalise the purchasing power of different currencies. In other words, they eliminate the differences in price levels between countries in the process of conversion.

The series in this compendium was converted by Plan Bleu; it is based on the purchasing power parity calculated for the year 2000 expressed in US dollars PPP constant (published by the World Bank) and converted into euros PPP constant (on the basis of the parity of purchasing power in the 25 European member states). The rate of conversion used is equal to 1, 13658; i.e. 1 euro 2000 PPP is equal to 1, 13658 US dollars PPP.(Cf. Table 4.4)

Gross domestic product per inhabitant in constant purchasing power parity 2000

The gross domestic product per inhabitant is the ratio of the gross domestic product to the average population (Cf. Table 4.5). It is expressed in constant purchasing power parity for the year 2000 per inhabitant. The figures for the average population used for the calculation are those in table 4.2.

Tableau 4.4 Gross Domestic Product (Billions Euros PPP constant 2000, 1975-2003)

	1975	1980	1985	1990	1995	2000	2001	2002	2003
CY	*2.34*	*4.07*	*5.40*	*7.45*	*9.34*	*11.39*	*11.87*		
DZ	*66.23*	*90.95*	*114.90*	*120.16*	*124.12*	*144.82*	*145.53*	*152.93*	*161.57*
EG	*49.38*	*82.38*	*118.00*	*134.81*	*154.84*	*198.94*	*205.60*	*214.25*	*221.80*
IL	*38.23*	*46.01*	*53.51*	*65.01*	*90.14*	*114.07*	*111.48*	*110.08*	*111.36*
JO	*3.90*	*8.27*	*10.97*	*10.76*	*14.97*	*16.80*	*17.44*	*18.49*	*19.06*
LB				*6.96*	*14.45*	*15.99*	*17.25*	*17.88*	*18.97*
MA	*36.15*	*47.96*	*58.08*	*71.14*	*74.62*	*87.64*	*93.03*	*95.60*	*100.22*
MT	*1.30*	*2.31*	*2.50*	*3.39*	*4.71*	*6.13*	*5.83*	*5.99*	*5.85*
PS									
SY	*15.39*	*21.29*	*24.76*	*28.26*	*39.57*	*47.46*	*48.70*	*50.71*	*51.67*
TN	*16.86*	*22.96*	*28.44*	*32.58*	*40.06*	*52.60*	*55.08*	*56.00*	*58.90*
TR	*137.31*	*156.01*	*199.12*	*260.11*	*304.22*	*370.56*	*349.35*	*376.46*	*398.04*

Table 4.5 Domestic Product per inhabitant (Euros PPP constant 2000, 1975-2003)

	1975	1980	1985	1990	1995	2000	2001	2002	2003	
CY	*4 663*	*7 998*	*9 964*	*12 848*	*14 350*	*16 417*	*16 921*			
DZ		*4 872*	*5 175*	*4 743*	*4 382*	*4 761*	*4 713*	*4 877*	*5 073*	
EG		*2 003*	*2 503*	*2 570*	*2 664*	*3 078*	*3 117*	*3 183*	*3 247*	
IL	*11 059*	*11 862*	*12 641*	*13 861*	*16 266*	*18 138*	*17 313*	*16 755*	*16 647*	
JO	*2 153*	*3 786*	*4 141*	*3 254*	*3 573*	*3 533*	*3 574*	*3 694*	*3 711*	
LB									*5 053*	1
MA	*2 126*	*2 481*	*2 665*	*2 942*	*2 828*	*3 053*	*3 189*	*3 226*	*3 331*	
MT	*4 200*	*7 257*	*7 286*	*9 423*	*12 484*	*15 712*	*14 839*	*15 136*	*14 672*	
PS										
SY					*2 770*	*2 908*	*2 913*	*2 961*	*2 944*	
TN	*3 004*	*3 593*	*3 917*	*3 996*	*4 472*	*5 500*	*5 694*	*5 725*	*5 986*	
TR	*3 431*	*3 511*	*3 958*	*4 637*	*4 944*	*5 496*	*5 098*	*5 407*	*5 629*	

Note: 1: computed with the 2004 population .

List of acronyms

Acronym	Label
BOD	Biological Oxygen Demand
CFC	Chlorofluorocarbon
CH_4	Methane
CO	Carbon monoxide
CO_2	Carbon dioxide
COD	Chemical Oxygen Demand
CORINAIR	CORe INVentory of AIR emissions
CR	Critically endangered
CRF	Common Reporting Format
D.S.	Dry Solids
DD	Data deficient
Eco-Lef	Packaging recovery programme in Tunisia
EEA	European Environmental Agency
EMEP	Co-operative programme for monitoring and evaluation of the long range transmission of air pollutants in Europe
EN	Endangered
EU	European Union
Eurostat	Statistical Office of the European Communities
EX	Extinct
FAO	Food and Agriculture Organisation of the United Nations
GDP	Gross Domestic Product
GHG	Green House Gases
GNP	Gross National Product
GWP	Global Warming Potential
HCFC	Hydrochlorofluorocarbon
IPCC	Intergovernmental Panel on Climate Change
ISIC	International Standard Industrial Classification
ISSCFV	International Standard Statistical Classification of Fishing Vessels
IUCN	World Conservation Union
IWWTP	Industrial Waste Water Treatment Plant
$K_2Cr_2O_7$	Potassium Dichromate
$KMnO_4$	Potassium permanganate
LC	Least concern
LPG	Liquid Petroleum Gas
LTAA	Long Term Annual Average
LYA	Last year available
MCSD	Mediterranean Commission on Sustainable Development
MED-Env	Statistical Cooperation project MEDSTAT Environment
n.e.s.	non elsewhere specified
N_2O	Nitrous Oxide
NACE	Statistical classification of economic activities in the European Community

Acronym	Label
NE	Not evaluated
NH_4	Amonium
NMVOC	Non Methanic Volatif Organic Component
NO_2	Nitrogen dioxide
NO_3	Nitrate
NO_x	Nitrogen oxides
NSO	National Statistics Office
NUTS	Nomenclature of statistical territorial Units
OECD	Organisation for Economic Cooperation and Development
Pb	Lead
PM	Particulate matter
PM10	Particulate matter with a mass median aerodynamic diameter less than 10 micrometers
PPP	Purchase power parity
SF_6	Sulfur Hexafluoride
SO_2	Sulfur dioxide
SO_x	Sulfur Oxyde
SPA	Specially Protected Areas
SPAMI	Specially Protected Areas of Mediterranean importance
toe	Ton of oil equivalent
TSS	Total Suspended Solids
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UN-ECE	United Nations Economic Commission for Europe
UNFCCC	United Nations Framework Convention on Climate Change
UWWTP	Urban Waste Water Treatment Plant
VU	Vulnerable
WDPA	World Database for Protected Area
WRI	World Resources Institute

List of sources

Source Code		Label
CY	DA	Department of Agriculture
	DFI	Department of Labour Inspection
	DTPH	Department of Town Planning and Housing
	ES	Environment Service
	FD	Forest Department
	FMRD	Fisheries and Marine Research Department
	RAC	Recycling Association of Cyprus
	SS	Statistical Service (CYSTAT)
	WDD	Water Development Department
DZ	ANN	Agence Nationale pour la Conservation de la Nature
	ANRH	Agence Nationale des Ressources Hydrauliques
	DAPE	Direction de l'Assainissement et de la Protection de l'Environnement
	DGF	Direction Générale des Forêts
	LEM	Laboratoire d'Etudes Maritimes
	MADR	Ministère de l'Agriculture et du Développement Rural
	MATE	Ministère de l'Aménagement du Territoire et de l'Environnement
	MRE	Ministère des Ressources en Eau
	ONS	Office National des Statistiques
EG	CAPMAS	Central Agency for Public Mobilization and Statistics
	EEAA	Egyptian Environmental Affairs Agency
	MALR	Ministry of Agriculture and Land Reclamation
	MHP	Ministry of Health and Population
	MOP	Ministry of Planning
	MWRI	Ministry of Water Resources and Irrigation
	WRC	Water Research Centre
IL	CBS	Central Bureau of Statistics
	FJ	Jewish Foundation
	HUJI	Hebrew University of Jerusalem Department of Ecology
	IMC	Israeli Meteorological Center
	ME	Ministry of Environment
	MINWC	Mekorot
	NRNPA	Nature Reserve and National Park Authority
	SOREQ	Nuclear Research Center
JO	DOS	Departement of Statistics
	MA	Ministry of Agriculture
	ME	Ministry of Environment
	MEMR	Ministry of Energy and Mineral Resources
	MH	Ministry Of Health, Environmental Health
	MPWH	Ministry of Public Works and Housing
	MWI	Ministry Of Water and Irrigation, Water Authority
	RSCN	Royal Society For the Conservation of the Nature
LB	ACS	Administration Centrale de la Statistique
	MA	Ministère de l'Agriculture
	ME	Ministère de l'Environnement

	Source Code	Label
MA	DDF	Direction du Développement Forestier
	DGCL	Direction Générale des Collectivités Locales
	DGH	Direction Générale de l Hydraulique
	DS	Direction de la Statistique
	ONEM	Observatoire National de l'Environnement du Maroc
	ONEP	Office National de l'Eau Potable
MT	AD	Agriculture Department
	EPD	Environment Protection Department
	MEPA	Malta Environment Planning Authority
	MET	Meteorological Office
	NSO	National Statistics Office
	WMSID	Waste Management Strategy Implementation Department
	WSC	Water Service Corporation
PS	EQA	Environmental Quality Authority
	PCBS	Palestinian Central Bureau of Statistics
SY	CBS	Central Bureau of Statistics
	GD	Governorate of Damascus-Environmental service
	MAAR	Ministry of Agriculture and Agrarian Reform
	MHS	Ministry of Housing and Servitude
	MI	Ministry of Irrigation
	MLA	Ministry of Environment and Local Authorities
	SCEA	General Commission for Environmental Affairs
TN	ANGED	Agence Nationale de Gestion de Déchets
	ANME	Agence Nationale pour la Maîtrise de l'Energie
	ANPE	Agence National pour la Protection de l'Environnement
	APAL	Agence de Protection et d'Aménagement du Littoral
	DGEDA	Direction Générale de la Planification, du Développement et de l'Investissement
	DGF	Direction Générale des Forêts
	DGRE	Direction Générale des Ressources en Eaux
	INS	Institut National de la Statistique
	UICN	Union mondiale pour la nature
	MEDD	Ministère de l'Environnement et de l'Aménagement du Territoire
	MT	Ministère des Transports
	ONAS	Office National de l'Assainissement
	SONEDE	Société d'Exploitation et de Distribution des Eaux
TR	MF	Ministry of Forestry
	MH	Ministry of Health
	SHW	State Hydraulic Works
	TUBITAK	The Scientific and Technological Research Council of Turkey
	TURKSTAT	Turkish Statistical Institute

Country	Sources	Table	Figure	Country file
CY	DA		1.6	
	DFI	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.9, 3.6	2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 2.10, 2.12, 3.26	
	DTPH	2.10, 2.15, 2.19		
	ES	2.16, 2.17	3.22, 3.23, 3.24	
	FD	1.1, 1.5, 1.6, 3.1, 3.2	1.7, 3.5, 3.6	
	FMRD	3.8	3.27	
	RAC	2.10, 2.11	2.14	
	SS	1.1, 1.4, 1.15, 1.16, 1.17, 1.18, 1.19, 1.20, 1.21, 1.22, 1.23, 1.24, 1.25, 1.26, 1.27, 1.28, 2.7, 2.8, 2.10, 2.12, 2.13, 2.14, 2.19, 3.5, 4.1, 4.2	1.3, 1.4, 1.18, 1.20, 1.21, 2.11, 2.13, 2.15, 2.16, 3.1, 3.2, 3.4, 3.13, 3.15, 3.16, 3.17, 3.18, 3.25	
	WDD	1.7, 1.8, 1.9, 1.10, 1.12, 1.13, 1.14, 2.20, 2.21, 2.22, 3.4	1.11, 1.12, 1.13, 1.15, 1.16, 1.17, 2.17, 2.18, 2.19, 3.12	
DZ	ANN	1.17, 1.18, 1.19, 1.20, 1.21, 1.22, 1.23, 1.24, 3.7	1.18, 1.19, 1.20	
	ANRH	1.7, 1.8, 1.9, 1.10, 3.4	1.11, 1.15, 1.16, 3.12	
	DAPE	2.20, 2.21, 2.22	2.17, 2.18, 2.19, 3.11	
	DGF	1.1, 1.5, 1.6, 3.1, 3.2, 3.3	1.7, 1.9, 1.10, 3.3, 3.5, 3.6, 3.8	1.1
	LEM			
	MADR	1.1, 1.4, 3.5	1.3, 1.4, 3.2, 3.4, 3.13	
	MATE	1.22, 1.24, 2.1, 2.2, 2.3, 2.4, 2.5, 2.7, 2.8, 2.9, 2.11, 2.12, 2.13, 2.14, 2.15, 2.16, 2.17, 2.19, 3.9	1.5, 2.1, 2.4, 2.7, 2.8, 2.15, 2.16, 3.19, 3.20, 3.21, 3.22, 3.23, 3.24, 3.28, 3.29	
	MRE	1.13	1.17	
	ONS	1.7, 1.10, 1.14, 2.7, 3.6, 4.1, 4.3	1.15, 2.11, 3.9, 3.15, 3.16, 3.17, 3.25, 3.26	
EG	CAPMAS	1.1, 2.5, 2.7, 2.20, 3.6, 4.1, 4.2	2.8, 2.11, 3.9, 3.15, 3.16, 3.17, 3.26	
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Internet Links :

Convention on Biological Diversity: http://www.biodiv.org/default.shtml

FAO Aquastat: Global information system of water and agriculture developed by the Land and Water Development Division of FAO. http://www.fao.org/AG/AGL/aglw/aquastat/main/index.stm

Manufacturers of Emission Controls Association (MECA): http://www.meca.org/index.ww

Montreal Protocol Summary Control Measures: http://ozone.unep.org/Treaties_and_Ratification/control_measures.asp

United Nations Framework Convention on Climate Change: http://ghg.unfccc.int/index.html

UNEP- WCMC: World Database of Protected Areas: http://sea.unep-wcmc.org/wdbpa/

World Resources Institute: http://www.wri.org/2000-2001

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