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ENVIRONMENTAL STATISTICS COMPENDIUM OF TURKEY, II

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Turkish Statistical Institute
ANKARA
TURKEY
2006

Project implemented under the technical supervision of Eurostat

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FOREWORD by TURKSTAT

In recent years environmental issues such as the climate change, loss of biodiversity, waste management, and water pollution have begun to attract growing public attention in our country as well as throughout the world. For the foreseeable future, sustainable management of the environment will be one of the greatest challenges confronting the world. Therefore in order to build up a comprehensive knowledge of the environment it is necessary to have reliable, high quality, internally consistent, and internationally compatible and comparable environmental data.

Turkish Statistical Institute (TURKSTAT), the responsible authority for the compilation, evaluation and dissemination of statistics, has begun studies on environmental issues in 1990 in order to be able to correspond to the national and international demands. Initially, environmental statistics have been developed based on OECD Pressure-State-Response framework; afterwards its scope has been enlarged in parallel with the international developments.

The main studies of TURKSTAT on environmental statistics are; Air Quality Statistics, Emission Inventory of Turkey (Greenhouse Gases Emission Statistics), Manufacturing Industry Waste Inventory, Mining Establishments Waste Inventory, Thermal Power Plants Waste Inventory, Organized Industrial Regions Waste Inventory, Municipal Solid Waste Inventory, Municipal Drinking and Using Water Inventory, Municipal Wastewater Inventory, Environmental Employment and Expenditure Inventory. The results are released at national, regional and local level.

In the Mediterranean region, Euro-Mediterranean Statistical Co-operation Programme (MEDSTAT), which intends to respond to the statistical data requirements stated in Barcelona Declaration in conformity with the statistical standards of EU, was launched in 1995 in order to strengthen the national statistical systems, to meet to the needs of national users and to improve the cooperation between national and international organizations. MEDSTAT-ENV Project is one of the sub-projects covered under this program.

In the framework of the 1st phase of the project that was completed in 2003, the harmonization of data and continuity of data exchange between Mediterranean countries and Statistical Office of the European Commission (EUROSTAT) was tackled and TURKSTAT established strong relationships with the national bodies and EUROSTAT.

One of the main outputs of the MEDSTAT-ENV I Project (1999-2003) was Environmental Statistics Compendium of Turkey in 2003. The 2nd phase of the project has also been a chance for our Institute to publish an updated version of this publication. In this version, land, forest, biodiversity, air, water, wastewater, solid waste, environmental expenditure and employment data and sustainable development indicators produced by Turkish Statistical Institute and other related organizations were covered.

With the belief that the Environmental Statistics Compendium of Turkey, II would meet the specific objectives of the project, and serve national and international users, we thank Blue Plan for the Mediterranean Regional Activity Center for their fruitful efforts in this project, all the related national bodies for their collaborations, and all persons who have contributed in the preparation of this publication.

FOREWORD by European Commission

The European Union's policy with regard to the Mediterranean region is governed by the Euro-Mediterranean partnership (referred to as the Barcelona Process) launched after the 1995 Barcelona Conference. The Euro-Mediterranean summit of November 2005 which celebrated the 10th anniversary of the Barcelona Process restated the commitment to the principles and objectives of the Declaration of Barcelona and reiterated the importance of regional understanding and cooperation.

The member states of the European Union and the Mediterranean Partner countries[1] have intensified their relationship in the field of statistics thanks to MEDSTAT, the regional statistics cooperation programme. This programme is funded by the European Commission (MEDA fund) under the contractual responsibility of the Directorate General of EuropeAid Cooperation Office. Eurostat, the European Community's statistics office, is in charge of the technical monitoring of the programme. MEDSTAT confirms the importance of supplying complete, reliable, relevant and comparable statistics for decision-makers and for a sustainable economic development of the Mediterranean region.

As of the launching of the programme in 1996, the environment was proposed to be fully dealt with; the sub-programme MEDSTAT-Environment was put in place, the latter forming one of the ten MEDSTAT sub-programmes.

This second phase of the MEDSTAT-Environment project (MED-Env II), implemented by Plan Bleu, regional activity centre of the Mediterranean Action Plan, covers the period 2003-2006 and is a continuation of the actions carried out in the first phase of the programme (1999-2003) while emphasizing efforts for three new topics: air pollutant emission, biodiversity and the calculation of environmental indicators for sustainable development. MED-Env II is based on the experience and progress made by each country since the start of the programme.

The main objective of MED-Env II is to strengthen the sustainable capacity of the twelve Mediterranean partner countries to produce and publish complete, reliable, relevant environmental statistics and indicators while taking into account the users' needs. This information should be in conformity with international standards, more especially with the European ones, in order to be comparable in time and space.

The results targeted in this second phase are:

- To contribute to the institutional and inter-institutional strengthening of national statistics systems with regard to the production of environmental statistics;
- To adapt the regional strategy so as to take into consideration the specific situation of each national statistics system;
- To promote the harmonisation of national statistics with the international and European standards underway;
- To ensure data exchange between the Mediterranean countries and the European Union, and among the Mediterranean partners themselves;
- To ensure more visibility concerning the results from the Euro-Mediterranean partnership in terms of environmental statistics;
- To take into consideration the users' needs at national, regional and international levels.

[1] **Algeria, Egypt, Israel, Jordan, Lebanon, Morocco, Palestinian Authority, Syria, Tunisia, Turkey and, for the continuation of the programme, Cyprus and Malta, which have been Member States since 1st May 2004.**

This national statistics compendium of Turkey is co-financed by Turkish Statistical Institute and the MEDSTAT-Environment programme. This compendium, as visibility tool, reflects the progress made by Turkish Statistical Institute in the production of environmental information since the launching of the MEDSTAT-Environment programme.

The efforts deployed by the Turkish Statistical Institute throughout this second phase of MEDSTAT-Environment have helped not only to enrich and widen the collection of environmental data but also to put in place the means to disseminate on a regular basis the environmental statistics produced and collected. This second publication, which is an updated version of the first compendium published in 2003, is a perfect illustration of this effort.

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SYMBOLS AND ABBREVIATIONS

.. Data not available

- Denotes magnitude nil

CEPA	Classification of Environmental Protection Activities
CH_4	Methane gas
CO	Carbon monoxide
CO_2	Carbon dioxide
CORINAIR	Coordination of Information on the Environment Commission's Air Emissions Inventory
EPE	Environmental Protection Expenditure
EUROSTAT	Statistical Office of the European Communities
GDP	Gross Domestic Product
IPCC	The Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature and Natural Resources
LTL	Long Term Limits
MEDSTAT	Euro-Mediterranean Statistical Co-Operation
N_2O	Nitrous oxide
NMVOC	Non-methane Volatile Organic Compound
NO_X	Nitrogen oxides
NUTS1	Nomenclature of territorial units for statistics
O_3	Ozone
OECD	Organization for Economic Co-operation and Development
PAHs	Poly-aromatic hydrocarbons
PM	Particulate Matter
SO_2	Sulphur dioxide
STL	Short Term Limits
TUBİTAK	The Scientific and Technological Research Council of Turkey
TURKSTAT	Turkish Statistical Institute
UNFCCC	United Nations Framework Convention on Climate Change
VOC	Volatile Organic Compound
WHO	World Health Organization

LAND AND FOREST

AGRICULTURAL LAND USE

Agricultural and environmental issues are inseparable since environmental concerns play a vital role in agricultural policy making. The agricultural sector constitutes the 13% of the GNP of Turkey and therefore, it is important to have current, accurate and harmonized data on agriculture and environment for decision making purposes. Turkish Statistical Institute (TURKSTAT) periodically conducts agricultural censuses in order to be able to provide the required data.

Conducting census of agriculture is a legal obligation of the TURKSTAT. The planning and application of all of the processes from preparatory work to dissemination of results of the census requires a long and intensive amount of work.

The first Census of Agriculture in Turkey was conducted in 1927, and in the years 1950, 1963, 1970 and1980. After the year 1990, it was decided by a decree that the agricultural census be held in years ending with 1, and sixth census was held in 1991 and seventh in 2001.

Moreover, annual agricultural statistics are compiled by TURKSTAT through the Ministry of Agriculture and Rural Affairs.

Agricultural Land Use

The Turkish Statistical Institute publishes Agricultural Statistics annually. The data for this publication are compiled from questionnaires issued by TURKSTAT and sent to provincial offices of the Ministry of Agriculture and Rural Affairs.

The information on crop production given in this publication has been collected through the questionnaires sent to the provincial and district organizations of the Ministry of Agriculture and Rural Affairs. In 1994, the questionnaires, in current agricultural statistics, were updated according to the current conditions. Until 1995, the area covered by fruit trees and olive trees had not been calculated from the total number of trees (in fruit orchards and scattered trees). Since 1995, only the area of fruit orchards and closed olive gardens (orchards and olive plantation) were given together. The area of scattered trees has not been included.

The information on unused and undeveloped potentially productive land and land under permanent meadows and pastures given in this table were taken from The 2001 Agricultural Census Village General Information Survey. The coverage of this survey was all of the villages and centers of provinces and districts having less than 25000 inhabitants.

The crops in this publication are tabulated according to the crop classification of the United Nations Food and Agriculture Organization.

Table 1. Agricultural land, 2000-2004

(thousand ha)

	2001	2002	2003	2004
Total agricultural land	42 911	43 140	42 588	43 151
Total arable land	25 744	25 938	25 316	25 812
Cultivated field area	23 001	23 163	22 554	23 063
Sown area	18 087	18 123	17 563	18 107
Fallow land	4 914	5 040	4 991	4 956
Vegetable gardens	799	831	818	805
Unused and undeveloped potentially productive land	1 944	1 944	1 944	1 944
Land under permanent crops	2 550	2 585	2 655	2 722
Vineyards	525	530	530	520
Area of fruit trees	1 425	1 435	1 500	1 558
Area of olive trees	600	620	625	644
Land under permanent meadows and pastures	14 617	14 617	14 617	14 617

Source: Turkish Statistical Institute

Figure 1. Cultivated field area

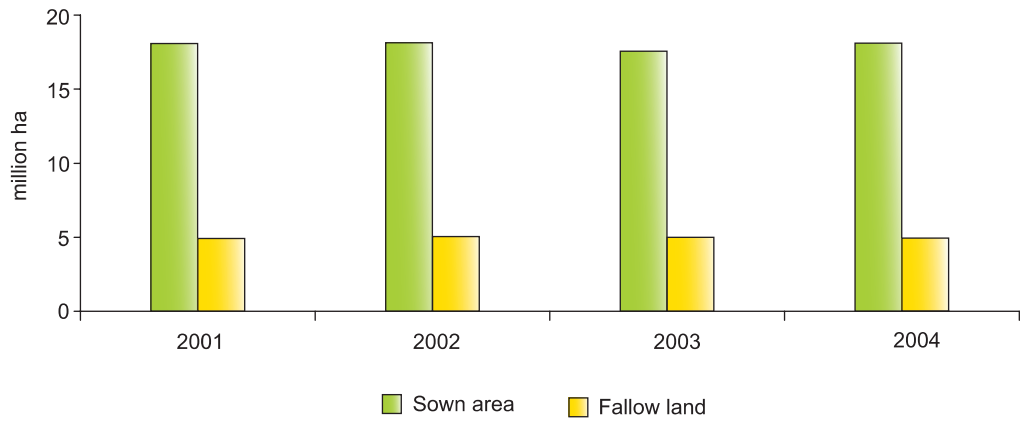
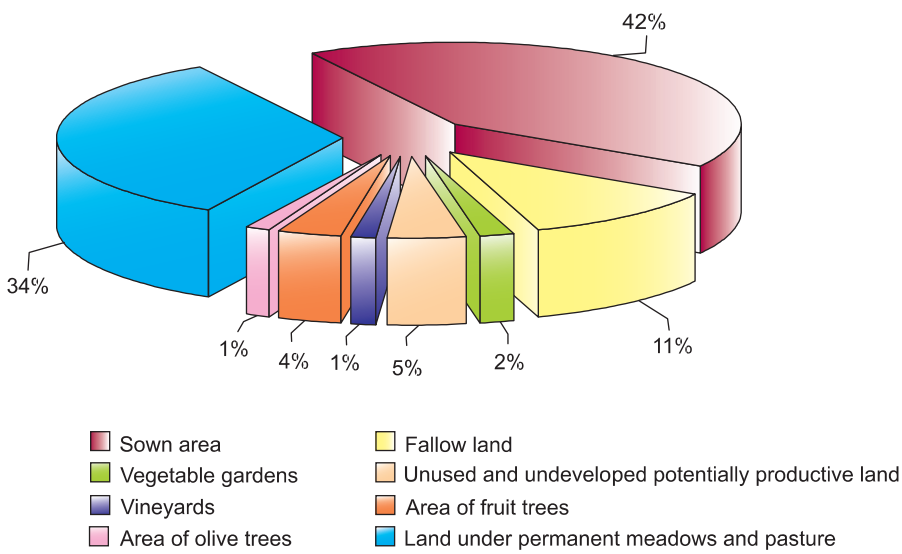


Figure 2. Agricultural land, 2004



The total area of Turkey is 78 356 200 ha and based on the data, more than half of Turkey is covered by agricultural land, which is mostly represented by arable land (around 60%) followed by permanent pastures and meadows (around 34%). The remaining areas are covered by permanent crops (around 6%).

Between 2001 and 2004, total agricultural area has remained almost the same showing an increase less than 1%.

There had been a slight increase in land under permanent crops (7%), due to the increase in area of fruit trees (9%) and the increase in area of olive trees (7%) between 2001 and 2004.

FOREST

Forest resources play a significant role in economic and social development. Their capacity for providing a wide range of benefits has satisfied growing needs for forest resource products and services as well as addressing environmental needs and biodiversity.

Ministry of Environment and Forestry is responsible for protection, reclamation, management, development and construction of forest resources. Also management, protection and development of national parks, natural parks, natural monuments, nature conservation areas, forest camping places and seperation of hunting-wild life areas are under the responsibilty of Ministry of Environment and Forestry.

The forests are submitted to many pressures including forest fires, but also the land ownership pressure, the clearing for agricultural use and urbanisation. The knowledge of the structure of the forest allows to better evaluate the production capacity and the risks of degradation.

Forest

Table 2. Forest cover type

(km²)

	1999	2004
Total forest and other wooded land	207 632	211 887
Forest cover	100 275	106 212
Coniferous forest	65 636	70 834
Broadleaved forest	34 639	35 378
Other wooded land	107 357	105 675

Source: Ministry of Environment and Forestry

According to the 2004 data, Turkey had approximately 2.12 million hectares of forest land which constitutes about 27% of the total area of Turkey. Coniferous forests are the most common type of forest and they represent nearly 67% of total forest area.

The area covered by both broadleaved forest and coniferous forest increased during 1999-2004 period. Although there was a decrease in other wooded land area, total forest and other wooded land increased 2% between 1999 and 2004.

Figure 3. Land use of forest area

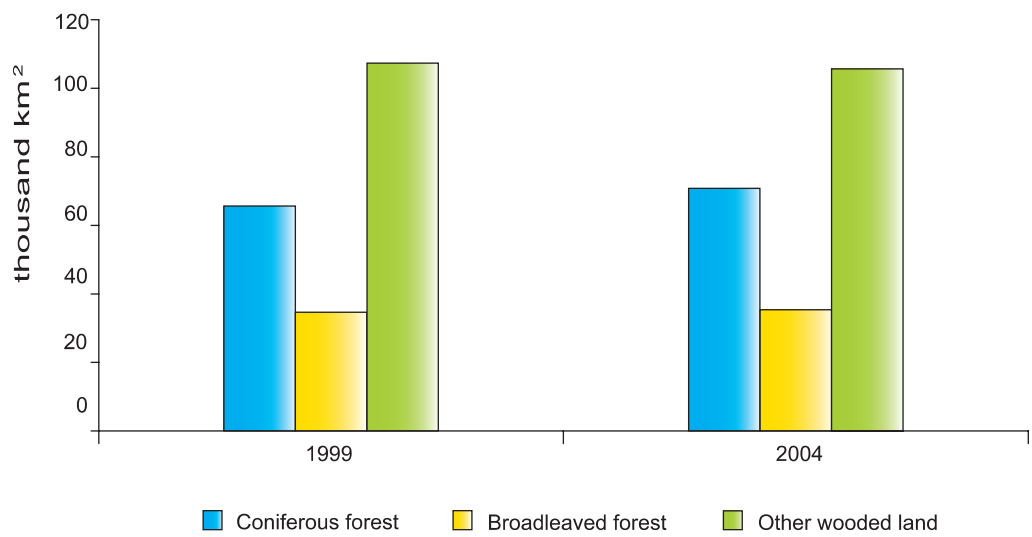


Table 3. Depletion and growth of forest resources in terms of volume

(thousand m³)

	2001	2002	2003	2004	2005
Felling total	8 204	9 520	9 067	9 977	10 060
Coniferous	6 166	7 661	6 966	7 600	7 650
Broadleaved	2 038	1 859	2 101	2 377	2 410
Gross increment total	..	..	..	36 282	..
Coniferous	..	..	..	23 400	..
Broadleaved	..	..	..	12 882	..
Net change	..	..	..	+ 26 305	..
Coniferous	..	..	..	+ 15 800	..
Broadleaved	..	..	..	+ 10 505	..

Source: Ministry of Environment and Forestry

Felling total volume of forest increased nearly 23% between 2001 and 2005. This increase mostly depends on the increase in coniferous forest volume. The sharpest increase was realized between 2001 and 2002.

The only study aiming to find the net change in the forest volume was carried out in 2004. The results of this study show that both coniferous and broadleaved forest volume increased making up a total net positive change of 26305 thousand m³.

Figure 4. Felling volume of forest resources

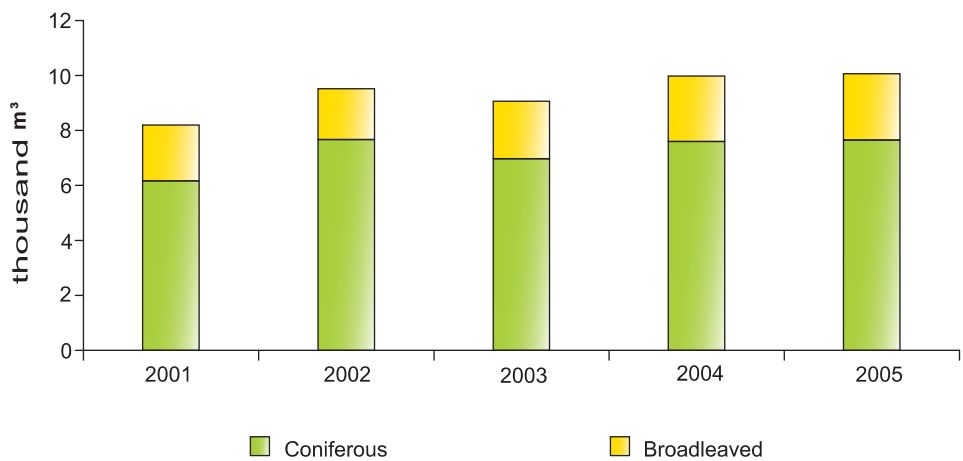


Table 4. Growing stock of standing volume of forest cover

(thousand m^3)

	1999	2004
Trees on forest total	1 366 361	1 288 125
Coniferous	906 435	869 622
Broadleaved	459 926	418 503

Source: Ministry of Environment and Forestry

In 1999, the total standing stock was approximately 1.37 billion m^3. Trees on forest total decreased nearly 6% between 1999 and 2004 and became 1.29 billion m^3.

Both coniferous and broadleaved forest covers decreased around 40 million m^3.

Figure 5. Trees on forest total 1999

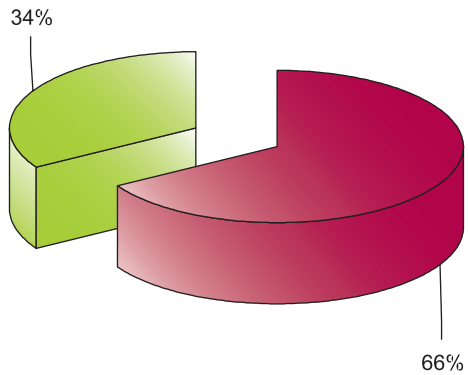
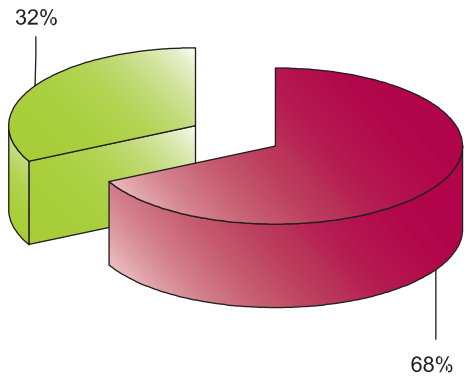


Figure 6. Trees on forest total 2004



BIODIVERSITY

BIODIVERSITY

"Biological diversity" means the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. "Biological resources" includes genetic resources, organisms or parts thereof, populations, or any other biotic component of ecosystems with actual or potential use or value for humanity (Convention on Biological Diversity).

Biodiversity usually comes to order whenever attention is needed on environmental issues, like;

- Healthy existance of the ecosystems
  As an example, the dissapearence of a species, can cause different effects such as the destruction of species in a way to make the ecosystem complete its own collapsion. This situation is based upon each species having a certain role in the ecosystem and them having contact with other species.
- Healthy existance of the mankind
  It is really important for the people to get to know nature, as it teaches us different values. Taking a walk in the forest, smeeling flowers and breathing the clean air is a pleasure. Having a look at the matter in a more specified way, the food and drugs obtained from the nature can be based on biodiversity.

Flora and Fauna

The data about the biological diversity of plant and animal populations in Turkey are obtained in cooperation with The Scientific and Technological Research Council of Turkey (TUBITAK). TUBITAK has prepared The Database of Taxonomic Species in Turkey by gathering the data from TUBITAK's previous researches and from the work of outside researchers.

The database is continuously being updated and the coordination process is carried out by TUBITAK. The researchers that contribute the database have a full access to the system in order to change and manage their own data.

The changes that are made by researchers are saved on a Working Copy of the database. After the approval of the Working Copy by the Scientific Committee, it can be opened to public access as the "Presentation Copy". TUBITAK updates the Presentation Copy two times each year.

Within the cooperation between TUBITAK and TURKSTAT, TUBITAK has prepared a web interface in the format of OECD/EUROSTAT joint questionnaires and provided online access to the database for TURKSTAT.

Table 5. Animal population statistics

	Total number of known and indigenous species
Mammals	126
Birds	510
Reptiles	75
Amphibians	21
Invertebrates	5 727
Insecta	5 395
Crustacea	239
Mollusca	93

Source: TUBITAK

According to IUCN categories, among 9153 vascular plant species, 670 species are listed as endangered, 162 species are listed as critically endangered, and 1149 species are classified as vulnerable. All of the abovementioned species are reported as indigenous species.

The data on animal and plant population statistics, which are given in Table 5 and Table 6, were obtained from Database of Taxonomic Species in Turkey on 31.12.2005. It can be seen that all the species that are covered in this database are indigenous.

Among 510 bird species given in the database, 1 of them is classified as vulnerable. In addition to that, out of 21 amphibians, 1 specie is listed as endangered.

Table 6. Plant population statistics

	Total number of known and indigenous species
Vascular Plants	9 153
Non-vascular Plants	2 103
Mosses	2
Lichens	1 082
Algea	1 019

Source: TUBITAK

Protected Areas

Table 7. Number of terrestrial protected areas according to the IUCN categories, 2000-2005

(Number)

	2000	2001	2002	2003	2004	2005
Cat.I Strict nature reserve	34	34	34	34	34	34
Cat.II National park	33	33	33	33	35	36
Cat.III Natural monument	59	60	89	102	102	102
Cat.IV Protected landscape-seascape	16	16	17	17	17	17

Source: Ministry of Environment and Forestry

Table 8. Terrestrial protected areas according to the IUCN categories, 2000-2005

(ha)

	2000	2001	2002	2003	2004	2005
Cat.I Strict nature reserve	81 861	81 861	81 861	81 861	81 861	81 861
Cat.II National park	691 722	691 722	691 722	691 722	802 082	808 172
Cat.III Natural monument	344	462	465	5287	5 287	5 287
Cat.IV Protected landscape-seascape	69 137	69 137	69 505	69 505	69 505	69 505

Source: Ministry of Environment and Forestry

According to the IUCN categories, in 2005 there were 34 strict nature reserve areas (Cat.I) covering 82 thousand hectares, 36 national parks (Cat.II) covering 808 thousand hectares, 102 natural monument sites (Cat.III) covering 5 thousand hectares and 17 protected landscape-seascape areas (Cat.IV) covering 69.5 hectares.

AIR POLLUTION

AIR EMISSIONS

Greenhouse gas emissions of direct and indirect gases from fuel combustion and industrial processes have a great impact on global warming. Climate change is a potentially major threat to the world's environment and economic development. Human activities have substantially increased atmospheric concentrations of greenhouse gases. Turkey ratified the United Nations Framework Convention on Climate Change (UNFCCC) aimed to achieve stabilization of greenhouse gases on 24th May 2004. Under the UNFCCC, national emission inventories - which cover greenhouse gas emissions by source - are requested from the parties of the Convention. Turkey has been a signatory of the Convention.

Turkish Statistical Institute has been preparing the emission inventory for Turkey since 1997. Air emission calculations of years 1970-2004 are available in TURKSTAT. In 2002, the Coordination Committee of Climate Change has been constituted under the circular of the Prime Ministry in order to coordinate the studies on climate change in the framework of UNFCCC and Kyoto Protocol. Technical Working Commission formed in the Coordination Committee of Climate Change has constituted sub-working groups. Turkish Statistical Institute has been determined as the coordinating organisation for the Greenhouse Gas Emission Inventory Sub-working Group. In the extent of these studies greenhouse gas emissions (CO_2, CH_4, N_2O, CO, NMVOC, NO_X) and SO_2 have been calculated.

Air Emissions

Greenhouse gases were estimated by using Tier 1 approach of Intergovernmental Panel on Climate Change (IPCC) Guidelines. Direct greenhouse gases, indirect greenhouse gases and sources of greenhouse gases are defined in this methodology. IPCC Methodology gives more than one method to estimate emissions. First method called Tier 1 is the simplest method and gives rough estimations. The other methods (Tier 2 and Tier 3) need more detailed data in order to estimate emissions. The applicability of these methods depends on the availability of data.

Besides the main six greenhouse gases, SO_2 and PM were also estimated. SO_2 and PM emissions were calculated by using IPCC and CORINAIR methodologies in industrial processes. However, SO_2 and PM emissions generated from thermal power plants have been estimated by using national emission factors.

Table 9. Primary energy supply by fuel type

(Mtoe)

	2000	2001	2002	2003	2004
Solid fuel	24.09	19.91	21.02	22.51	23.77
Hard coal	9.93	7.01	8.84	11.20	12.33
Lignite	12.52	11.43	10.44	9.47	9.45
Asphalt	0.00	0.01	0.00	0.14	0.31
Petroleum coke	1.17	1.02	1.34	1.32	1.44
Secondary coal	0.47	0.44	0.40	0.38	0.24
Liquid fuel	32.30	30.94	30.93	31.81	32.92
Petroleum	32.30	30.94	30.93	31.81	32.92
Gas fuel	13.73	14.87	16.10	19.45	20.43
Natural gas	13.73	14.87	16.10	19.45	20.43
Other	10.39	9.69	10.28	10.05	10.71
Nuclear	-	-	-	-	-
Renewable	10.10	9.33	10.01	10.00	10.77
Electricity trade	0.29	0.36	0.27	0.05	-0.06
Total Primary Energy Supply	80.51	75.41	78.33	83.82	87.83

Source: Ministry of Energy and Natural Resources

Figure 7. Primary energy supply, 2000

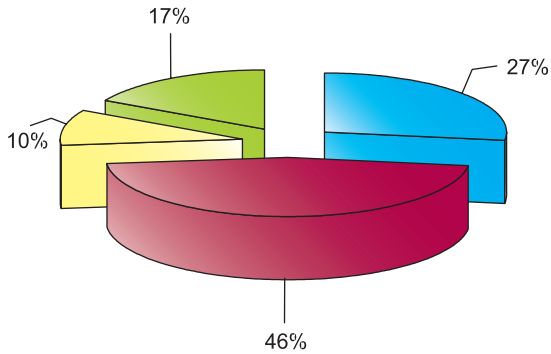
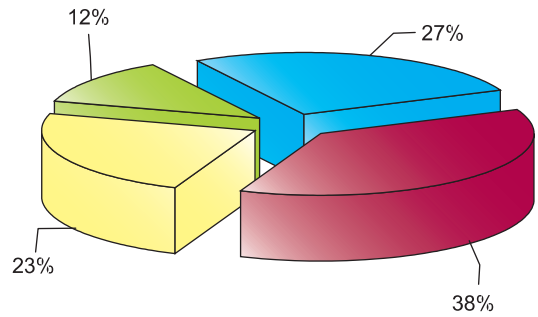


Figure 8. Primary energy supply, 2004

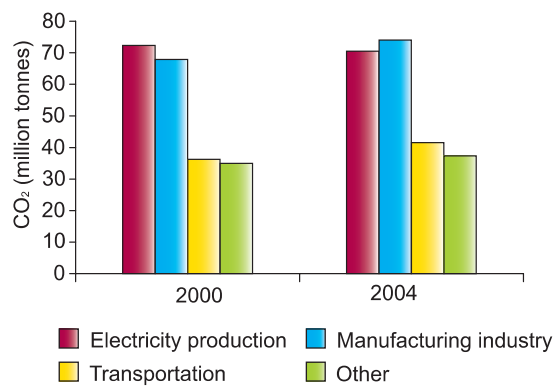


IPCC (Intergovernmental Panel on Climate Change) Guidelines define carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) as direct greenhouse gases and nitrogen oxides (NO_X), carbon monoxide (CO) and non-methane volatile organic compounds (NMVOC) as indirect greenhouse gases. Sulphur dioxide (SO_2) is not a "greenhouse gas" but its presence in the atmosphere may influence climate.

In Turkey CO_2 emissions from fuel consumption have increased rapidly from 1970 to 2000 due to higher energy demand. In the future CO_2 emission values are expected to increase, as Turkey is a rapidly developing, industrializing and urbanizing country. The aims are to complete the infrastructure to develop the potential of the industrial sector to compete with the EU countries, to create an informative society and to set up development objectives through the integration with the developed countries. These targets bring together a rapid increase in the electrical energy demand as well. Total primary energy supply in Turkey increased from 80.51 million toes to 87.83 million toes between 2000 and 2004.

The shares of direct greenhouse gases (CO_2, CH_4 and N_2O) from fuel consumption in total man made emissions were 92.6%, 6.8% and 18.3%, respectively in 2000 and 92.2%, 6.3% and 19.3% in 2004. The shares of sectors in fuel consumption have also changed: while in 2000, 34.6% of CO_2 emissions were generated by electricity production. 31.2% by manufacturing industry. 17.3% by transportation and 16.8% by other (residential, agriculture, etc.), in 2004 31.6% were generated by electricity production, 33.1% by manufacturing industry. 18.6% by transportation and 16.7% by other sectors. When CO_2 data for 2000 and 2004 are compared, it is observed that whereas share of electricity production has decreased, shares of transportation, manufacturing industry and other sectors have increased.

Figure 9. CO_2 emissions from fuel consumption by sectors



In 2000, the shares of sectors for CH_4 emissions were: 43.2% from agriculture, 6.8% from fuel consumption, 22.9% from landfills, 27.0% from coal mining and 0.1% from industrial processes. In 2004 these portions have changed to 39.6% of CH_4 emissions generated by agriculture, 29.6% by landfills, 24.4% by coal mining, 6.3% by fuel consumption and 0.1% by industrial processes.

Table 10. Air emissions by sectors, 2000

(1000 tonnes)

	SO_2	CH_4	NO_x	N_2O	Particulate Matter	NMVOC	CO	CO_2
Total Mobile Sources	61.78	4.46	305.37	0.32	..	294.01	1 545.52	36 230.72
Fuel consumption from transportation	61.78	4.46	305.37	0.32	..	294.01	1 545.52	36 230.72
Total Stationary Sources	2 313.47	1 765.29	639.11	17.19	147.60	676.28	2 236.54	188 832.03
Fuel consumption	2 256.16	115.90	605.27	2.88	146.18	219.46	1 739.36	172 080.46
Electricity production	1 398.99(1)	1.22	209.04	0.71	146.18(1)	4.63	17.76	72 091.53
Manufacturing industries	619.14	5.53	197.90	0.79	..	10.84	74.31	64 975.63
Other (residential. agriculture. etc.)	238.03	109.15	198.33	1.38	..	203.99	1 647.29	35 013.30
Industrial processes	57.31(2)	2.25	22.88	13.85	1.42	456.82(3)	13.37	16 751.57
Landfills	-	404.86(4)	-	-	-	-	-	-
Coal mining	-	477.58	-	-	-	-	-	-
Agriculture	-	764.70	10.96	0.46	-	-	483.81	-
Enteric fermentation and manure	-	730.09	-	..	-	-	-	-
Rice cultivation	-	11.60(5)	-	-	-	-	-	-
Open burning of agricultural residues	-	23.01	10.96	0.46	-	-	483.81	-
Total Man-Made Emissions	2 375.25	1 769.75	944.48	17.51	147.60	970.29	3 782.06	225 062.75

Source: Turkish Statistical Institute

(1) SO_2 and PM emissions from electricity production are estimated by Electricity Generation Co. Inc.

(2) SO_X emissions from glass production and refinery feedstock are included in this total

(3) VOC emissions from ammonia production are included in this total

(4) The value of 1998 is used for 2000 due to lack of data

(5) IPCC 1996 Revised Guideline is used for calculation

Table 11. Air emissions by sectors, 2004

(1000 tonnes)

	SO_2	CH_4	NO_x	N_2O	Particulate Matter	NMVOC	CO	CO_2
Total Mobile Sources	79.45	4.26	365.42	0.40	..	265.14	1 381.89	41 552.85
Fuel consumption from transportation	79.45	4.26	365.42	0.40	..	265.14	1 381.89	41 552.85
Total Stationary Sources	1 476.04	1 813.40	663.06	15.64	109.29	691.77	2 112.77	200 698.95
Fuel consumption	1 427.59	109.89	631.24	2.70	108.11	202.27	1 595.28	181 824.62
Electricity production	764.72(1)	1.18	203.92	0.62	108.11(1)	4.81	18.69	70 498.25
Manufacturing industries	513.01	6.30	223.64	0.85	..	11.92	81.18	73 989.17
Other (residential. agriculture. etc.)	149.86	102.41	203.68	1.23	..	185.54	1 495.41	37 337.20
Industrial processes	48.45(2)	2.46	20.40	12.46	1.18	489.50(3)	15.64	18 874.33
Landfills	-	538.27	-	-	-	-	-	-
Coal mining	-	443.68(4)	-	-	-	-	-	-
Agriculture	-	719.10	11.42	0.48	-	-	501.85	-
Enteric fermentation and manure	-	681.23	-	..	-	-	-	-
Rice cultivation	-	14.00(5)	-	-	-	-	-	-
Open burning of agricultural residues	-	23.87	11.42	0.48	-	-	501.85	-
Total Man-Made Emissions	1 555.49	1 817.66	1 028.48	16.04	109.29	956.91	3 494.66	242 251.80

Source: Turkish Statistical Institute

(1) SO_2 and PM emissions from electricity production have been estimated by Electricity Generation Co. Inc.

(2) SO_x emissions from glass production and refinery feedstock have been included in this total.

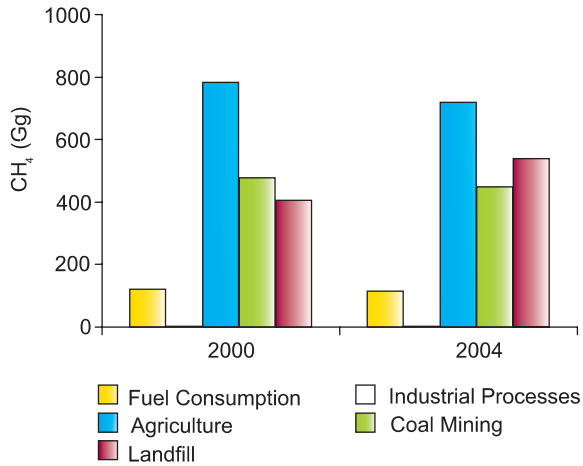
(3) VOC emissions from ammonia production have been included in this total.

(4) The value of 2001 have been used for 2004 due to lack of data

(5) IPCC 1996 Revised Guideline have been used for calculation

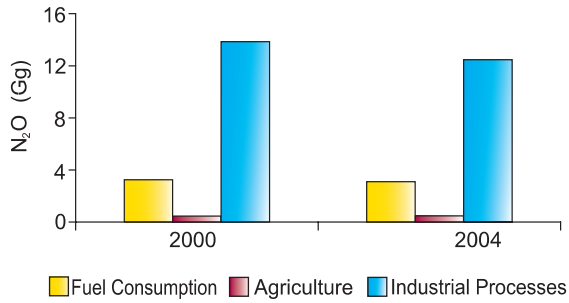
The shares of CH_4 emissions from landfills and industrial processes increased gradually. Actually the reason of the increase in CH_4 emissions from landfills can be explained by the increase in the number and capacity of landfills.

Figure 10. CH_4 emissions by sectors



When N_2O emissions are evaluated, it is observed that 79.1% of N_2O emissions were generated by industrial processes, 18.3% by fuel consumption and 2.6% by agriculture in 2000. In 2004 the portions have changed to 77.7% of N_2O emissions generated by industrial processes, 19.3% by fuel consumption and 3.0% by agriculture. It is observed that while the share of emissions from industrial processes showed a decrease, that of fuel consumption and agriculture slightly increased from 2000 to 2004.

Figure 11. N_2O emissions by sectors



The distributions of NO_x emissions by sectors were: 96.4% from fuel consumption, 2.4% from industrial processes and 1.2% from agriculture in 2000. These shares changed as 96.9% from fuel consumption, 2.0% from industrial processes and 1.1% from agriculture in 2004.

The calculations for NMVOC emissions by sectors in total NMVOC emissions show that 52.9% of NMVOC emissions are generated by fuel consumption and 47.1% by industrial processes in 2000 and 48.8% by fuel consumption and 51.2% by industrial processes in 2004.

The sector shares of CO emissions compared to total CO emissions between 2000 and 2004 have changed from 86.9% to 85.2% for fuel consumption, from 0.35% to 0.45% for industrial processes and from 12.8% to 14.4% for agriculture.

SO_2 emissions from thermal power plants, which are major part of total SO_2 emissions, have decreased from 1.4 million tones in 2000 to 0.8 million tones in 2004.

Between 2000 and 2004, SO_2 emissions decreased considerably. The main reason for this decrease is due to the decrease in the usage of lignite as fuel and the activation of "Flue Gas Desulfurization" units in thermal power plants. The total decrease in the lignite usage is about 40% according to the fuel consumption data of Electricity Generation Co. Inc.

AIR CONCENTRATION

In urban areas main air pollutants in the ambient air are; carbon monoxide (CO), ozone (O_3), nitrogen oxides (NO_x), sulphur dioxide (SO_2), particulate matter (PM) and lead (Pb). Besides these, poly-aromatic hydrocarbons (PAHs) and acid aerosols are considered as the important air pollutants. Air pollution problems depend on more factors than just the presence of air pollutants; these factors include the high amount of fuel burning of sources (industries, power plants, transportation vehicles, residents and other), applied control measures of emissions, the dispersion system, meteorological and terrestrial characteristics.

It is considered that mainly SO_2 and PM cause urban air pollution especially in winter season due to residential heating. In 2005, these two parameters have been measured in 123 measurement stations in 49 provincial and 9 district centers by the Ministry of Health.

Turkish Statistical Institute cooperates with the Ministry of Health on air pollution statistics since 1990. Daily measurement results collected from the stations for each month are sent to the Turkish Statistical Institute at the end of the following month. All data are evaluated and published in monthly, annual and winter season bulletins by Turkish Statistical Institute.

Air Concentration

SO_2 and PM have been measured in the stations in provincial and district centres by automatic, semi-automatic and manual measurement devices.

In bulletins there are some statistics as averages, minimum, maximum, number of measurements, rate of change, the number of days exceeding long term limit, short term limit and first warning level limit values.

There are some constraints for calculating rate of change for monthly, annual and winter season period. While calculating the rate of change for monthly period, measurement stations having at least 21 days measurement results are taken into account in order to provide comparability of data. For winter season bulletins measurement stations having at least 4 months (October-March) with 21 days measurement results are taken into account to calculate the rate of change from the previous period. Finally, in the annual bulletin, the rate of change from the previous year is calculated for measurement stations having at least 9 months with 21 days measurement results.

Table 12. Air quality standards

($\mu g/m^3$)

	Turkey		WHO	
	LTL	STL	LTL	STL
SO_2	150	400	50	125
Particulate matter	150	300	50	120

Source: Air Quality Control Regulation, 1986
World Health Organization (WHO) Air Quality Guidelines for Europe, 1987

Table 13. Annual average concentrations of pollutants in selected provinces

($\mu g/m^3$)

	Ankara		Bursa		Antalya	
	2000	2004	2000	2004	2000	2004
SO_2	47	30	62	95	49	38
Particulate matter	57	47	47	44	71	52

Source: Ministry of Health

From Table 12, it can be inferred that Turkish limits are higher than the limits of WHO.

The Table 13 shows air quality trends in terms of sulphur dioxide (SO_2) and particulate matter (PM) concentrations in three provinces, which were selected according the following criteria:

- A city in which a notable portion (5-10 percent) of the national population is concentrated (Ankara)
- An industrial city in which a significant number of inhabitants were considered to be exposed to the worst level of pollution (Bursa), and
- A city with dominant residential and service function and with intermediate level of pollutants (Antalya).

The two parameters, SO_2 and PM have been measured in some provincial and district centres since 1985. But it is important to establish measurement network for CO, O_3, NO_x and Pb monitoring in order to control air pollutants that affect atmospheric quality. According to Table 13, for the period 2000-2004, SO_2 concentrations in Ankara and Antalya provinces decreased by 36% and 22%, respectively. On the contrary, SO_2 concentration in Bursa increased by 53%. PM concentrations decreased in Ankara, Bursa and Antalya with the respective values of 18% 6% and 27%.

Figure 12. Annual SO_2 concentrations in selected provinces

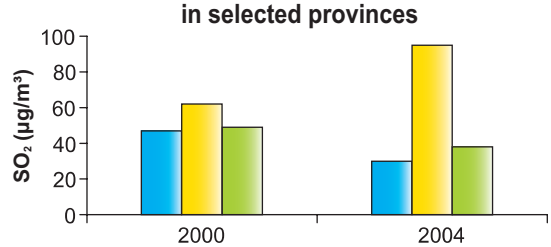
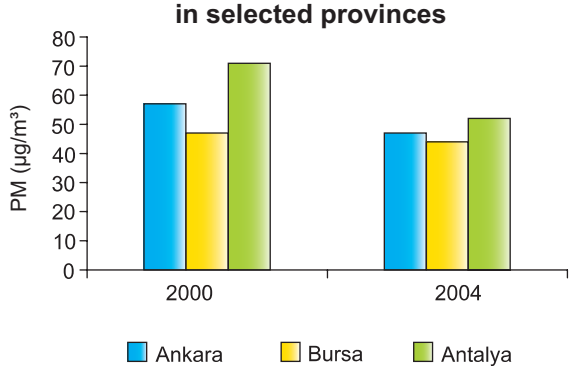


Figure 13. Annual PM concentrations in selected provinces



As shown in Table 14, the winter season SO_2 concentrations in Antalya between the period of 2000-2001 and 2004-2005 showed a decreasing trend. In additionally, the PM concentrations also showed a decreasing trend. The highest concentration was seen in 2000-2001 season with 84 µg/m³ in this province.

The winter season SO_2 concentration in Bursa showed an increasing trend. In 2004-2005 season, SO_2 concentration was 103 µg/m³. However, that in 2000-2001 season was only 66 µg/m³. The highest variation was observed in 2003 - 2004 winter with 57% increase according to previous winter season. The trend of PM concentration in this province changed considerably throughout the winter seasons. The second highest concentration with 70 µg/m³ was seen in 2001-2002 season and the increase according to previous year was expressively high with 59%.

Both trends of pollutants in Ankara showed slow decreases. The highest concentration for SO_2 was observed in 2002-2003 winter with value of 56 µg/m³. For PM concentrations of Ankara, the highest concentration was 82 µg/m³ in 2000-2001 season. The lowest ones were observed in 2004-2005 winter season with respective values of 38 and 64 µg/m³. There were no dramatic changes in winter season.

Table 14. Average concentrations of pollutants for winter season in selected provinces

(µg/m³)

		2000-2001	2001-2002	2002-2003	2003-2004	2004-2005
SO_2	Ankara	55	47	56	44	38
	Bursa	66	69	68	107	103
	Antalya	61	58	53	50	51
PM	Ankara	82	75	76	73	64
	Bursa	44	70	68	83	66
	Antalya	84	80	73	70	71

Source: Ministry of Health

Figure 14. Winter season SO_2 concentrations in selected provinces

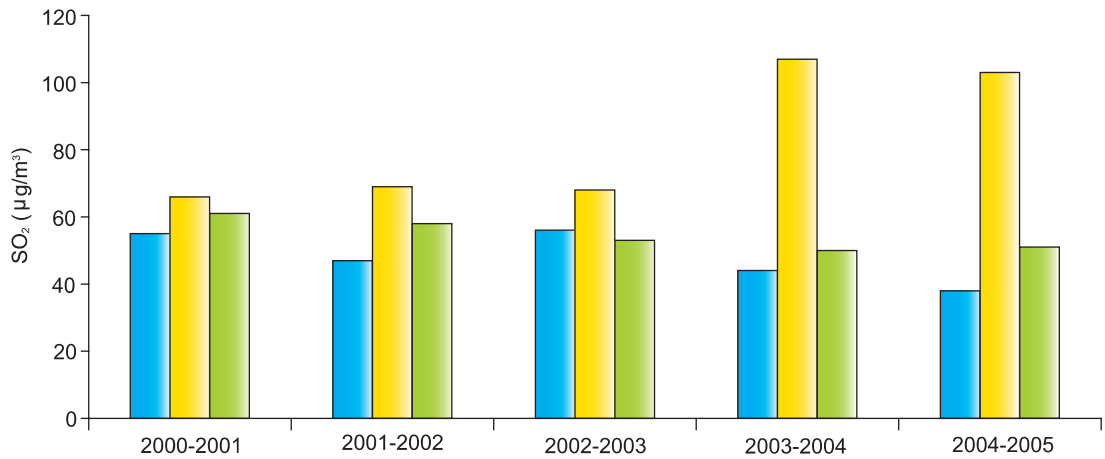
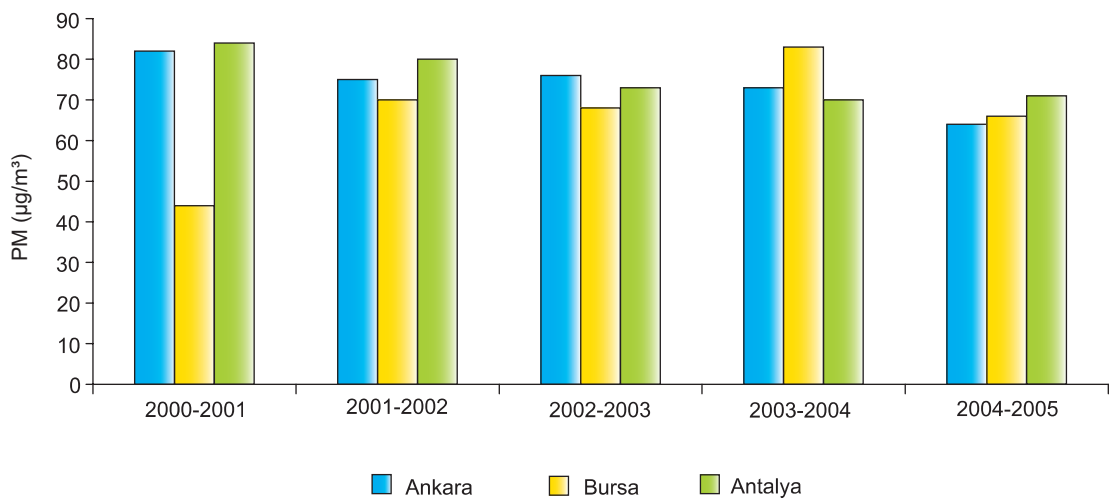


Figure 15. Winter season PM concentrations in selected provinces



STOCKS OF MOTOR VEHICLES

The transport sector is a growing part of the overall energy scene, because this sector is one of the main consumers of the energy resources being not renewable. The trade agreements of this sector on international cooperation involve the economy. Therefore, it has an important role in the economic growth. Similarly, transport is also implicated in a range of provincial environmental problems including atmospheric pollution, noise pollution and congestion.

The knowledge of the transport activity trends is the basis for both economic and environmental considerations. For this reason the Turkish Statistical Institute (TURKSTAT) collects annual statistical data on the number of motor vehicles and their miscellaneous characteristics entered in the traffic register. These data are, then, used for the determination of the economic and environmental level of this sector in Turkey.

Stocks of Motor Vehicles

In order to announce statistics of motor vehicles in a short period to the public after one of the copy of "The Application and Action Form of Vehicles for Traffic Registration" was taken from The General Directorate of Public Security, monthly data entrance was done in TURKSTAT. But, because of delays and non-arrivals of forms that come via post to TURKSTAT, periodical differences occur between the data of our institute and administrative data of The General Directorate of Public Security.

In recent years, because of the development in data processing sector, and starting data entrance of current form in The General Directorate of Public Security, it was put in the agenda that both two organisations waste their sources and time to transfer the same forms to magnetic environment. Moreover, because of doing data entrances in both TURKSTAT and The General Directorate of Public Security, there were some inconsistencies in the statistics of motor vehicles. After looking over these situations, in order to prevent job repetition, to save manpower and sources, and to provide consistent statistics, a study has begun. With this aim, in 15 April 2004, a protocol was signed between two associations to provide data transfer in electronic format.

TURKSTAT revised the statistics on the "Road construction and work machinery" which were published before, and prepared them newly according to 2918 numbered Law of Highway Traffic. According to this law, vehicles like work machinery used in agricultural sector were registered by Chamber of Agriculture and the other working machinery were registered by Chamber of Commerce and Industry, of which they are members, therefore they are not included The General Directorate of Public Security's database. So working machinery are covered both in the headline of "truck" and "special purpose vehicles".

Turkish Statistical Institute evaluates those data and publishes the statistics in monthly press bulletins.

Table 15. Trends in the stocks of motor vehicles

	2000	2004
Total	8 320 449	10 236 357
Car (1)	4 422 180	5 400 440
Minibus	235 885	318 954
Bus	118 454	152 712
Small truck (1)	794 459	1 259 867
Truck	394 283	647 420
Motorcycle	1 011 284	1 218 677
Tractor	1 159 070	1 210 283
Others	184 834	28 004

Source: Turkish Statistical Institute
(1) Land vehicle is included.

Table 16. Number of road motor vehicles by fuel type (1)

	2000	2001	2002	2003	2004
Total	5 965 261	6 123 158	6 236 343	6 447 728	7 779 393
Gasoline	4 867 148	4 981 422	5 044 259	5 130 400	4 366 622
Diesel	1 098 113	1 141 736	1 192 084	1 317 328	2 198 490
LPG	- (2)	- (2)	- (2)	- (2)	818 127
Unknown	- (2)	- (2)	- (2)	- (2)	396 154

Source: Turkish Statistical Institute
(1) Motorcycles, special purpose vehicles, road construction and work machinery, and trucks are excluded.
(2) Data are not collected.

The number of all types of motor vehicles has increased from 2000 to 2004. Especially number of passenger cars increased as 22% from 2000 to 2004. This situation indicates increase of ownership of automobiles by the years. As can be seen from Table 15 while the numbers of passenger cars, minibuses, buses, small trucks, trucks and motorcycles increased, the number of others (special purpose vehicles, road construction and work machinery) decreased between 2000 and 2004.

As it is shown in Table 16, the percentage of gasoline fueled road motor vehicles decreased by 10% from 2000 to 2004, the percentage of diesel fueled vehicles increased by almost 100%.

Transportation related activities could reduce environmental quality and have worst effect on human health. Motor vehicle emissions are a significant source of urban air pollution. CO_2 emissions from the combustion of fossil fuels by vehicles are increasing the concentration of greenhouse gases, which alter the earth's climate. For instance CO_2 emissions from transportation that constitute an important part of total emissions generated from fuel consumption have been increased by years. (See "Emissions", Tables 10 & 11).

At present in Turkey road motor vehicles by province, horsepower, tire dimension, trademark, use and carrying capacity are collected. As there is no information about the number of vehicles by fuel and vehicle type, emission by road transport is estimated roughly by using total fuel consumption.

Figure 16. Road motor vehicles

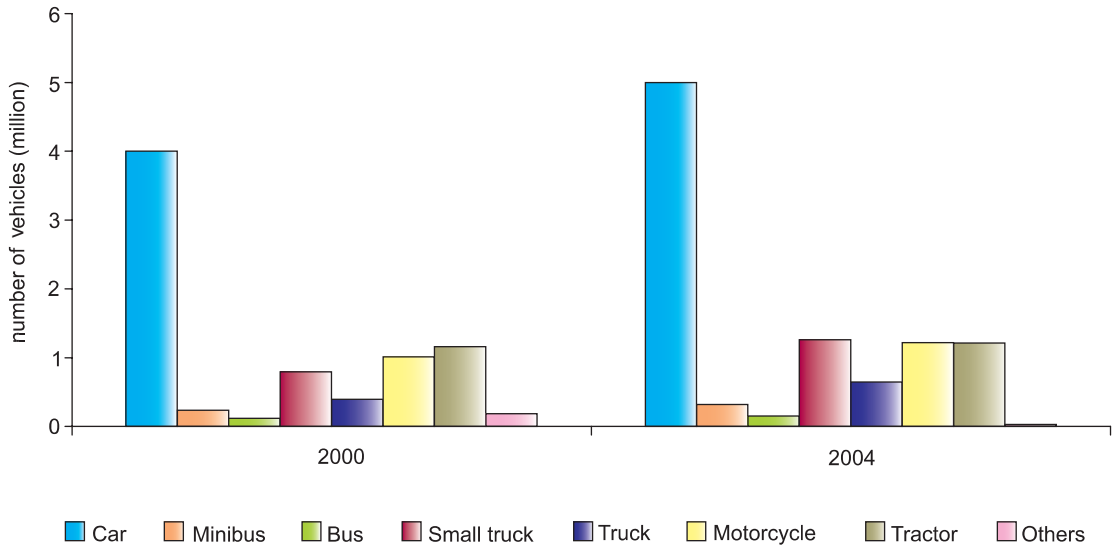
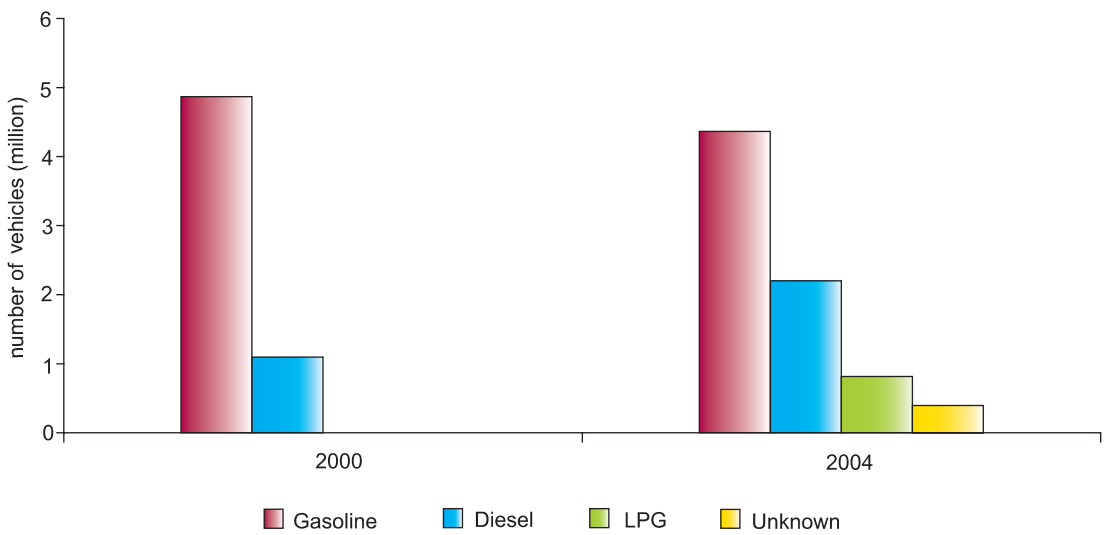


Figure 17. Kind of fuel used in road motor vehicles



WATER

WATER SUPPLY AND TREATMENT BY SECTORS

Water supply is the sum of the water provided to final users through a network and the direct withdrawals of the users for their final use. In other words water supply refers to the water provided to different sectors. As a result of socio-economic development and increase in life standards, demand for water resources is increasing. For that reason, investments on water supply systems and efficiency of these systems are becoming important since most of the water is being lost between the point of abstraction and final use.

Water resources have different kinds of uses (domestic, industrial, agricultural, electricity production etc.) and user types (household, farmers, industrial establishments etc.), so its management is under the responsibility of different institutions.

Water Pollution Control Regulation enacted by the Ministry of Environment and Forestry has been the only tool that defines principles for the prevention of surface and groundwater resources from pollution since 1988. Water Pollution Control Regulation sets discharge standards of domestic and industrial wastewaters and defines water quality classes of inland waters and protection area of water resources. In addition to this regulation, as a result of a great progress in environmental legislation, Turkey has enacted three new regulations since 2004. Regulation on the Protection of Waters Against Pollution by Nitrates from Agricultural Sources was enacted in 2004 by Ministry of Agricultural and Rural Affairs and Ministry of Environment and Forestry, Regulation on the Quality of Surface Water Intended for the Abstraction of Drinking Water was enacted by Ministry of Environment and Forestry in 2005, and Regulation on the Quality of Water Intended for Human Consumption was enacted by Ministry of Health in 2005.

Water Supply and Treatment by Sectors

The statistics on water by sectors are based on mainly two different studies in Turkey.

1. Public Water Supply

Within the scope of the environmental responsibilities of municipalities, water supply and distribution, wastewater collection and discharge, and solid waste collection, transportation and disposal activities cover an important part. The Turkish Statistical Institute, being aware of these responsibilities, has been performing a survey annually since 1994 with 4 different questionnaires covering previous topics as well as environmental expenditures and employment. Drinking water questionnaire covers all the drinking water services given by or on behalf of the municipalities. The data includes the responsible authority, the rate of population served by drinking water networks and water treatment plants, amount of water abstracted to drinking water networks by type of resources, status of drinking water treatment plants, etc.

The results of the survey cover all municipalities between 1994 and 2003. In 2004, the methodology has changed and a threshold analysis was performed. Instead of all municipalities, the municipalities constituting 95% of total amount of municipal solid waste, drinking water, and wastewater in 2003, were determined to be included in 2004 survey.

2. Industrial Water Supply

Industrial water statistics are produced by two different surveys, which are performed annually to manufacturing industry establishments and thermal power plants. Data on water, wastewater, waste, and environmental employment and expenditures are collected.

Within the scope of the thermal power plants statistics, all thermal power plants have been investigated annually since 1992 and auto producers which produce 100 MW or more power have also been covered since 2002 in cooperation with Electricity Generation Corporation Inc. Data on water abstraction, use, and treatment of all thermal power plants are collected by this survey.

Within the scope of manufacturing industry statistics, manufacturing industry establishments having more than 25 employees and representing 88.33% of total production and 75.60% of total employment have been investigated since 1991. Data on the amount of water supplied by sources and water consumed by industry group have been collected. However, in the manufacturing industry survey of 2004, the data from all the establishments in public sector and large-scale establishments in private sector, which represent approximately 80% of the value added data of the private sector establishments with 10 or more employees, were collected.

Table 17. Sectoral water abstraction by resources, 2004

(thousand m³/year)

	Total	Municipal	Manufacturing industry	Energy production
Total	8 537 775	4 732 938	1 223 609	2 581 218
Spring	1 714 593	1 237 440	6 670	470 483
River	214 776	139 200	68 275	7 301
Lake and artificial lake	109 968	85 977	23 991	-
Dam	2 115 457	1 986 977	86 457	42 023
Well	1 558 208	1 283 344	267 201	7 663
Sea	2 706 396	-	656 452	2 049 944
Others	118 367	-	114 563	3 804

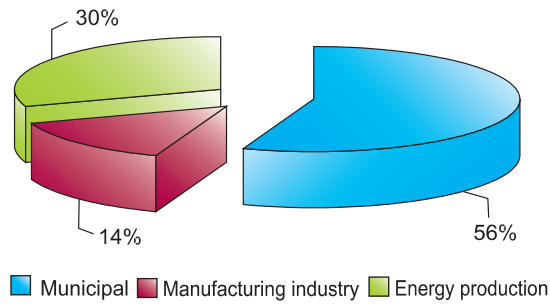
Source: Turkish Statistical Institute

The results of the municipal water survey show that, in 2004, 4.73 billion m³ of water was abstracted by municipalities in order to be distributed by network systems. Of this amount, 42% was abstracted from dams, 27% from wells, 26% from springs, 3% from rivers, and 2% from lakes and artificial lakes.

In 2004, the major water sources for manufacturing industry were sea (54%) and wells (22%), while they were sea (80%) and springs (18%) for energy production facilities.

A total amount of 8.54 billion m³ of water was abstracted by municipalities, manufacturing industry, and energy production facilities in 2004. 56% of the total amount was used by municipalities whereas, 14% was used by manufacturing industry and 30% was used by energy production facilities.

Figure 18. Water abstraction by sectors, 2004



Considering the total abstraction by resources, the major water source was sea having a share of 32%. It was followed by dams, springs, and wells with a share of 25%, 20%, and 18%, respectively. Rivers, lakes and artificial lakes, and other resources supplied only 5% of the total demand.

Figure 19. Water abstraction by resources, 2004

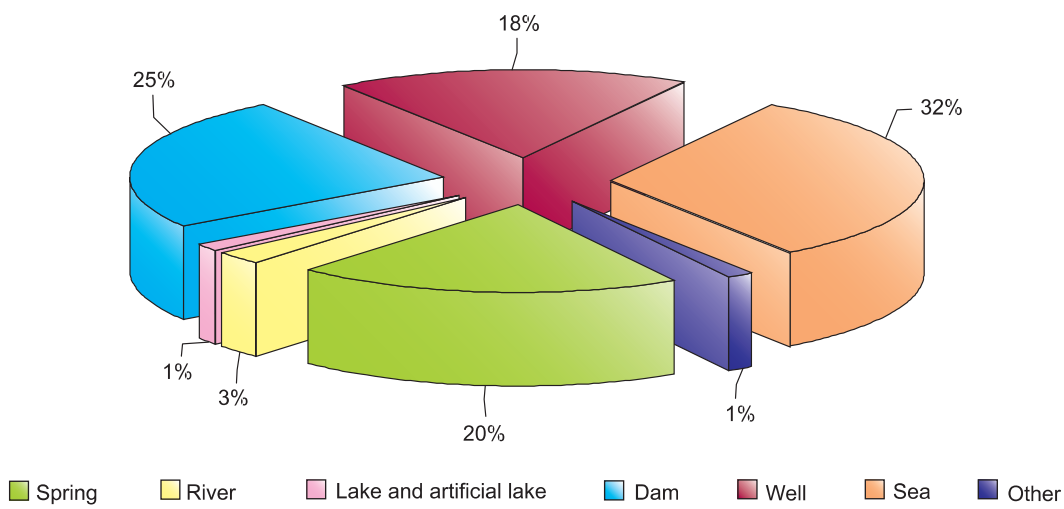


Table 18.Amount of water abstracted to municipal drinking water networks by type of resources,2004

NUTS1 levels (1)	Total amount of water abstracted (1000 m³/year)	Ground water (1000 m³/year)	Surface water (1000 m³/year)	Water consumption (liters/capita-day)
TR-TURKEY	4 732 938	2 520 784	2 212 154	260
TR1-İstanbul	735 699	20 282	715 417	204
TR2-West Marmara	166 517	114 313	52 204	246
TR3-Aegean	680 610	563 192	117 418	288
TR4-East Marmara	451 441	135 629	315 812	277
TR5-West Anatolia	517 447	175 059	342 388	269
TR6-Mediterranean	699 002	438 289	260 713	285
TR7-Central Anatolia	275 579	236 644	38 935	268
TR8-West Black Sea	285 704	198 281	87 423	295
TR9-East Black Sea	152 349	73 808	78 541	253
TRA-North East Anatolia	123 813	123 813	-	250
TRB-Central East Anatolia	242 560	237 653	4 907	302
TRC-South East Anatolia	402 217	203 821	198 396	245

Source: Turkish Statistical Institute
(1) See Glossary for the definition.

Table 18 shows that, of the total amount abstracted to be distributed by the municipal network systems, 53% was drawn from ground waters where the rest was from surface waters (47%). According to NUTS1 levels, surface water abstraction was more than ground water abstraction in TR1, TR4 and TR5 regions in 2004.

Average amount of water consumption per capita was calculated to be 260 liters/day in 2004.

According to Table 19, 1223 million m³ of water was supplied in 2004 by manufacturing industry. 54% of this amount was supplied from seas, 22% from wells, 7% from dams, 6% from rivers, 5% from other sources, 4% from city network, 2% was supplied from lakes.

Basic metal industry, food and beverages industry, textile industry, chemicals and chemical products industry were supplied 62%, 11%, 8% and 7% of the total amount of water supplied respectively in 2004.

Figure 20. Amount of water supplied by sources in manufacturing industry, 2004

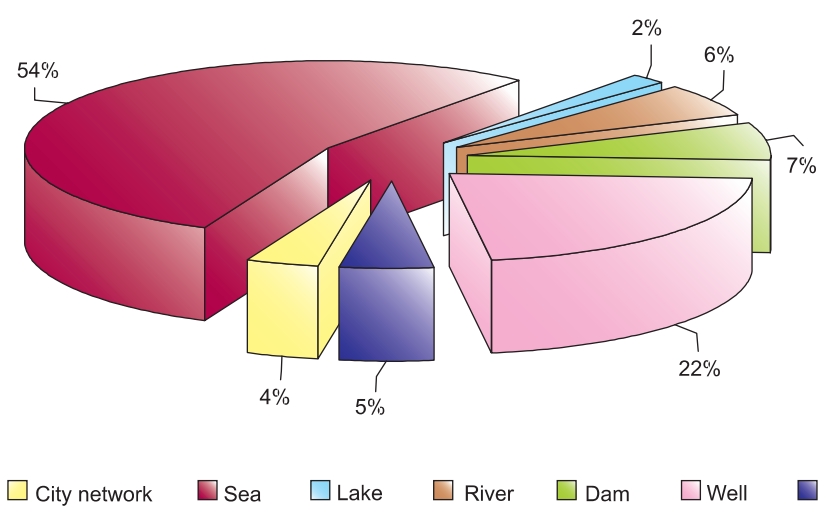


Table 19. Amount of water supplied by sources and industry group in manufacturing industry, 2004

(thousand m³/year)

Industry group (NACE Rev. 1.1)[1]	**Total**	City network	Spring	Sea	Lake	River	Dam	Well	Tanker	Other [2]
Total	1 223 609	50 325	6 670	656 452	23 991	68 275	86 457	267 201	14 941	49 296
Manufacture of food and beverages (15)	132 920	7 409	3 138	278	1 955	20 546	1 608	93 904	590	3 492
Manufacture of tobacco products(16)	2 940	493	109	12	-	-	-	2 173	2	152
Manufacture of textiles (17)	93 567	6 265	294	-	-	300	478	65 687	4 689	15 854
Manufacture of wearing apparel (18)	19 552	3 918	682	-	-	30	-	9 746	1 842	3 334
Manufacture of leather and footwear (19)	1 658	107	19	-	7	-	-	679	265	581
Manufacture of wood products and cork (20)	2 258	206	28	-	-	328	-	950	388	358
Manufacture of paper and paper products (21)	17 986	301	69	-	-	-	-	17 046	97	475
Printing and Publishing (22)	1 212	779	-	-	-	15	-	200	164	55
Manufacture of coke, refined petroleum (23)	23 304	265	19	-	8 538	-	13 139	1 253	82	6
Manufacture of chemicals and chemical products (24)	88 303	2 457	30	13 170	13 478	544	26 858	13 139	1 251	17 376
Manufac. of rubber and plastics products.(25)	6 625	901	17	-	-	-	79	3 060	1 562	1 008
Manufacture of non-metallic products (26)	34 318	1 680	1 743	-	2	1 162	-	26 624	876	2 231
Manufacture of basic metals (27)	755 003	5 459	209	642 992	-	44 751	44 295	16 628	235	434
Manufacture of fabricated metal products (28)	3 888	1 048	111	-	-	-	-	1 104	162	1 462
Manufacture of machinery and equipment nec (29)	23 800	14 019	6	-	-	600	-	8 417	75	683
Manufacture of office,account. and compu. mach.(30)	33	-	-	-	-	-	-	-	-	33
Manufacture of electrical machinery nec (31)	2 744	746	56	-	10	-	-	1 408	172	352
Manufacture of radio,TV,communication equipm.(32)	2 029	368	-	-	-	-	-	1 430	22	208
Manufacture of medical and optical instruments (33)	168	35	1	-	-	-	-	50	30	52
Manufacture of motor vehicles and trailers (34)	5 401	1 600	15	-	-	-	-	3 123	296	366
Manufacture of other transport equipment (35)	1 731	1 233	-	-	-	-	-	291	145	61
Manufacture of furniture;manufacturing nec (36)	4 168	1 035	124	-	-	-	-	289	1 997	723

Source: Turkish Statistical Institute
(1) See glossary for the definition.
(2) Includes organized industrial regions network and irrigation network of State Planning Organization.

Table 20. Population connected to municipal drinking water networks and treatment plants

(%)

	2001	2002	2003	2004
Drinking water network	95	97	97	93
Public drinking water treatment plants	35	34	38	42

Source: Turkish Statistical Institute

When the rate of population served by drinking water network in total municipal population was considered annually, it can be seen that there was a decrease in 2004. The reason for this decrease was the change in the scope of the survey.

There was a considerable increase in population connected to public drinking water treatment plants after 2002. In 2002 only 34% of population was connected to public drinking water treatment plants, but in 2004, although the scope of the survey became narrower, this ratio increased to 42%.

Table 21. Amount of water treated in public drinking water treatment plants

(million m^3)

	2001	2002	2003	2004
Total	1 668	1 712	1 894	2 080
Physical	35	44	103	99
Conventional	1 633	1 668	1 791	1 981

Source: Turkish Statistical Institute

There was a considerable increase in water treatment by public drinking water treatment plants after 2001. In 2001 only 1668 million m^3 of water was treated, where in 2004 this amount increased by 25%. Although physical treatment methods found themselves a field of application, most of the water was treated by conventional treatment methods.

Table 22. Status of municipal drinking water treatment plants, 2004(1)

(thousand m^3/year)

NUTS1 Levels	Number of plants	Capacity	Amount of water treated
TR TURKEY	131	3 701 813	2 079 580
TR1-İstanbul	25	1 252 474	721 237
TR2-West Marmara	17	187 132	53 115
TR3-Aegean	10	311 519	108 081
TR4-East Marmara	15	593 219	312 552
TR5-West Anatolia	11	500 836	338 531
TR6-Mediterranean	3	220 840	206 290
TR7-Central Anatolia	3	88 809	33 593
TR8-West Black Sea	17	148 173	98 489
TR9-East Black Sea	23	128 827	65 747
TRA-North East Anatolia	1	9 461	-
TRB-Central East Anatolia	1	946	473
TRC-South East Anatolia	5	259 577	141 472

Source: Turkish Statistical Institute
(1) Capacities of water treatment plants which are not operated are also included.

TR-1 Istanbul region has the highest number of treatment plants with a value of 25, which accounts for 19% of the total number of water treatment plants owned by municipalities. TR-1 Istanbul region is followed by TR-9 East Black Sea region with 23 treatment plants making up the 18% of the total number.

The highest water treatment rates were realized in TR-1 Istanbul region with an annual value of 721 million m^3. This amount constituted the 35% of the total amount of water treated by the municipalities.

WASTEWATER

WASTEWATER

Wastewater is the used water that contains physical, chemical and bacteriological pollutants and is discharged into sewage system or directly to the natural environment. Wastewater originating from different sectors is the major source of pollution for the water sources in Turkey.

The Water Pollution Control Regulation enacted in 1988 by the Ministry of Environment and Forestry has been the only tool that defines principles for the prevention of surface and groundwater resources from pollution until 1993. This regulation sets discharge standards of domestic and industrial wastewaters and defines water quality classes of inland waters and protection area of water resources. In addition to this, Environmental Impact Assessment Regulation promulgated in 1993 helped to increase awareness for discharges of wastewater after treatment. Moreover, Regulation on the Control of Pollution Caused by Certain Dangerous Substances Discharged into the Aquatic Environment was enacted in 2005 and Regulation on the Urban Wastewater Treatment was enacted in 2006 by the Ministry of Environment and Forestry.

Municipalities are the only agencies responsible for the collection and disposal of sewerage in urban areas. These services are given by water and sewerage administrations in metropolitan municipalities. Industrial establishments, which discharge their wastewaters directly into receiving bodies, are inspected by the Ministry of Environment and Forestry.

Wastewater Treatment and Discharge by Sectors

The statistics on wastewater by sectors are based on mainly two different studies in Turkey.

1. Public Wastewater

In the scope of the responsibilities of municipalities, water supply and distribution, wastewater collection and discharge, and solid waste collection, transportation and disposal activities cover an important part. The Turkish Statistical Institute, being aware of these responsibilities, has been performing a survey annually since 1994 with 4 different questionnaires covering previous topics as well as environmental expenditures and employment. Wastewater questionnaire covers all the wastewater services given by or on behalf of the municipalities. The data includes the responsible authority, the rate of population served by sewerage systems and wastewater treatment plants, amount of wastewater discharged from sewerage by type of receiving bodies and status of wastewater treatment plants, etc.

The results of the survey cover all municipalities between 1994 and 2003. In 2004, the methodology has changed and a threshold analysis was performed. Instead of all municipalities, the municipalities constituting 95% of total amount of municipal solid waste, drinking water, and wastewater in 2003, were determined to be included in 2004 survey.

2. Industrial Wastewater

Industrial wastewater statistics are produced by two different surveys, which are performed annually to manufacturing industry establishments and thermal power plants. Data on water, wastewater, waste, and environmental employment and expenditures are collected.

Within the scope of the thermal power plants statistics, all thermal power plants have been investigated annually since 1992 and auto producers which produce 100 MW or more power have also been covered since 2002 in cooperation with Electricity Generation Corporation Inc. Wastewater discharge by type of receiving bodies and wastewater treatment of all thermal power plants are investigated within this survey.

Within the scope of manufacturing industry statistics, manufacturing industry establishments having more than 25 employees and representing 88.33% of total production and 75.60% of total employment have been investigated since 1991. Data on the amount of wastewater discharged by type of receiving bodies, wastewater treatment, and amount of treatment sludge by disposal methods by industry group have been collected. However, in the manufacturing industry survey of 2004, the data from all the establishments in public sector and large-scale establishments in private sector, which represent approximately 80% of the value added data of the private sector establishments with 10 or more employees, were collected.

Table 23. Sectoral wastewater discharge according to receiving bodies, 2004

(million m³)

Receiving Body	**Total**	Municipal	Manufacturing industry	Energy production
Total	5 881	2 770	638	2 473
Sea	3 386	1 087	372	1 927
Lake – Artificial Lake	579	54	4	521
River	1 468	1 302	156	10
Land	64	37	16	11
Dam	119	116	-	3
Others	265	174	90	1

Source: Turkish Statistical Institute

When considered from a sectoral perspective, it can be seen that municipalities had the highest discharge rates in 2004. Municipalities were followed by energy production sector and manufacturing industry in descending order.

The result of the municipal wastewater survey shows that, in 2004, 2.77 billion m³ of wastewater was discharged by network systems. Of this amount 47% was discharged into rivers, 39% into sea, 4% into dams, 2% into lakes and artificial lakes, 2% onto land and 6% to other receiving bodies.

Figure 21. Wastewater discharge by sectors, 2004

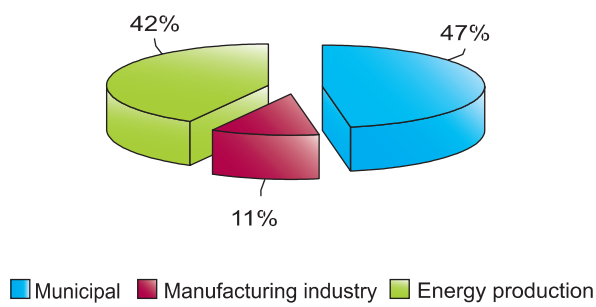
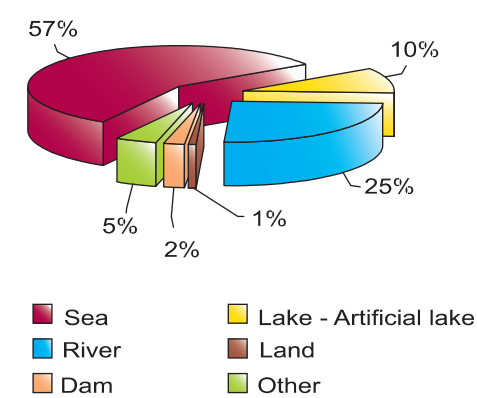


Figure 22. Wastewater discharge according to receiving bodies, 2004



For year 2004, manufacturing industry discharged its wastewater mostly into sea (58%) and rivers (24%) whereas, energy production sector preferred sea (78%) and lakes (21%) as its primary discharge locations.

When the wastewater discharge rates of municipalities, manufacturing industry, and energy production sector are considered cumulatively, it can be seen that sea is the primary discharge location with a percentage value of 57%, and it is followed by rivers and lakes-artificial lakes having shares of 25% and 10%, respectively.

Table 24. Amount of wastewater discharged from municipal sewerage by receiving bodies,2004

NUTS1 levels[1]	Amount of wastewater discharged (thousand m³/year)							Wastewater per capita (liters/capita-day)
	Total	Into sea	Into lake and artificial lake	Into river	Onto land	Into dam	Into other receiving bodies[2]	
TR TURKEY	2 770 350	1 087 444	53 873	1 301 536	36 777	116 206	174 514	177
TR1-İstanbul	673 163	475 903	1 026	196 234	-	-	-	212
TR2-West Marmara	84 709	31 654	41	48 926	1 643	1 095	1 350	136
TR3-Aegean	392 562	237 241	10 045	113 337	8 636	6 878	16 425	190
TR4-East Marmara	274 215	131 135	261	139 805	666	465	1 883	185
TR5-West Anatolia	327 738	-	9 412	260 955	6 666	197	50 508	175
TR6-Mediterranean	307 557	107 855	4 052	71 998	3 207	19 809	100 636	182
TR7-Central Anatolia	124 044	-	3 464	107 283	8 072	4 396	829	139
TR8-West Black Sea	116 348	47 323	-	68 130	138	420	337	130
TR9-East Black Sea	67 450	56 333	-	11 040	49	-	28	134
TRA-North East Anatolia	52 028	-	-	51 182	775	-	71	126
TRB-Central East Anatolia	109 920	-	23 470	19 616	162	66 293	379	184
TRC-South East Anatolia	240 616	-	2 102	213 030	6 763	16 653	2 068	161

Source: Turkish Statistical Institute
(1) See Glossary for the definition.
(2) Wastewater discharges to drainage channels of the State Hydraulic Works, septic tanks and carstic formations are included.

According to the municipal wastewater survey results, when considered in NUTS1 levels, TR-1 İstanbul produced the highest amount of total wastewater with an amount of 673 million m³/year and this amount accounted for 24% of the total wastewater production in Turkey in 2004. TR-1 İstanbul was followed by TR-3 Aegean, TR-5 West Anatolia, and TR-6 Mediterranean regions in terms of total wastewater production. In addition to that, TR-1 İstanbul had also, the highest per capita wastewater production rate among 12 NUTS1 levels with a value of 212 liters/capita-day.

Total amount of 638 million m³ industrial wastewater was discharged to receiving bodies in 2004. Of this amount 36% was discharged after treatment and 64% was discharged without treatment. 51% of the total treated industrial wastewater was discharged to river, 26% was discharged to sea, 11% was discharged to city sewerage, 6% was discharged to land and 6% was discharged to the other receiving bodies after treatment.

The highest amount of industrial wastewater discharges belonged to basic metal industry (with 51%), food and beverages industry (with 13%), textile industry (with 12%) and chemical industry (with 9%) in 2004.

Figure 23. Wastewater treatment in manufacturing industry, 2004

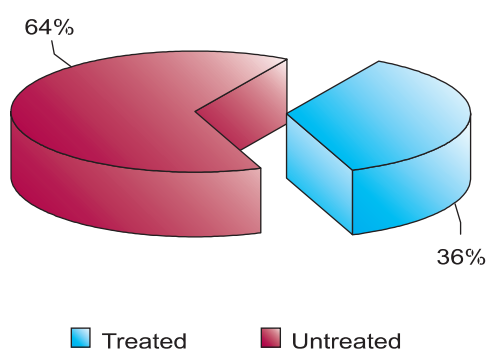


Table 25. Amount of industrial wastewater discharged to the receiving bodies by the status of treatment and industry group, 2004

(thousand m³/year)

Industry group (NACE Rev. 1.1)[1]	Treatment status	**Total**	City sewerage	Sea	Lake	River	Land	Dam	Septic tank	Other[2]
Total	Untreated	409 316	45 151	311 877	3 278	38 758	1 522	3	4 060	4 667
	Treated	228 440	25 224	60 457	482	117 405	13 954	272	313	10 333
Manufacture of food and beverages (15)	Untreated	40 950	13 314	638	259	21 364	254	-	1 619	3 502
	Treated	39 334	8 950	736	324	18 672	7 880	-	77	2 695
Manufacture of tobacco products(16)	Untreated	1 380	1 368	7	-	1	-	-	4	-
	Treated	300	179	-	-	112	-	-	-	9
Manufacture of textiles (17)	Untreated	15 943	9 937	3	-	5 405	129	3	170	296
	Treated	60 781	8 426	2 497	-	41 390	4 314	272	17	3 865
Manufacture of wearing apparel (18)	Untreated	4 626	4 365	34	-	148	35	-	32	12
	Treated	13 148	1 678	113	-	11 062	1	-	20	274
Manufacture of leather and footwear (19)	Untreated	287	277	-	-	4	2	-	2	2
	Treated	902	563	-	-	301	3	-	1	34
Manufacture of wood products and cork (20)	Untreated	493	346	-	-	94	5	-	11	37
	Treated	635	210	-	-	383	-	-	42	-
Manufacture of paper and paper products (21)	Untreated	3 725	633	1	-	3 039	-	-	50	2
	Treated	9 433	55	273	-	8 696	19	-	3	387
Printing and Publishing (22)	Untreated	836	811	-	-	10	-	-	-	15
	Treated	214	125	-	-	89	-	-	-	-
Manufacture of coke, refined petroleum (23)	Untreated	21	11	-	-	-	2	-	8	-
	Treated	12 142	188	9 115	-	2 839	-	-	-	-
Manufacture of chemicals and chemical products (24)	Untreated	22 240	1 978	16 681	3 003	120	16	-	75	367
	Treated	34 276	1 192	30 049	131	944	30	-	4	1 926
Manufac. of rubber and plastics products.(25)	Untreated	3 319	2 606	-	-	369	5	-	316	23
	Treated	1 143	395	2	-	555	9	-	1	181

Table 25. Amount of wastewater discharged to the receiving bodies by the status of treatment and industry group, 2004 (continued)

(thousand m³/year)

Industry group (NACE Rev. 1.1)[1]	Treatment status	**Total**	City sewerage	Sea	Lake	River	Land	Dam	Septic tank	Other[2]
Manufacture of non-metallic products (26)	Untreated	3 885	1 711	7	11	1 159	120	-	540	337
	Treated	6 493	686	57	21	5 154	124	-	68	383
Manufacture of basic metals (27)	Untreated	301 042	578	294 433	-	5 021	907	-	102	1
	Treated	22 615	514	17 122	-	4 807	133	-	27	12
Manufacture of fabricated metal products (28)	Untreated	1 164	1 096	13	-	18	3	-	32	2
	Treated	1 752	648	3	6	686	26	-	4	379
Manufacture of machinery and equipment nec (29)	Untreated	2 303	1 643	2	3	598	36	-	21	-
	Treated	19 558	435	1	-	18 968	58	-	25	71
Manufacture of office,account. and compu. mach.(30)	Untreated	30	-	-	-	-	-	-	-	30
	Treated	-	-	-	-	-	-	-	-	-
Manufacture of electrical machinery nec (31)	Untreated	1 839	815	7	-	79	1	-	907	30
	Treated	535	251	43	-	210	14	-	15	2
Manufacture of radio,TV,communication equipm.(32)	Untreated	212	42	-	-	169	-	-	1	-
	Treated	1 561	7	-	-	254	1 300	-	-	-
Manufacture of medical and optical instruments (33)	Untreated	106	94	-	-	4	-	-	8	-
	Treated	46	3	-	-	37	4	-	2	-
Manufacture of motor vehicles and trailers (34)	Untreated	627	303	-	2	167	7	-	146	2
	Treated	2 981	616	444	-	1 810	1	-	4	106
Manufacture of other transport equipment (35)	Untreated	490	432	51	-	-	-	-	1	6
	Treated	443	61	-	-	382	-	-	-	-
Manufacture of furniture;manufacturing nec (36)	Untreated	3 798	2 791	-	-	989	-	-	15	3
	Treated	148	42	2	-	54	38	-	3	9

Source: Turkish Statistical Institute
(1) See Glossary for the definition.
(2) Includes discharge to drainage channels of the State Hydraulic Works and discharge to carstic formation.

Table 26. Population connected to public sewerage and treatment plants

(%)

	2001	2002	2003	2004
Sewerage	59	62	64	63
Public sewage treatment plants	29	31	33	37

Source: Turkish Statistical Institute

There has been a considerable increase in population connected to public sewage treatment plants after 2001. In 2001 only 29% of population was connected to public sewage treatment plant, but in 2004 this ratio increased to 37%, whereas there was a slight increase in the population connected to sewerage. Although the scope of the survey became narrower in 2004, the population connected to sewage network increased to 63%.

Figure 24. Population connected to public sewerage and sewage treatment plant

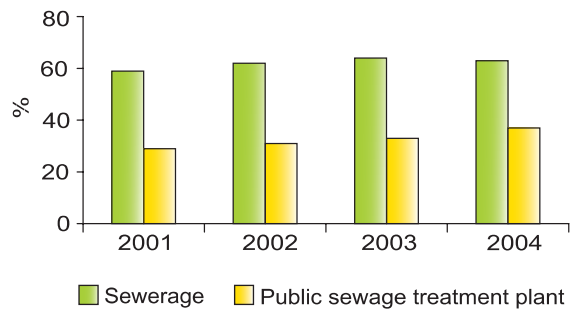


Table 27. Public sewage treatment, 2004

(million m³)

	Number	Design capacity	Effluents
Total	165	3 054	1 684
Mechanical	34	1 089	476
Biological	127	1 698	985
Advanced	4	267	223

Source: Turkish Statistical Institute

In 2004, there were 165 public wastewater treatment plants treating an annual amount of 1684 million m³ of wastewater.

Around 61% of public wastewater was discharged after treatment. The rate of biological treatment was realized as 59%, the rate of mechanical treatment was 28%, and the rate of advanced treatment was 13%.

Figure 25. Methods employed during public sewage treatment, 2004

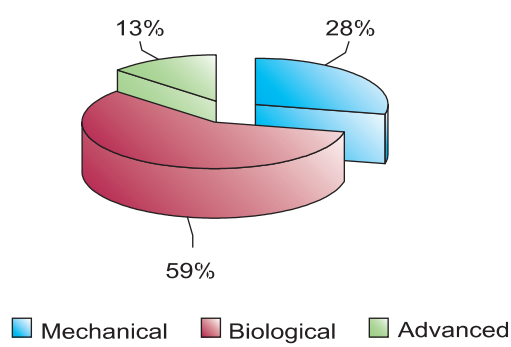


Table 28. Status of public wastewater treatment plants, 2004 (1)

(thousand m³/year)

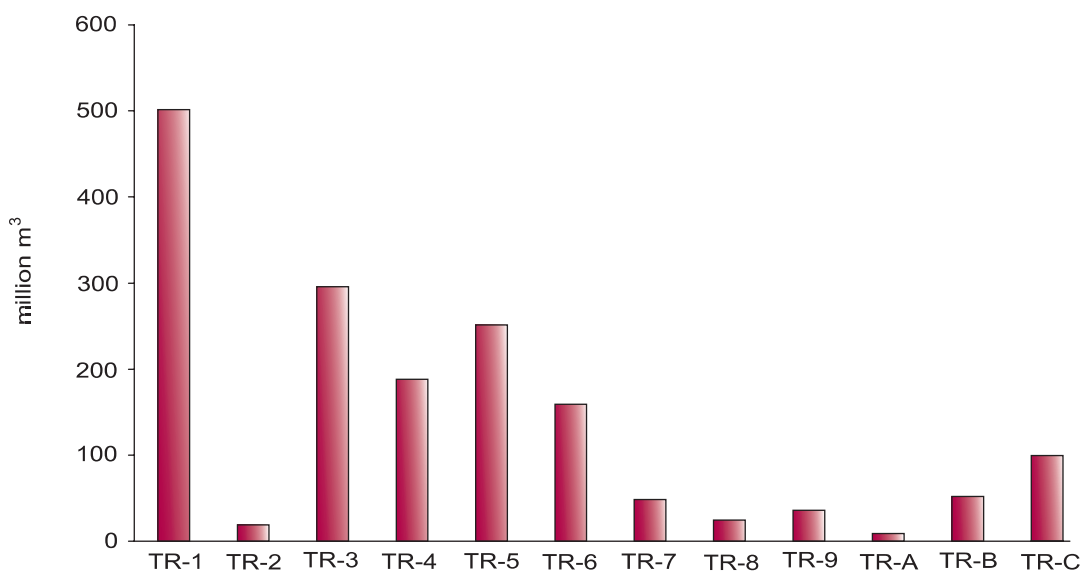
NUTS1 levels	Number of plants	Capacity	Amount of wastewater treated
TR-TURKEY	165	3 053 871	1 684 616
TR1-İstanbul	13	1 046 932	501 576
TR2-West Marmara	8	49 831	19 191
TR3-Aegean	36	424 252	295 786
TR4-East Marmara	23	458 071	188 189
TR5-West Anatolia	9	312 478	251 262
TR6-Mediterranean	33	235 910	159 125
TR7-Central Anatolia	6	106 734	48 380
TR8-West Black Sea	9	98 600	24 507
TR9-East Black Sea	11	88 436	35 888
TRA-North East Anatolia	2	18 338	8 943
TRB-Central East Anatolia	6	95 627	52 099
TRC-South East Anatolia	9	118 662	99 670

Source: Turkish Statistical Institute

(1)Capacities of wastewater treatment plants which are not operated are also included.

According to NUTS1 levels, TR-3 Aegean region had the highest number of treatment plants with a value of 36, which accounted for 22% of the total number of wastewater treatment plants owned by municipalities. TR-3 Aegean region was followed by TR-6 Mediterranean region with 33 treatment plants making up the 20% of the total number. With an annual value of 501 million m³, the highest wastewater treatment was realized in TR-1 İstanbul region and this amount constitutes the 30% of the total wastewater treated by the municipalities.

Figure 26. Public wastewater treatment by NUTS1 levels, 2004



Pollution Originating from Coastal Industries

Table 29. Wastewater discharged into the sea by manufacturing industry establishments and thermal power plants

(thousand m^3)

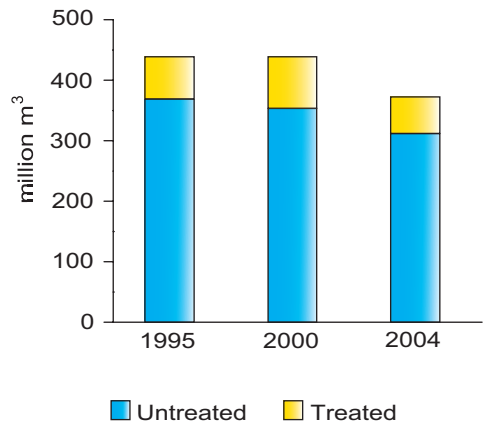
	1995	2000	2004
Total	2 174 623	2 161 289	2 299 518
Manufacturing Industry	439 010	438 614	372 334
Treated	70 120	84 955	60 457
Untreated	368 890	353 659	311 877
Energy Production	1 735 613	1 722 675	1 927 184
Treated	231	135	157
Untreated	1 735 382	1 722 540	1 927 027

Source: Turkish Statistical Institute

When the wastewater discharged into the sea by manufacturing industry establishments was considered, it was observed that the total amount of wastewater discharged into the sea decreased by 15% in 2004 with respect to 1995. In 1995, 16% of the wastewater discharged into the sea was treated whereas, this ratio increased to 19% in 2000 and decreased back to 16% in 2004.

When the coastal wastewater discharge values of thermal power plants were considered, it was seen that less than 0.01% of the wastewater was treated. The reason for this percentage being so small is that the thermal power plants use most of the water for cooling purposes and the cooling water is not required to be treated according to the Water Pollution Control Regulation.

Figure 27. Wastewater discharged into the sea by manufacturing industry establishments



Treatment Sludge of Manufacturing Industry

Table 30. Amount of treatment sludge by disposal methods and industry group, 2004

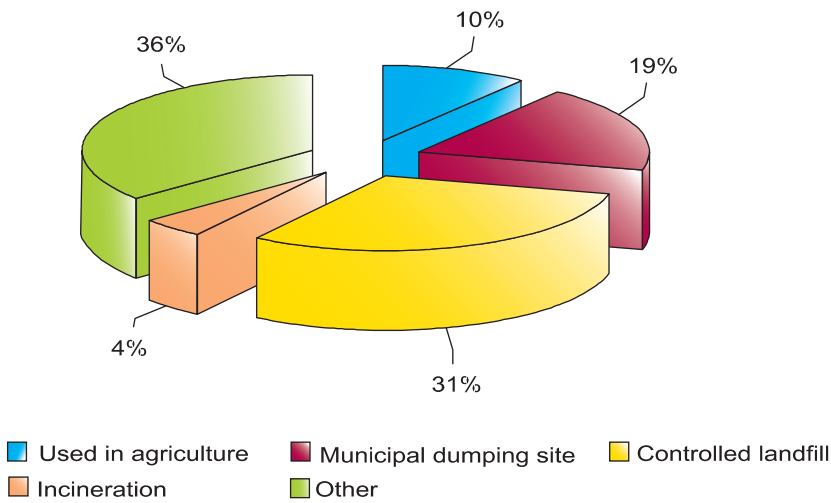
(tonnes/year)

Industry group (NACE Rev. 1.1)[1]	**Total**	Used in agriculture	Municipal dumping site	Controlled landfill	Incineration	Other [2]
Total	2 306 535	234 322	431 482	705 087	101 287	834 357
Manufacture of food and beverages (15)	903 206	227 841	245 397	92 819	17	337 132
Manufacture of tobacco products(16)	16 258	-	16 024	229	5	-
Manufacture of textiles (17)	55 192	185	44 423	5 304	35	5 245
Manufacture of wearing apparel (18)	16 756	3 125	1 959	7 253	1	4 418
Manufacture of leather and footwear (19)	4 993	1	-	292	-	4 700
Manufacture of wood products and cork (20)	444	10	4	225	-	205
Manufacture of paper and paper products (21)	55 687	18	10 211	36 028	162	9 268
Printing and Publishing (22)	1 214	915	151	60	10	78
Manufacture of coke, refined petroleum (23)	19 349	-	3	891	18 270	185
Manufacture of chemicals and chemical products (24)	510 484	1 500	15 521	464 893	20 611	7 959
Manufac. of rubber and plastics products.(25)	718	-	596	110	12	-
Manufacture of non-metallic products (26)	353 412	74	82 952	23 978	21	246 387
Manufacture of basic metals (27)	188 669	602	11 263	23 329	16	153 459
Manufacture of fabricated metal products (28)	9 145	-	1 093	7 864	165	23
Manufacture of machinery and equipment nec (29)	26 756	48	1 197	1 318	404	23 789
Manufacture of electrical machinery nec (31)	2 849	-	117	2 216	501	15
Manufacture of radio,TV, communication equipm.(32)	441	-	30	163	247	1
Manufacture of medical and optical instruments (33)	19	1	18	-	-	-
Manufacture of motor vehicles and trailers (34)	134 058	1	220	35 560	60 793	37 484
Manufacture of other transport equipment (35)	672	-	300	98	-	274
Manufacture of furniture;manufacturing nec (36)	6 213	1	3	2 457	17	3 735

Source: Turkish Statistical Institute
(1) See Glossary for the definition.
(2) Includes used in production, dumping into open area, dumping into rivers and using as filling material.

2.3 million tonnes of treatment sludge was produced from manufacturing industry in 2004. 31% of total amount was controlled landfilled, 19% was disposed to municipal dumping sites, 10% was used for agricultural purposes, 4% was incinerated and 36% was disposed of by other methods. Food and beverages industry produced 39% of the total treatment sludge in 2004. Chemicals and chemical products industry, non-metallic products industry and basic metal industry were followed food and beverages industry with the percentages of 22%, 15% and 8% respectively in 2004.

Figure 28. Amount of treatment sludge by disposal methods, 2004



WASTE

WASTE GENERATION BY SECTORS

Solid waste consists of all residual products for which there is no use. In general, it is the solid substances left to the environment after processing of raw material or consumption of the product during human activities. It used to be an easy solution to throw away or burn what was not needed, but as the quantities of waste generated increased, the associated environmental problems became increasingly obvious.

As waste is one of the main environmental problems arising as a result of the industrialisation and high population growth rate and because the characteristics of waste differs from one sector to another, information on the amount of waste produced by sectors is needed for setting up effective solid waste management strategies.

Waste Generation by Sectors

The statistics on environment by sectors are based on mainly two different studies in Turkey.

1. Municipal Waste

In the scope of the responsibilities of municipalities, water supply and distribution, wastewater collection and discharge, and solid waste collection, transportation and disposal activities cover an important part. The Turkish Statistical Institute, being aware of these responsibilities, has been surveying all of the municipalities annually since 1994 with 4 different questionnaires covering previous topics as well as environmental expenditures and employment. Solid waste questionnaire covers all the solid waste services given by or on behalf of the municipalities. The data includes the responsible authority on collection, transportation or disposal, the amount of the solid waste collected, the destination of the waste, qualifications and number of the staff working on the waste, etc.

The municipalities surveyed are determined based on 2003 data on municipal solid waste, drinking water and wastewater. Combination of municipalities constituting 95% of total amount of solid waste, drinking water and wastewater in 2003 respectively are covered within the scope of the survey of 2004.

2. Industrial Waste

Industry Waste Statistics are produced by three different surveys, which are performed annually to manufacturing industry establishments and thermal power plants. Data on water, wastewater, waste, and environmental employment and expenditures were collected.

Within the scope of the thermal power plants statistics, 16 thermal power plants have been investigated annually since 1992 and auto producers which produce 100 MW or more power are also covered since 2002 in cooperation with Electricity Generation Corporation Inc. Solid waste production and disposal methods of all thermal power plants are investigated within this survey. The solid waste originated from thermal power plants covers mainly ash and slag.

Within the scope of manufacturing industry statistics, manufacturing industry establishments having more than 25 employees and representing 88.33% of total production and 75.60% of total employment have been investigated since 1992. However, in the manufacturing industry survey of 2004, the data from all the establishments in public sector and large-scale establishments in private sector, which represent approximately 80% of the value added data of the private sector establishments with 10 or more employees, were collected. Amount and destination of industrial and domestic waste of the establishments, amount of sludge generated from wastewater treatment plants, environmental employment, incomes and expenditures are investigated with this survey.

Table 31. Amount of waste generated by sectors

A: Disposed of B: Sold C: Reused or recycled

(thousand tonnes)

	2000			2004		
	A	B	C	A	B	C
Manufacturing Industry	9 683	5 917	1 460	8 209	7 943	1 346
Energy Production	18 634	165	-	25 356	1 005	-
Municipal	30 728(1)	-	262(1)	28 876(1)	-	349
Total	59 045	6 082	1 722	62 441	8 948	1 695

Source: Turkish Statistical Institute
(1) The value on the amount of annual waste generation is estimated.

The amount of waste generated by manufacturing industry establishments have been increasing by the years. While the amount of waste disposed of and reused/recycled decreased, the amount of waste sold increased by 34% between 2000 and 2004. 43% and 53% of the total waste generated were reused/recycled in the establishment or were sold between 2000 and 2004 respectively. This indicates that 43% and 53% of the total waste generated were gained by the economy in 2000 and 2004.

For energy production, there has been an increase in the amount of waste generated from 18.8 million tonnes in 2000 to 26.4 million tonnes in 2004.

There was a decrease in the amount of municipal waste generated, from 30.9 million tonnes in 2000 to 29.2 million tonnes in 2004. The amount of municipal waste per capita was of 1.34 kg/day in 2004 (490.8 kg/year).

Total amount of waste generated by sectors has been increased by 9% between 2000 and 2004. The fluctuation in the figures is originated from the changes in the coverage of the waste surveys.

And as it is seen, municipal waste formed the biggest portion of the total amount of waste generated both in 2000 and 2004.

Figure 29. Waste disposal by sectors, 2000

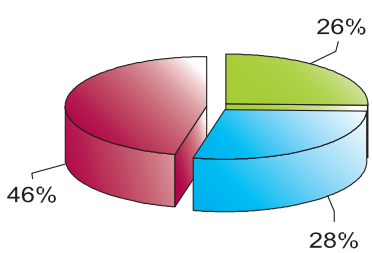


Figure 30. Waste disposal by sectors, 2004

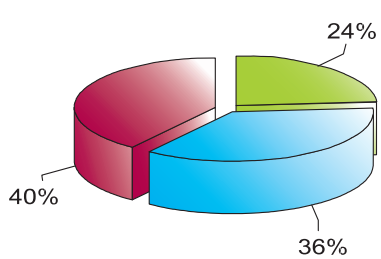


Table 32. Amount of industrial waste generated by industry group in manufacturing industry establishments, 2004

(tonnes/year)

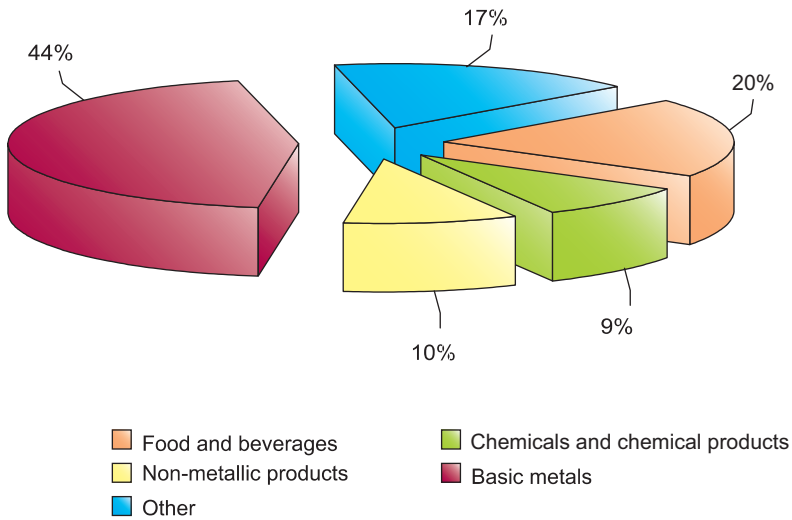
Industry group(NACE Rev. 1.1)[1]	**Total**	Recycled or reused	Sold or donated	Ultimate disposal
Total	17 497 482	1 345 507	7 942 758	8 209 217
Manufacture of food and beverages (15)	3 511 679	84 782	2 327 581	1 099 316
Manufacture of tobacco products (16)	19 765	5 405	6 956	7 404
Manufacture of textiles (17)	364 432	5 317	277 711	81 404
Manufacture of wearing apparel (18)	129 183	1 896	100 187	27 100
Manufacture of leather and footwear (19)	11 531	70	8 816	2 645
Manufacture of wood products and cork (20)	111 324	67 942	21 582	21 800
Manufacture of paper and paper products (21)	176 053	14 983	73 330	87 740
Printing and Publishing (22)	42 813	211	41 513	1 089
Manufacture of coke, refined petroleum (23)	124 218	444	1 677	122 097
Manufacture of chemicals and chemical products (24)	1 496 256	13 328	1 068 065	414 863
Manufac. of rubber and plastics products.(25)	91 267	5 315	56 569	29 383
Manufacture of non-metallic products (26)	1 692 660	114 395	410 801	1 167 464
Manufacture of basic metals (27)	7 764 699	769 938	2 060 131	4 934 630
Manufacture of fabricated metal products (28)	717 358	27 526	644 988	44 844
Manufacture of machinery and equipment nec (29)	586 291	23 810	524 898	37 583
Manufacture of electrical machinery nec (31)	137 254	51 250	46 853	39 151
Manufacture of radio,TV,communication equipm.(32)	13 433	65	11 708	1 660
Manufacture of medical and optical instruments (33)	9 268	78	8 634	556
Manufacture of motor vehicles and trailers (34)	310 191	59 823	173 144	77 224
Manufacture of other transport equipment (35)	38 542	-	34 098	4 444
Manufacture of furniture;manufacturing nec (36)	149 265	98 929	43 516	6 820

Source: Turkish Statistical Institute
(1) See glossary for the definition.

Manufacturing industry establishments created 17.5 million tonnes of industrial waste in 2004. Of this solid waste 47% was disposed of, 45% was sold and 8% was recycled or reused.

Basic metal industries made the highest contribution (44%) to solid waste production and they were followed by food and beverages (20%), non-metallic production (10%) and chemicals and chemical products manufacturing industries (9%) in descending order in 2004.

Figure 31. Waste generation by sectors in manufacturing, 2004



1.2 million tonnes of hazardous waste were generated by manufacturing industry establishments in 2004. While 73% of the total amount of hazardous waste was disposed of, 21% was sold or donated and 6%was recycled or reused on the establishments site.

83% of the total amount of hazardous waste was generated by the following sectors; basic metal industries, chemicals and chemical products industry, food and beverages industries and coke production and refined petroleum industries with the percentages pf 27%, 24%, 22% and 10% respectively in 2004.

Figure 32. Hazardous waste generation in manufacturing industry, 2004

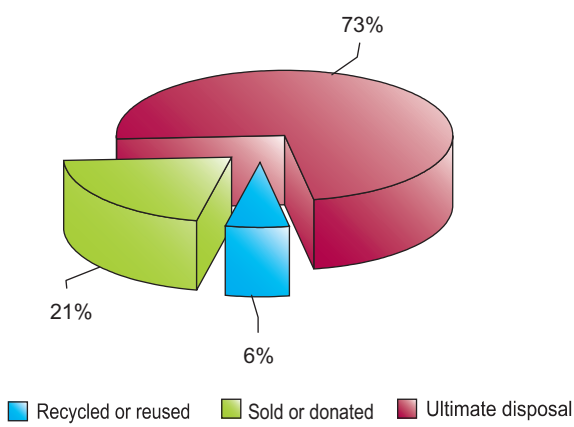


Table 33. Amount of hazardous waste generated by industry group, in manufacturing industry establishments, 2004

(tonnes/year)

Industry group(NACE Rev. 1.1)(1)	Total	Recycled or reused	Sold or donated	Ultimate disposal
Total	1 196 404	71 282	248 352	876 770
Manufacture of food and beverages (15)	262 284	16	219 873	42 395
Manufacture of tobacco products(16)	7 918	4 623	7	3 288
Manufacture of textiles (17)	4 945	1 040	2 594	1 311
Manufacture of wearing apparel (18)	1 625	-	1 511	114
Manufacture of leather and footwear (19)	1	-	-	1
Manufacture of wood products and cork (20)	443	1	421	21
Manufacture of paper and paper products (21)	3 232	1	48	3 183
Printing and Publishing (22)	209	-	208	1
Manufacture of coke, refined petroleum (23)	114 128	299	501	113 328
Manufacture of chemicals and chemical products (24)	289 110	7 939	6 240	274 931
Manufac. of rubber and plastics products.(25)	2 763	190	781	1 792
Manufacture of non-metallic products (26)	33 630	897	1 847	30 886
Manufacture of basic metals (27)	327 986	2 895	3 056	322 035
Manufacture of fabricated metal products (28)	5 951	21	3 817	2 113
Manufacture of machinery and equipment nec (29)	814	205	346	263
Manufacture of electrical machinery nec (31)	64 594	48 349	876	15 369
Manufacture of radio,TV,communication equipm.(32)	4 669	64	4 147	458
Manufacture of medical and optical instruments (33)	26	1	2	23
Manufacture of motor vehicles and trailers (34)	71 792	4 739	2 041	65 012
Manufacture of other transport equipment (35)	144	-	14	130
Manufacture of furniture;manufacturing nec(36)	140	2	22	116

Source: Turkish Statistical Institute
(1) See glossary for the definition.

WASTE TREATMENT

One of the main concepts in solid waste management is "waste that cannot be reused or recycled should be disposed of without harming human health and environment". This statement puts the importance of environmental technologies on solid waste disposal on the agenda. Controlled landfills, composting and incineration are the most important and widespread used methods of solid waste disposal for solid waste management.

In Turkey, the Solid Waste Control Regulation was enacted in 1991 by the Ministry of Environment and Forestry. According to this regulation and Municipality Law, municipalities are the responsible organisations for collection, transportation and disposal of solid waste in the municipal area. The industrial organisations and touristic establishments outside the municipal area are responsible for the collection and transportation of their solid waste. Regulation also emphasizes that waste production should be minimised where on the contrary recycling should be maximised. This may be possible by making modifications in the production and consumption pattern, education, and good approaches in solid waste collection methods. The last component is the appropriate disposal of the solid waste.

In addition to the above-mentioned regulation, Turkey has made a great progress in terms of waste regulations. The Clinical Waste Control Regulation was enacted in 1993, the Hazardous Waste Control Regulation was enacted in 1995 and revised in 2005, the Waste Oils Control Regulation was enacted in 2004, the Construction and Demolition Waste Control Regulation, Used Batteries and Accumulators Control Regulation, and the Packaging and Packaging Waste Control Regulation were enacted in 2004 and the Vegetal Waste Oils Control Regulation was enacted in 2005 by the Ministry of Environment and Forestry.

Municipal Waste Treatment and Disposal

Solid waste questionnaire covers all the solid waste services given by or on behalf of the municipalities. The data includes the responsible authority on collection, transportation or disposal, the amount of the solid waste collected, the destination of the waste, qualifications and number of the staff working on the waste, etc.

The Turkish Statistical Institute has been collecting data on the current status of waste services and waste disposal sites of all municipalities in Turkey within the scope of Environmental Statistics since 1994. All municipalities are covered in the scope of the surveys.

The municipalities surveyed in 2004 are determined based on 2003 data on municipal solid waste, drinking water and wastewater. Combination of municipalities constituting 95% of total amount of solid waste, drinking water and wastewater in 2003 respectively are covered within the scope of the survey.

Data about the waste treatment and disposal plants have been collected since 1994. Registered data on the construction of solid waste facilities is also collected from the responsible organisations. Both data are used in the evaluations: registered data for the capacity and survey results for the annual amount of waste treated in the plant.

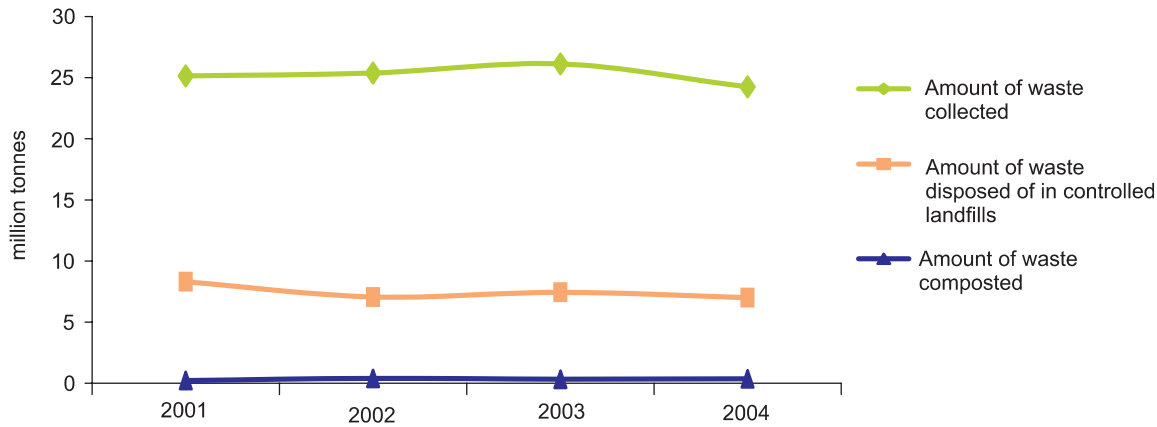
Table 34. Treatment and disposal of municipal waste

(thousand tonnes)

	2001	2002	2003	2004
Total treatment or recovery operations	218	383	326	349
Composting	218	383	326	349
Total final disposal	24 916	24 990	25 792	23 888
Landfill	24 471	24 572	25 305	23 714
of which – controlled landfill	8 304	7 047	7 432	6 991
– uncontrolled landfill	16 167	17 525	17 873	16 723
Other	445	417	487	174
Total	25 134	25 373	26 118	24 237

Source: Turkish Statistical Institute

Figure 33. Treatment and disposal of municipal waste



Of the 24.2 million tonnes of solid waste collected in municipalities in 2004, 65.3% was disposed of in municipal dumping site, 28.9% was disposed of in controlled landfill, 1.6% was disposed of by burial, 1.4% was disposed of in composting plant, 0.4% was disposed of into lake and river, 0.3% was disposed of by burning in an open area. Considering the NUTS1 levels, it can be seen that the highest total solid waste amount belong to TR1, TR3, and TR6 for year 2004. When compared to other treatment and disposal methods, disposal in the municipal dumping sites has still got the biggest share.

Waste in general is disposed of by traditional methods in Turkey. 2334 municipalities in 2001, 2635 municipalities in 2002, 2655 municipalities in 2003 and 1680 municipalities in 2004 dump their waste in wild (uncontrolled) dumping sites.

The first controlled landfill site was taken into operation in 1992, two of the composting plants first operated in 1994 and the first incineration plant started operation in 1995. Percentage of population served by those plants was 4% in 1994; it rose to 25% in 2004. In 2004, composting plants and controlled landfills dealt with 7.3 million tonnes of municipal waste where the total amount of solid waste collected was 24.2 million tonnes. The rate of composting and controlled landfill was 22% in 1998 but it increased to 30% in 2004. This increase is especially a result of the increase in the number of controlled landfills.

Data for mechanical sorting and recycling of municipal waste are not available in Turkey yet.

Figure 34. Municipal solid waste by destination, 2004

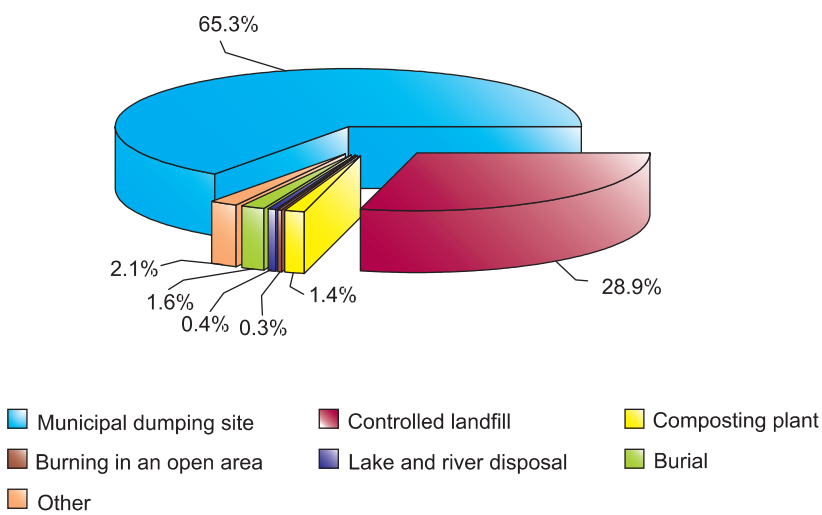


Table 35. Amount of solid waste by destination according to NUTS1 levels, 2004

(thousand tonnes)

NUTS1 levels[1]	Total disposal	Solid waste disposed of						
		Municipal dumping site	Controlled landfill	Composting plant	Burning in an open area	Lake and river disposal	Burial	Other [2]
TR TURKEY	24 237 198	15 827 974	6 990 555	348 955	71 159	103 189	396 750	498 616
TR1-İstanbul	4 468 487	148 123	4 156 395	151 158	458	-	-	12 353
TR2-West Marmara	1 334 377	1 105 391	136 586	-	366	-	58 726	33 308
TR3-Aegean	3 648 720	2 360 946	1 018 977	111 052	14 858	23 886	66 002	52 999
TR4-East Marmara	1 919 721	1 181 859	698 708	-	-	3 050	2 165	33 939
TR5-West Anatolia	2 948 583	2 934 311	-	-	445	6 220	-	7 607
TR6-Mediterranean	3 217 132	2 730 627	300 707	86 745	29 968	8 998	43 917	16 170
TR7-Central Anatolian	1 697 786	1 122 473	410 250	-	-	23 379	19 127	122 557
TR8-West Black Sea	1 559 161	1 460 098	-	-	5 978	6 120	85 379	1 586
TR9-East Black Sea	546 448	482 412	-	-	881	1 694	21 089	40 372
TRA-North East Anatolia	558 508	516 676	-	-	1 830	4 392	35 244	366
TRB-Central East Anatolia	807 279	770 770	-	-	912	-	35 441	156
TRC-South East Anatolia	1 530 996	1 014 288	268 932	-	15 463	25 450	29 660	177 203

Source: Turkish Statistical Institute
(1) See Glossary for the definition.
(2) Includes filling of land with waste and disposal to agricultural area, open land, etc.

Table 36. Number of solid waste treatment and disposal facilities and percent population served

	2001	2002	2003	2004
Number of controlled landfills	12	12	15	16
Number of composting plants	3	4	5	5
Percent population served by controlled landfills and composting plants (%)	24	24	24	25

Source: Turkish Statistical Institute

Waste Treatment and Disposal in Manufacturing Industry

Environmental data for manufacturing industry establishments is being collected within the Manufacturing Industry Waste Inventory. The scope of the survey had been the establishments with more than 25 employees and representing 88.33% of total production and 75.60% of total employment since 1992.

However, in the manufacturing industry survey of 2004, the data from all the establishments in public sector and large-scale establishments in private sector, which represent approximately 80% of the value added data of the private sector establishments with 10 or more employees, were collected.

The survey covers the amount and destination of industrial and domestic waste of the establishments.

In the European level waste data should be produced and transmitted according to the Regulation No 2150/2002 of the European Parliament and of the Council on waste statistics. Starting point is defined to be 2004 which is the reference year.

Based on this regulation, Turkish Statistical Institute made some improvements on the waste questionnaires. Main topics of the European Waste Catalogue were included to the waste part of the questionnaires for manufacturing industry in 2004. Waste generation, disposal and treatment methods were questioned in hazardous and non-hazardous waste detail.

It is observed that; among 8.2 million tonnes of disposed industrial waste, 47.3% was disposed of into sea, lake, or river, 20% was disposed of into municipal dumps, 10.9% was controlled landfilled, 9.3% was stored in the field of establishments, 2.4% was incinerated and 10.1% was disposed of by other methods in 2004.

Of all the industrial sectors, basic metal industry constituted 60% of the total disposed of industrial waste. Following sectors were non-metallic mineral industry, manufacture of food and beverages industry, and manufacture of chemicals and chemical products industry with the percentage of 14%, 13% and 5% respectively.

Figure 35. Disposal methods of industrial waste, 2004

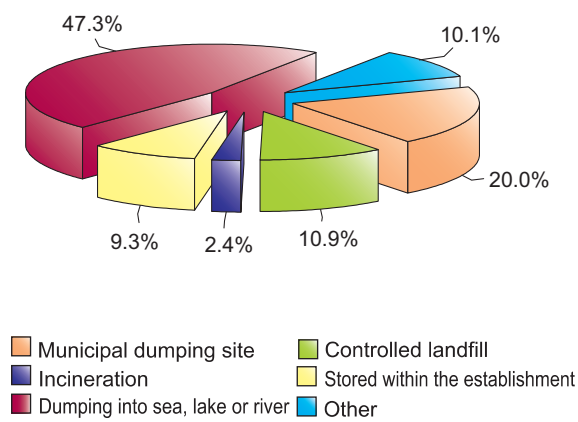


Table 37. Amount of industrial waste by disposal methods and industry group, 2004

(tonnes/year)

Industry group(NACE Rev. 1.1)[1]	**Total**	Municipal dumping site	Controlled landfill	Incineration	Stored within the establisment	Dumping into sea, lake or river	Others[2]
Total	8 209 217	1 645 572	894 331	200 302	766 882	3 879 090	823 040
Manufacture of food and beverages (15)	1 099 316	538 709	27 439	1 523	327 943	4 509	199 193
Manufacture of tobacco products(16)	7 404	550	5 422	13	193	-	1 226
Manufacture of textiles (17)	81 404	58 840	19 817	814	1 509	21	403
Manufacture of wearing apparel (18)	27 100	7 133	16 624	1	25	9	3 308
Manufacture of leather and footwear (19)	2 645	1 182	710	-	3	-	750
Manufacture of wood products and cork (20)	21 800	18 669	19	2	285	-	2 825
Manufacture of paper and paper products (21)	87 740	82 991	1 482	155	3 067	-	45
Printing and Publishing (22)	1 089	414	673	-	-	-	2
Manufacture of coke, refined petroleum (23)	122 097	660	6 534	94 564	1 160	-	19 179
Manufacture of chemicals and chemical products (24)	414 863	7 102	323 261	18 864	1 142	2	64 492
Manufac. of rubber and plastics products.(25)	29 383	21 653	2 991	3 421	1 249	10	59
Manufacture of non-metallic products (26)	1 167 464	768 950	30 954	3 625	50 083	651	313 201
Manufacture of basic metals (27)	4 934 630	75 017	420 644	7 925	350 732	3 873 884	206 428
Manufacture of fabricated metal products (28)	44 844	28 995	5 414	5 931	4 428	-	76
Manufacture of machinery and equipment nec (29)	37 583	2 845	3 314	84	20 071	-	11 269
Manufacture of electrical machinery nec (31)	39 151	25 834	11 791	539	959	-	28
Manufacture of radio,TV,communication equipm.(32)	1 660	1 033	137	393	33	-	64
Manufacture of medical and optical instruments (33)	556	144	345	1	64	-	2
Manufacture of motor vehicles and trailers (34)	77 224	4 300	6 870	62 261	3 547	4	242
Manufacture of other transport equipment (35)	4 444	143	4 162	129	-	-	10
Manufacture of furniture;manufacturing nec (36)	6 820	408	5 728	57	389	-	238

Source: Turkish Statistical Institute

(1) See glossary for the definition.

(2) Includes disposal into open area, using as filling material and burial etc.

Table 38. Amount of hazardous waste by disposal methods and industry group, 2004

(tonnes/year)

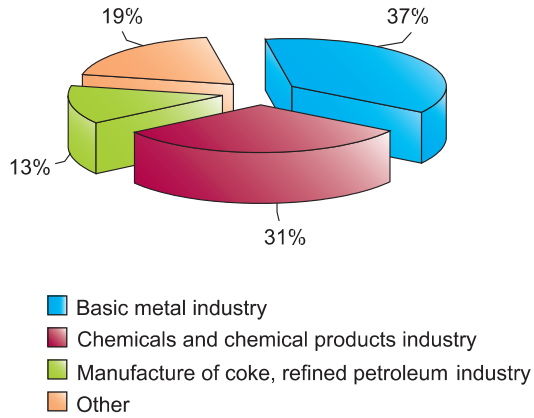
Industry group (NACE Rev. 1.1)[1]	**Total**	Municipal dumping site	Controlled landfill	Incineration	Stored within the establisment	Using as filling material	Burial	Others
Total	876 770	18 189	584 754	183 712	61 419	5 275	2 163	21 258
Manufacture of food and beverages (15)	42 395	2 919	3	1 519	34 902	1 308	637	1 107
Manufacture of tobacco products(16)	3 288	-	3 275	13	-	-	-	-
Manufacture of textiles (17)	1 311	76	6	292	906	-	30	1
Manufacture of wearing apparel (18)	114	3	15	1	-	30	-	65
Manufacture of leather and footwear (19)	1	-	-	-	1	-	-	-
Manufacture of wood products and cork (20)	21	-	-	2	-	-	-	19
Manufacture of paper and paper products (21)	3 183	1	1	120	3 061	-	-	-
Printing and Publishing (22)	1	-	-	-	-	-	1	-
Manufacture of coke, refined petroleum (23)	113 328	3	67	94 020	60	-	-	19 178
Manufacture of chemicals and chemical products (24)	274 931	121	257 663	15 608	44	-	1 425	70
Manufac. of rubber and plastics products.(25)	1 792	66	15	578	1 091	-	-	42
Manufacture of non-metallic products (26)	30 886	63	26 776	122	220	3 697	7	1
Manufacture of basic metals (27)	322 035	15	294 001	7 918	19 505	-	-	596
Manufacture of fabricated metal products (28)	2 113	26	12	457	1 606	-	-	12
Manufacture of machinery and equipment nec (29)	263	26	1	61	10	-	-	165
Manufacture of electrical machinery nec (31)	15 369	14 750	140	466	12	-	-	1
Manufacture of radio,TV,communication equipm.(32)	458	5	-	390	-	-	63	-
Manufacture of medical and optical instruments (33)	23	20	1	1	1	-	-	-
Manufacture of motor vehicles and trailers (34)	65 012	33	2 776	61 962	-	240	-	1
Manufacture of other transport equipment (35)	130	-	1	129	-	-	-	-
Manufacture of furniture;manufacturing nec (36)	116	62	1	53	-	-	-	-

Source: Turkish Statistical Institute
(1) See glossary for the definition.

Manufacturing industry establishments created approximately 876.8 thousand tonnes of hazardous waste in 2004. 37% of the total amount was created by basic metal industry, 31% was created by chemicals and chemical products industry, 13% was created by manufacture of coke, refined petroleum industries and 19% was produced by other sectors in 2004.

While 67% of the total amount of hazardous waste was controlled landfilled, 21% was incinerated, 7% was stored within the establishment field, 2% was disposed of into municipal dumping site and 3% was disposed of by other methods in 2004.

Figure 36. Amount of hazardous waste by sectors, 2004



INDICATORS

INDICATORS

Traditionally, environmental data were defined, collected, and used by experts. However, from another point of view on environmental issues from both political and public user groups, a demand for less technical information evolved. As a consequence of a growing public demand for information and increasing demand for knowledge based policy making, it became evident that the technical data and the technical language used, needed to be transformed into a language understandable for non-experts and decision makers. A process of reducing complex data and data series by aggregating the data into single representative data was initiated and today, a comprehensive set of indicators exists.

During the last decade, Turkey has initiated strong efforts in collection of data on the state of the environment. The work on the indicators has been started in 1990's in Turkey. Some of the "Environmental Indicators", "Environmental Performance Indicators", "Sustainable Development Indicators", and "Millennium Indicators" have been calculated up to now.

Since 2005, mainly 3 governmental organizations have been working on indicators on environmental issues:

- Ministry of Environment and Forestry with the "Institutional Building and Access to Environmental Information, Turkey" project,
- State Planning Organization with the "Integration of Sustainable Development to Sectoral Policies" program,
- Turkish Statistical Institute with the "Population and Development Indicators" project in cooperation with the United Nations Population Fund and "Sustainable Development Indicators" within the MEDSTAT-ENV project.

Sustainable Development Indicators

Table 39. Sustainable development indicators

SDI No	Title	Unit	2000	2001	2002	2003	2004	2005
13	Access to safe drinking water	%	..	..	93.6	90.9	..	..
19	Loss of agricultural land due to the urbanization	%	..	0.003	..	..	..	..
24	Exploitation index of forest resources	%	..	..	..	..	..	42
25	Forest and other wooded land: total area	million ha	20.7	20.7	20.7	20.7	20.7	21.2
33	Protected coastal area - coastal	ha	170432	170432	170432	170432	170432	170432
36	Density of the solid waste disposed in the sea	Number/km^2	..	-	-	-	-	..
40	Existence of monitoring programs concerning pollutant inputs	Boolean	Yes	Yes	Yes	Yes	Yes	Yes
52	Share of irrigated agricultural land	%	18.4	18.4	18.3	18.6	18.3	..
63-1-1	Industrial releases into water (manufacturing industry)	mio m^3	425	..	..	..	354	..
63-1-2	Industrial releases into water (thermal power plants)	mio m^3	1729	2003	2333	..	2456	..
89	Existence of economic tools to recover the water cost in various sectors	Boolean	Yes	Yes	Yes	Yes	Yes	Yes
91-1	Share of industrial wastewater treated on site (manufacturing industry)	%	31.51	..	..	..	35.82	..
91-2	Share of industrial wastewater treated on site (thermal power plants)	%	0.23	0.19	0.29	..	0.11	..
96	Number of turtles catched per year	Number	..	..	..	..	..	30 (approx)
98-1-1	Percentage of indigenous threatened species - Mammals	%	32	..	..	..	..	..
98-1-2	Percentage of indigenous threatened species - Birds	%	..	..	..	..	..	40
98-1-3	Percentage of indigenous threatened species - Reptiles	%	3	..	..	..	..	..
98-1-4	Percentage of indigenous threatened species - Amphibians	%	52	..	..	..	..	..

Table 39. Sustainable development indicators (continued)

SDI No	Title	Unit	2000	2001	2002	2003	2004	2005
99	Total expenditure of governmental organizations on protected areas management	million TL	..	476 586	376 995	402 819	389 048	..
100	Generation of municipal solid waste	tonnes/ inhab	..	0.45	0.45	0.46	0.41	..
101-1	Generation of hazardous wastes (manufacturing industry)	1000t	1166	..	..	..	1125	..
101-2	Generation of hazardous wastes (thermal power plants)	1000t	..	..	..	..	0.4	..
103	Generation of industrial solid waste	tonnes/ inhab	0.230	..	..	..	0.227	..
108-1	Destination of municipal waste - Composting	%	..	0.9	1.5	1.3	1.4	..
108-2	Destination of municipal waste - Incineration	%	..	-	-	-	-	..
108-3	Destination of municipal waste - Controlled landfill	%	..	33.0	27.8	28.5	28.8	..
109	Collection rate of household wastes	%	..	0.81	0.82	0.81	0.83	..
110	Emissions of greenhouse gases	Gigagrams of CO_2 equivalent	257628	244407	248294	264413	276081	..
111	Emissions of sulphur oxides	Tonnes SO_2 equivalent	1456.30	1441.51	1130.72	884.98	813.17	..
112	Emissions of nitrogen oxides	Tonnes NO_2 equivalent	944.48	896.64	920.08	972.07	1028.48	..
115-1	Environmental investment expenditure of governmental organizations on air pollution abatement	million $	5.44	0.14	0.08	-	-	..
115-2	Environmental investment expenditure of thermal power plants on air pollution abatement	million $	114.36	42.44	66.35	9.97	4.15	..
117	Share of agglomerations over 100000 inhabitants equipped with an air pollution monitoring network	%	47	43	43	43	39	40
119	Economic impact of natural disasters	%of GNP	0.49	0.28	0.07	0.06	0.06	..
120	Burnt area per year	ha	26352	7394	8513	6644	4876	2825

Table 39. Sustainable development indicators (continued)

SDI No	Title	Unit	2000	2001	2002	2003	2004	2005
124	Percentage of enterprises engaged in "environment certification" processes	%	..	..	..	..	7.7	..
125	Total environmental protection expenditure of governmental organizations as a percent of GDP	%	0.37	0.21	0.20	0.22	0.20	..
127	Number of Agendas 21 adopted by local authorities	Number	..	..	..	..	..	62

Table 39. Sustainable development indicators (continued)

SDI No	Title	Source	Explanatory notes
13	Access to safe drinking water	Turkish Statistical Institute	The percentage of the population who has piped water system inside the dwelling. In this definition, pressured water brought into the dwelling through the use of pipes is called the piped-water system. Waterspout, well, spring, cistern, rain-water accumulation, fountains outside of the dwelling (even if in the courtyard) are not considered as piped-water system. If the piped-water system is brought into the courtyard and is commonly used, then the piped-water system is assumed to exist. TURKSTAT, Household Budget Survey.
19	Loss of agricultural land due to the urbanization	Turkish Statistical Institute	The total arable land and land under permanent crops in 1991 is divided by the area of agricultural land transferred to built-up land during 1991-2001 period. TURKSTAT, 2001 Agricultural Census, Annual Agricultural Statistics.
24	Exploitation index of forest resources	Ministry of Environment and Forestry	
25	Forest and other wooded land: total area	Ministry of Environment and Forestry	
33	Protected coastal area - coastal	Ministry of Environment and Forestry	18900 Natural Park, 16430 Natural Protected Area, 135102 National Park
36	Density of the solid waste disposed in the sea	Turkish Statistical Institute	There is no amount of municipal waste dumped into the sea. TURKSTAT, Municipal Waste Survey.
40	Existence of monitoring programs concerning pollutant inputs	Ministry of Environment and Forestry	Turkish National MED-POL Monitoring Programme (1987-)
52	Share of irrigated agricultural land	Turkish Statistical Institute	The irrigated land is divided by the sum of total arable land and land under permanent crops. TURKSTAT, 2001 Agricultural Census, Village General Information Survey.
63-1-1	Industrial releases into water (manufacturing industry)	Turkish Statistical Institute	Includes untreated wastewater discharges into all water bodies. TURKSTAT, Manufacturing Industry Waste Statistics Survey.
63-1-2	Industrial releases into water (thermal power plants)	Turkish Statistical Institute	Includes untreated wastewater discharges into all water bodies. TURKSTAT, Thermal Power Plants Waste Statistics Survey.
89	Existence of economic tools to recover the water cost in various sectors	Ministry of Environment and Forestry	Turkish National Legislation

Table 39. Sustainable development indicators (continued)

SDI No	Title	Source	Explanatory notes
91-1	Share of industrial wastewater treated on site (manufacturing industry)	Turkish Statistical Institute	These indicators have been calculated by dividing the amount of annual wastewater treated on site to the amount of annual wastewater discharged of industrial sectors. TURKSTAT, Manufacturing Industry Waste Statistics Survey.
91-2	Share of industrial wastewater treated on site (thermal power plants)	Turkish Statistical Institute	These indicators have been calculated by dividing the amount of annual wastewater treated on site to the amount of annual wastewater discharged of thermal power plants. TURKSTAT, Thermal Power Plants Waste Statistics Survey.
96	Number of turtles catched per year	Ministry of Environment and Forestry	This information taken from Assoc.Prof.Dr. Yakup KASKA Pamukkale University.
98-1-1	Percentage of indigenous threatened species - Mammals	Ministry of Environment and Forestry	Data (species + subspecies) is collected from the "Research Project on Vertebrates of Turkey" which was carried out by Hacettepe University in 1999.
98-1-2	Percentage of indigenous threatened species - Birds	Ministry of Environment and Forestry	Data is collected from the updated report on important Birds Areas in Turkey which was published by Nature Society.
98-1-3	Percentage of indigenous threatened species - Reptiles	Ministry of Environment and Forestry	Data (species + subspecies) is collected from the "Research Project on Vertebrates of Turkey" which was carried out by Hacettepe University in 1999.
98-1-4	Percentage of indigenous threatened species - Amphibians	Ministry of Environment and Forestry	Data (species + subspecies) is collected from the "Research Project on Vertebrates of Turkey" which was carried out by Hacettepe University in 2000.
99	Total expenditure of governmental organizations on protected areas management	Turkish Statistical Institute	TURKSTAT, Environmental Employment and Expenditure Survey for the governmental organizations.
100	Generation of municipal solid waste	Turkish Statistical Institute	This indicator has been calculated by dividing the annual amount of generated municipal solid waste to the annual population projections. TURKSTAT, Municipal Solid Waste Statistics Survey.
101-1	Generation of hazardous wastes (manufacturing industry)	Turkish Statistical Institute	TURKSTAT, Manufacturing Industry Waste Statistics Survey.
101-2	Generation of hazardous wastes (thermal power plants)	Turkish Statistical Institute	TURKSTAT, Thermal Power Plants Waste Statistics Survey.

Table 39. Sustainable development indicators (continued)

SDI No	Title	Source	Explanatory notes
103	Generation of industrial solid waste	Turkish Statistical Institute	TURKSTAT, Manufacturing Industry Waste Statistics Survey.
108-1	Destination of municipal waste - Composting	Turkish Statistical Institute	Indicators on composting are calculated by dividing the total amount of composted municipal solid waste by total amount of collected municipal solid waste. TURKSTAT, Municipal Waste Survey.
108-2	Destination of municipal waste - Incineration	Turkish Statistical Institute	Indicators on incineration do not exist since there is no municipal solid waste incineration application in Turkey. TURKSTAT, Municipal Waste Survey.
108-3	Destination of municipal waste - Controlled landfill	Turkish Statistical Institute	Indicators on controlled landfill are calculated by dividing the total amount of municipal solid waste sent to controlled landfills by total amount of collected municipal solid waste. TURKSTAT, Municipal Waste Statistics Survey.
109	Collection rate of household wastes	Turkish Statistical Institute	Indicators on collection rate of household wastes are calculated by dividing the total amount of collected municipal solid waste by total amount of generated municipal solid waste. TURKSTAT, Municipal Waste Statistics Survey.
110	Emissions of greenhouse gases	Turkish Statistical Institute	In calculation of total CH_4 emissions, the value of 1998 is used for 2000 due to lack of data for landfills and CH_4 emissions from coal mining are excluded. TURKSTAT.
111	Emissions of sulphur oxides	Turkish Statistical Institute	The emissions from electricity production are estimated by Electricity Generation Cooperation. SO_2 emissions from Electricity production and industrial processes are included to the national man-made SO_x emissions. TURKSTAT.
112	Emissions of nitrogen oxides	Turkish Statistical Institute	NO_x emissions from fuel consumption by sectors (transport, electricity production, manufacturing industries and others), industrial processes and agricultural activities are included the national man-made NO_x emissions. TURKSTAT.
115-1	Environmental investment expenditure of governmental organizations on air pollution abatement	Turkish Statistical Institute	TURKSTAT, Environmental Employment and Expenditure Survey for the governmental organizations.

Table 39. Sustainable development indicators (continued)

SDI No	Title	Source	Explanatory notes
115-2	Environmental investment expenditure of thermal power plants on air pollution abatement	Turkish Statistical Institute	TURKSTAT, Thermal Power Plants Waste Statistics Survey.
117	Share of agglomerations over 100 000 inhabitants equipped with an air pollution monitoring network	Turkish Statistical Institute	Data are calculated by dividing the number of provincial and district centers over 100 000 inhabitants equipped with at least one measurement station by the number of provincial and district centers over 100 000 inhabitants. TURKSTAT.
119	Economic impact of natural disasters	Turkish Statistical Institute and General Directorate of Disaster Affairs	The expenditure data for natural disasters is taken from the General Directorate of Disaster Affairs and the Gross National Product in purchaser's value in current prices is calculated by TURKSTAT.
120	Burnt area per year	Ministry of Environment and Forestry	
124	Percentage of enterprises engaged in "environment certification" processes	Turkish Statistical Institute	TURKSTAT, Environmental Employment and Expenditure Survey for the governmental organizations.
125	Total environmental protection expenditure of governmental organizations as a percent of GDP	Turkish Statistical Institute	TURKSTAT, Environmental Employment and Expenditure Survey for the governmental organizations.
127	Number of Agendas 21 adopted by local authorities	Ministry of Interior	Data is taken from the list of local authorities prepared by the Ministry of Interior by the end of 2005. It includes metropolitan municipalities, special provincial adminitrations, provincial and district municipalities.

Environmental Indicators

Table 40. Environmental indicators

Title	Unit	2001	2002	2003	2004
Amount of municipal waste per capita	(kg/capita-day)	1.31	1.34	1.38	1.34
Amount of municipal waste per capita (summer)	(kg/capita-day)	1.28	1.32	1.37	1.34
Amount of municipal waste per capita (winter)	(kg/capita-day)	1.32	1.34	1.38	1.33
Amount of water abstracted by municipalities	(liters/capita-day)	252	256	259	260
Amount of wastewater discharged by municipalities	(liters/capita-day)	147	154	173	177
Proportion of population with access to improved sanitation	(%)	..	..	81.4	86.5

Table 40. Environmental indicators (continued)

Title	Source	Explanatory notes
Amount of municipal waste per capita	Turkish Statistical Institute	TURKSTAT, Municipal Waste Statistics Survey.
Amount of municipal waste per capita (summer)	Turkish Statistical Institute	TURKSTAT, Municipal Waste Statistics Survey.
Amount of municipal waste per capita (winter)	Turkish Statistical Institute	TURKSTAT, Municipal Waste Statistics Survey.
Amount of water abstracted by municipalities	Turkish Statistical Institute	TURKSTAT, Municipal Drinking and Using Water Statistics Survey.
Amount of wastewater discharged by municipalities	Turkish Statistical Institute	TURKSTAT, Municipal Wastewater Statistics Survey.
Proportion of population with access to improved sanitation	Turkish Statistical Institute	The percentage of the population who has toilet inside the dwelling. In this definition, toilet is a part of the dwelling surrounded by walls on 4 sides with a separate door, where human excrement and dirty water are emptied into the main sewage canal, swage pipes or a ditch through the use of drainage pipes. TURKSTAT, Household Budget Survey.

ENVIRONMENTAL EMPLOYMENT AND EXPENDITURE OF GOVERNMENTAL ORGANIZATIONS

ENVIRONMENTAL EMPLOYMENT AND EXPENDITURES OF GOVERNMENTAL ORGANIZATIONS

Environmental protection expenditure (EPE) is the money spent on all purposeful activities directly aimed at the prevention, reduction and elimination of pollution or nuisances resulting from production processes or from the consumption of goods and services. For the public sector administrative, monitoring and enforcement expenditures are included. Actions which have a favourable impact on the environment but which serve primarily other goals do not come under environmental protection. Hence, they are excluded from this field.

The scope of environmental protection expenditure is defined according to the Single European Standard Statistical Classification of Environmental Protection Activities (CEPA). Harmonised data with this classification on environmental expenditure have been collected in Turkey since 1997.

CEPA distinguishes nine environmental domains: protection of ambient air and climate; wastewater management; waste management; protection and remediation of soil, groundwater and surface water; noise and vibration abatement; protection of biodiversity and landscape; protection against radiation; research and development; and other environmental protection activities.

The personnel working on environmental activities are called environmental employment. It includes both personnel working on only environmental activities and personnel working on environmental activities besides other activities.

Environmental Protection Expenditure of Governmental Organizations

Environmental employment and expenditure questionnaire of governmental organizations

Data on environmental protection expenditure of the governmental organizations have been compiled by "Environmental Employment and Expenditure Statistics" survey.

In the scope of this study which started in 1997, environmental expenditure data of governmental organizations having environmental activities have been compiled by environmental domain since 1990.

In this survey, postal questionnaires are sent to governmental organizations annually.

The results of the survey have been published as annual news bulletins.

Environmental protection expenditures are classified both by financial variables (investment expenditures, current expenditures) and environmental domains (air, water, wastewater, solid waste etc.).

Studies related to environmental protection expenditures will be developed and enlarged. In this survey data on environmental employment and expenditure of governmental organizations have been enclosed. In addition, compilation and evaluation of data on environmental protection expenditure and employment for industry sector and municipalities is an on going process.

Although water management and energy are not included in CEPA, the expenditure data of these two domains are also collected via the survey as they are environment related domains.

Table 41. Environmental expenditure by environmental domains

(million TL [1])

	1997	1998	1999	2000	2001	2002	2003	2004
Total environmental expenditure	83 499 182	151 283 406	323 629 488	476 471 492	387 164 725	564 126 873	792 783 921	859 120 016
Total current expenditure	20 897 679	35 940 992	85 401 410	121 575 210	161 625 342	163 515 453	219 609 279	320 524 450
Total investment expenditure	62 601 503	115 342 414	238 228 078	354 896 282	225 539 383	400 611 420	573 174 642	538 595 566
Protection of ambient air and climate	13 173 700	124 598	941 431	3 402 528	165 941	124 601	-	-
Water management	32 559 142	73 386 664	115 011 615	160 989 670	198 235 584	195 682 552	147 354 702	111 233 083
Wastewater management	11 676 838	34 218 043	59 391 713	143 470 479	7 211 726	171 367 542	347 727 023	323 693 376
Solid waste management	150	376 515	66 081	2 104	175 004	113 228	3 578 559	109 612
Protection of soil and groundwater	138 617	-	726 000	539 101	92 308	849 178	3 300 957	4 671 428
Noise and vibration abatement	-	-	3 000	-	-	-	-	-
Protection of biodiversity and landscape	214 039	76 512	40 948	150	206 547	389 082	303 059	367 856
Research and development	252 113	53 434	51 560	-	45 000	-	736 185	590 207
Energy	3 100	-	-	-	-	-	-	41 300
Other environmental protection activities [2]	4 094 362	5 331 566	58 438 445	42 904 241	19 407 273	32 085 237	67 737 422	65 169 954
Activities leading to indivisible expenditure [3]	489 442	1 775 082	3 557 285	3 588 009	-	-	2 436 735	32 718 750

Source: Turkish Statistical Institute

(1) The annual average exchange rates are as follows: in 1997 1€ = 171 343 TL, in 1998 1€ = 293 897 TL, in 1999 1€ = 445 677 TL, in 2000 1€ = 573 942 TL, in 2001 1€ = 1 093 683 TL, in 2002 1€ = 1 429 766 TL, in 2003 1€ = 1 685 301 TL, in 2004 1€ = 1 767 686 TL.

(2) Other environmental protection activities include general environmental management, training etc.

(3) Expenditure which is not possible to be separated by environmental domains is included in the activities leading to indivisible expenditure. Expenditure of activities covering especially water, wastewater and solid waster are included together in this part.

Total environmental protection expenditures of governmental organizations increased between 1997 and 2004 regularly, except the decrease in 2001. In the same period, the share of total environmental expenditure by governmental organizations in GDP accounted as maximum in 1999 (3.90%). The share of environmental expenditure for governmental organizations in GDP has been showing variation at the level of 2% since 2001.

As it is seen from the table, total environmental expenditure by governmental organizations amounted to 859 trillion TL and 2.01% of GDP in 2004. While 63% of total environmental expenditure was investment expenditure, 37% of total environmental expenditure was current expenditure.

In 2003 and 2004, the governmental organizations had not indicated any investments on the protection of ambient air and climate. Although investment expenditure on water management had been more than that of wastewater management until 2003, investment expenditure on wastewater management had almost been three fold that of water management since then. In the total investment expenditure, the highest share belonged to wastewater management with the share of 60%, followed by water management with a share of 21%. The rest belonged to all other environmental activities with a share of only 19% in 2004.

Figure 37. Investment expenditures by environmental domain, 2004

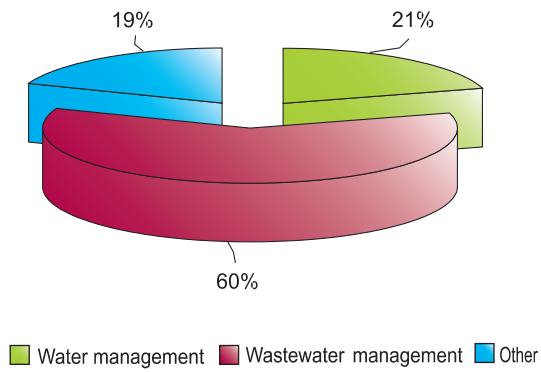
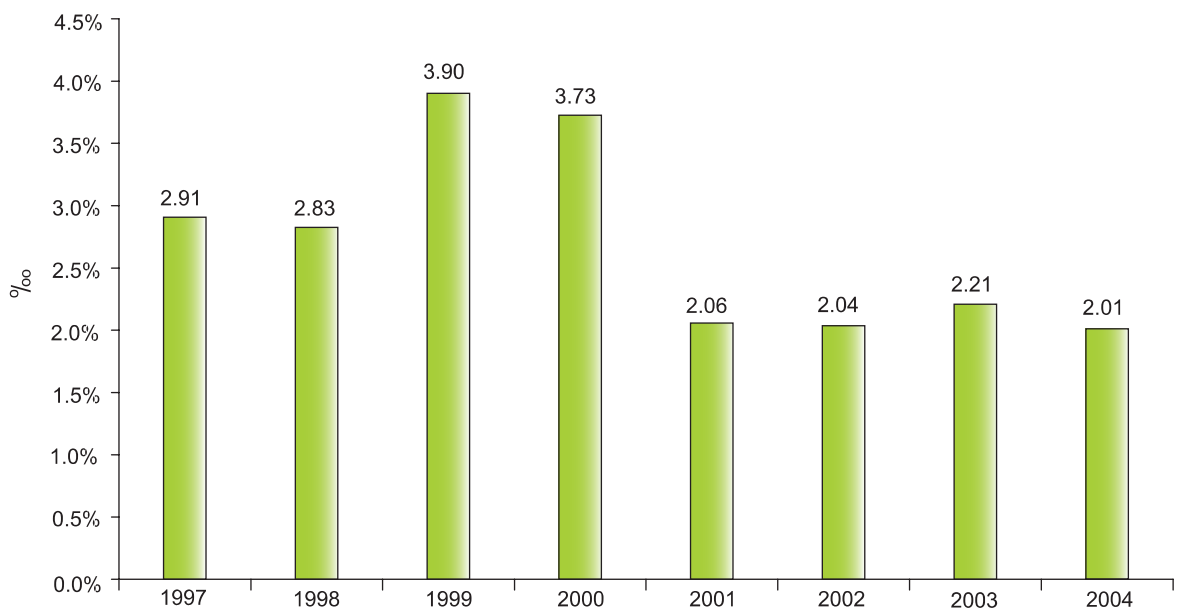


Figure 38. Share of environmental expenditures in gross domestic products for governmental organizations



Environmental Employment of Governmental Organizations

Environmental employment and expenditure questionnaire of governmental organizations

Data on environmental employment of the governmental organizations have been compiled by "Environmental Employment and Expenditure Statistics" survey.

In the scope of this study which started in 1997, environmental employment data of governmental organizations having environmental activities have been compiled.

Although water management and energy are not included in CEPA, the employment data of these two domains are also collected via the survey as they are environment related domains.

According to the survey results, in governmental organizations environmental employment for 2004 is 14186 people. While 87% of environmental employment was working on only environmental activities, 13% of it was working on the other activities of governmental organizations besides environmental activities.

In 2004, 21% of environmental employment was female and 79% was male. The share of university or higher graduates, and high school graduates in 2004 were 37% and 30% respectively.

In terms of qualification, in governmental organizations 27% of total environmental employment was technical personnel, 47% was workers and 26% was administrative personnel in 2004.

Figure 39. Environmental employment in governmental organisations by education level, 2004

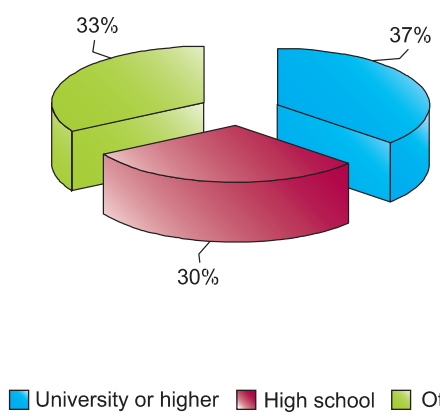


Figure 40. Environmental employment in governmental organisations by qualification, 2004

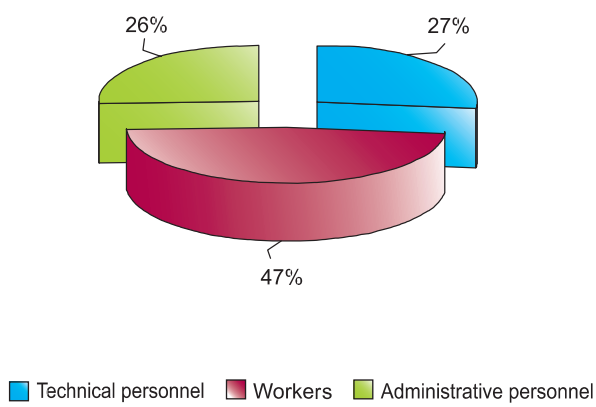


Table 42. Number of personnel working on environmental activities in governmental organizations by education level and qualification

	Total			Education level			Qualification		
	Total	Female	Male	University or higher	High school	Other	Technical personnel	Workers	Administrative personnel
Total environmental employment in 2000	10 309	2 070	8 239	3 879	2 550	3 880	2 841	3 810	3 658
Personnel working on only environmental activities	7 448	1 631	5 817	2 920	1 961	2 567	2 214	2 298	2 936
Personnel working on environmental activities besides other activities	2 861	439	2 422	959	589	1 313	627	1 512	722
Total environmental employment in 2002	11 779	2 362	9 414	4 314	3 012	4 453	3 292	4 932	3 555
Personnel working on only environmental activities	8 455	1 784	6 671	3 006	1 946	3 503	2 462	3 542	2 451
Personnel working on environmental activities besides other activities	3 324	578	2 743	1 308	1 066	950	830	1 390	1 104
Total environmental employment in 2004	14 186	3 044	11 142	5 210	4 236	4 740	3 837	6 704	3 645
Personnel working on only environmental activities	12 335	2 732	9 603	4 308	3 757	4 270	3 077	6 136	3 122
Personnel working on environmental activities besides other activities	1 851	312	1 539	902	479	470	760	568	523

Source: Turkish Statistical Institute

GLOSSARY

AIR POLLUTION

Long Term Limit Value (LTL) is the arithmetic mean of the monitoring results. It should not exceed the value specified in the Air Quality Protection Regulation.

Short Term Limit Value (STL) is the maximum daily average value. It should not exceed 95% of all monitoring results when all monitoring values are listed in their order of magnitude.

Car refers to cars intended for the transport of passengers and seating not more than eight persons (including the driver).

Small truck is the road motor vehicle that is designed to carry goods with a maximum permissible laden weight of 3500 kg.

Truck is the road motor vehicle that is designed to carry goods and exceeding 3500 kg laden weight.

Bus is the road motor vehicle designed for the transport of passengers having at least 15 seats. Trolley buses are also included.

Minibus is passenger road motor vehicle seating between 8 and 14 persons excluding driver.

Motorcycle is two or three wheeled motor vehicles with or without a sidecar.

Other vehicles include special purpose vehicles and road construction and work machinery.

LAND AND FOREST

Agricultural land is the area of agriculture, which includes sown areas, fallow land, vegetable garden, vineyards, areas of fruit trees, areas of olive trees, permanent pastures and meadows and unused and undeveloped potentially productive land.

Arable land is the area, which includes sown areas, fallow land, vegetable gardens and unused and undeveloped potentially productive land.

Land under permanent crops is considered as long lasting green cover, which includes vineyards, areas of olive trees and areas of fruit trees.

Coniferous forest is group of trees that are classified botanically as "Gymnospermae". They are sometimes referred to as "Softwood".

Broadleaved forest is group of trees that are classified botanically as "Angiospermae". They are sometimes referred to as "non-coniferous" or "hardwood".

Forest cover total area is the sum of coniferous forest area and broadleaved forest area. In other words, is the area of total forest cover of Turkey.

Other wooded land either with a tree crown (or equivalent stocking level) of 5 – 10 percent of trees able to reach a height of 5 m at maturity in situ (e.g. dwarf or stunted trees) and shrub and bush cover.

Felling total is average annual standing volume of all trees, living or dead, measured over bark to a minimum diameter breast height of a 0 cm (d.b.h.) that are felled during the given

reference period, including the volume of trees or parts of trees that are not removed from the forest, other wooded land or other felling site.

Gross increment total is average annual volume of increment over the reference period of all trees, measured to a minimum diameter breast height (d.b.h.) of 0 centimeters (cm). Includes the increment on trees, which have been felled or died during the reference period.

Net change is the subtraction of felling total from gross increment for each type and total. Trees on forest total is the standing total volume of trees, which includes the volume available for wood supply and not available for wood supply (for coniferous and broadleaved forest types).

WASTE

Waste refers here to materials that are not prime products (i.e. products produced for the market). Waste may be generated during the extraction of raw materials, during the processing of raw materials into intermediate and final products, during the consumption of final products, and during any other human activity.

Waste disposed of is the amount of waste that is dumped, landfilled, burned, incinerated, composted, etc.

Residuals recycled or reused is the part of the waste that can be reused or recycled at the place of generation (i.e. establishment) are also shown in the table.

Waste sold is the part of the waste that is useless for the generator (i.e. establishment) but can be used by someone else.

Municipal waste is the amount of waste that is collected by or on behalf of the municipalities. It includes waste originating from households, similar waste from commerce and trade, office buildings and institutions.

Controlled landfill is the burial of solid waste on a daily basis in layers compacted and covered with earth. In this method the landfill site should be selected particularly considering many factors. Leachate, rainwater and waste gases should be controlled. Filled sites may be used for recreational purposes.

Incineration is the process of controlled burning or oxidation of combustible waste into innocuous residue, reducing waste volume by 80 to 90 percent.

Composting is a biological process of converting organic materials such as solid waste and sludge into soil conditioners.

Other disposal includes burning in an open area, dumping at sea, lake or river.

WATER RESOURCES AND USES

Public water supply is the system for the collection, transmission, treatment, storage and distribution of water from source to consumers (e.g. to homes, commercial establishments, industry, and public agencies).

Wastewater is the water that is contaminated or of which properties are altered partially or completely as a result of domestic, industrial, agricultural and other activities.

Sewerage network is the system of collectors, pipelines, conduits and pumps to evacuate wastewater (rainwater, domestic and other wastewater) from any of the points of generation

either to a municipal sewage treatment plant or to a point where wastewater is discharged into receiving bodies.

Wastewater treatment is the process to render wastewater fit to meet applicable environmental standards or other quality norms for recycling and reuse.

Public sewage treatment is the treatment of sewage in municipal sewage treatment plants.

Mechanical treatment includes the processes of a physical and mechanical nature, which result in decanted effluents and separate sludge. It involves screening, grit chamber, and sedimentation tank (settling tank or clarifier).

Biological treatment is the processes, which employs aerobic or anaerobic microorganisms and results in decanted effluents and separated sludge containing microbial mass together with pollutants.

Advanced treatment is the process capable of reducing specific constituents in wastewater or sludge not normally achieved by other treatment options. Advanced treatment covers all unit operations, which are not considered to be mechanical or biological, i.e. ion exchange, activated carbon adsorption, reverse osmosis, etc.

ENVIRONMENTAL PROTECTION EXPENDITURES

Current expenditures are the outlays for own production of environmental services and specific goods bought in from the market. For example; operational expenditures of any treatment plant, payments for consultant, etc.

Investment expenditures are the outlays (purchases and own-account production) on land and on additions of new durable goods to the stock of fixed assets for environmental protection expenditures. For example; expenditures for the project designing and constructing end of pipe facilities, which are treatment plants, disposal sites, etc.

NOMENCLATURE OF TERRITORIAL UNITS FOR STATISTICS (NUTS)

Within the accession period of Turkey to the European Union, the Nomenclature of Territorial Units for Statistics (NUTS), that is being used in EU member countries, has been one of the short term priorities in Accession Partnership Document prepared by EU and in National Program prepared by Turkey. Regarding this fact, State Planning Organization and Turkish Statistical Institute have defined Territorial Units for Statistics. The nomenclature has been discussed by the related governmental organizations, then validated by EUROSTAT and finally approved by the Cabinet. The NUTS for Turkey has been declared by the Official Newspaper dated 22 September 2002 and numbered 24884.

Main indicators related with the socio-economic, cultural and geographic structure are considered to define the NUTS 1 and NUTS 2 levels, and 12 NUTS 1 regions and 26 NUTS 2 regions were formed by cluster analysis. The provincial administrative division was considered for NUTS 3 levels, and 81 units were defined.

The NUTS levels are considered for the compilation, development and harmonization of regional statistics, socioeconomic analysis of the regions, and development of regional policies.

STATISTICAL CLASSIFICATION OF ECONOMIC ACTIVITIES IN THE EUROPEAN COMMUNITY

(NACE Rev. 1.1)

The classification of the establishments by type of activity is determined in accordance with the "Statistical Classification of Economic Activities in the European Community (NACE Rev. 1.1)". Manufacturing Industry Classification adapted to the Turkish industrial structure. In cases where the establishments were engaged in more than one type of activity, the major activity was used. The criteria for determining the major activity was the proportion of labor force engaged. When this criteria could not be applied, the major type of activity is determined by the commodity with the highest value of production.